# قسم الهندسة البحرية وعمارة السفن

## ➢ المرفقات:

- توصيف البرنامج.
- مصفوفة البرامج.
- مجالس تبني المعايير الأكاديمية:
  1. مجلس قسم الهندسة البحرية وعمارة السفن لتبني المعايير الأكاديمية NARS 2018 .
  2. اعتماد توصيف البرنامج والمقررات من مجلس القسم.
  3. مجلس الكلية لتبني المعايير الأكاديمية NARS 2018 لكل الأقسام العلمية.
  4. مجلس الجامعة لتبني المعايير لكل الأقسام.
- توصيف المقررات.

# توصيف البرنامج

# Program Specifications of
# Naval Architecture & Marine Engineering Department
# NAME 2020/2021

**University:** Port Said **Faculty:** Engineering, Port-Said

## Program Specifications

## A- Basic Information

1- Programme Title *Naval Architecture and Marine Engineering*

2- Programme Type: Single ☑ Double ☐ Multiple ☐

3- Department (s): *Naval Architecture and Marine Engineering*

4- Coordinator: *Dr Ameen Bassam*

5- External Evaluator(s): **Prof Dr Ahmed Elheewy**

6- Internal Evaluator(s): **Prof Dr Adel Tawfik**

7- Last date of program specifications approval: ***2021***

# B- Professional Information

## 1- Program Aims

Graduates of the Bachelor of Science in the Naval Architecture & Marine Engineering undergraduate program at Port Said University should:

1- Apply a wide spectrum of engineering knowledge of the fundamentals of engineering science, computer applications, mathematics, and physics; and build the ability to apply this knowledge in naval architecture and marine engineering practice.

2- Use techniques, skills, and modern engineering tools necessary for naval architecture and marine engineering practice.

3- Master self-learning and life-long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.

4- Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.

5- Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.

6- Act professionally in design and supervision of naval architecture and marine engineering

7- Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools.

8- Lead, manage, supervise a group of designers, site engineers, supervisors and apply naval architecture and marine engineering principles to meet the International Maritime Organization and classification society's requirements to improve the safety and security of international shipping and to prevent pollution from ships.

## 2- Graduate Attribute with Program Aims

| | Graduate Attributes | Program Aims |
|---|---|---|
| Attributes of Engineers | 1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations;<br>2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation; | 1- Apply knowledge of the fundamentals of engineering science, computer applications, mathematics, and physics; and build the ability to apply this knowledge in naval architecture and marine engineering practice. |
| | 3. Use techniques, skills and modern engineering tools necessary for engineering practice; | 2- Use techniques, skills, and modern engineering tools necessary for naval architecture and marine engineering practice. |

| | | |
|---|---|---|
| | 4.Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner; | 3- Master self-learning and life-long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner. |
| | 5. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post-graduate and research studies; | |
| | 6. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;<br>7.Value the importance of the environment, both physical and natural, and work to promote sustainability principles;<br>8. Behave professionally and adhere to engineering ethics and standards; | 4- Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles. |
| | 9. Demonstrate leadership qualities, business administration and entrepreneurial skills.<br>10.Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance; | 5- Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills. |
| **Attributes of naval architecture and marine engineering** | 10. Act professionally in design and supervision of naval architecture and marine engineering | 6- Act professionally in design and supervision of naval architecture and marine engineering |
| | 11. Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools | 7- Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools |
| | 12. Lead, manage, supervise a group of designers, site engineers, supervisors and apply naval architecture and marine engineering principles to meet the International Maritime Organization and classification society's requirements to improve the safety and security of international shipping and to prevent pollution from ships. | 8- Lead, manage, supervise a group of designers, site engineers, supervisors and apply naval architecture and marine engineering principles to meet the International Maritime Organization and classification society's requirements to improve the safety and security of international shipping and to prevent pollution from ships |

## Competencies / Learning Outcomes (LOs)

## Level A: General

A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A5- Practice research techniques and methods of investigation as an inherent part of learning.

A6- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.

A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9- Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

## Level B: Specialty / MECHANICAL ENGINEERING

B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.

B3- Select conventional mechanical equipment according to the required performance.

B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.

## Level C: Sub-Specialty / Naval Architecture and Marine Engineering

C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors.

C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge.

C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects.

C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures.

C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities.

C6- Carry on specific research topic and develop the appropriate skills to present and defend.

## 3- Benchmarks and Academic Reference Standards

The external references for standards considered in the development of this program are the National Academic Reference Standards for Engineering (NARS 2018) and for Naval Architecture and Marine Engineering Program, the similar program offered by Alexandria University is considered as a benchmark.

## 4- Academic Standards and program Aims

| Competencies | Program Aims |
|---|---|
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | 1- Apply knowledge of the fundamentals of engineering science, computer applications, mathematics, and physics; and build the ability to apply this knowledge in naval architecture and marine engineering practice. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | |

| | |
|---|---|
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | |
| A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | 2- Use techniques, skills, and modern engineering tools necessary for naval architecture and marine engineering practice. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | |
| A5- Practice research techniques and methods of investigation as an inherent part of learning. | 3- Master self-learning and life-long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner. |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | |
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | 4- Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | |

| | |
|---|---|
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | 5- Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills. |
| A9- Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | 6- Act professionally in design and supervision of naval architecture and marine engineering |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | 7- Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | 8- Lead, manage, supervise a group of designers, site engineers, supervisors and apply naval architecture and marine engineering principles to meet the International Maritime Organization and classification society's requirements to improve the safety and security of international shipping and to prevent pollution from ships |
| A6- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | |
| B3- Select conventional mechanical equipment according to the required performance. | |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | |

## 5- Academic Standards and Program LO's

The following table explains how the LO's of the current program compare to the requirements of NARS 2018 for program outcomes and assessment:

| Competencies Level according to NARS | Program LO | Courses related to LO |
|---|---|---|
| A : general | A1 | Mathematics (1); Mechanics (1); Physics (1); Engineering Chemistry Engineering drawing and Projection; Mathematic (2); Mechanics (2) Physics (2); Production Technology; Engineering drawing and Projection; Computer and Programming; Mathematics (3-B); Mechanics (3-B); Drawing of Ships using computers; Principles of Ship Engineering; Mathematics(4-B); Naval Architecture (1); Theory of Ship Structures (1); Thermodynamics; Mathematics (5- B); Naval Architecture (2); Theory of Ship Structures (2); Fluid Mechanics and Marine applications; Numerical Analysis and statistics; Ship Construction (1); Ship Design(1); Ship hydrodynamics; Ship Vibrations and Control; Energy Conservation in Marine Systems; Marine measurements and tests; Marine Power Plants; Design and Dynamics of Small marine crafts; Marine Engineering (2); Propulsion of Marine Units |
| | A2 | Mathematics (1); Mechanics (1); Physics (1);Chemical Engineering; Mathematics (2); Mechanics (2); Physics (2); Production Technology; Princip1es of Ship Engineering; Engineering Metallurgy; Theory of Ship Structures (1); Mathematics(5- B); Fluid Mechanics and Marine applications; Numerical Analysis and statistics; Computational Geometric Modeling Related to Marine Applications; Advanced Marine Engines; New and Renewable Energy; Ship Inspections; Ship Structural Modeling |
| | A3 | Engineering Drawing and Geometric Projection (1); Engineering Drawing and Geometric Projection (2); Computer and Programming; Electrical eng. & electronics; Ship Construction (1); Ship hydrodynamics; Machine Design and Marine systems; Engineering Applications in Marine environment; Ship Construction(2); Ship design (2); Cost accounting of ship building; Ship powering and propulsion; Ship economy and feasibility studies; Marine Engineering (2); Propulsion of Marine Units; Technology of Offshore Units; Construction of special marine units |
| | A4 | Machine Design and Marine systems; Environmental Sciences and occupational Safety; Summer Training (2); Computational Geometric Modeling Related to Marine Applications; Project Management and Risk; Maritime law and insurance; Engineering methods for fighting marine pollution; Ship Production and Quality Control |
| | A5 | Mathematics (3-B); Electrical eng. & electronics; Mathematics(4-B); Thermodynamics; Mathematics(5- B); Marine Diesel Engines; Ship Machinery and auxiliary engines |
| | A6 | Electrical eng. & electronics; Numerical Analysis and statistics; Leadership; Project Management and Risk; Organization & |

| | | |
|---|---|---|
| | | Management of shipyards; Ship Production and Quality Control |
| | A7 | Technical English Language; History of Engineering and technology; Management and Marketing; Engineering Applications in Marine environment; Ship Resistance; Summer Training (2); Leadership; Project(A) |
| | A8 | Chemical Engineering; Engineering Drawing and Geometric Projection (1); Engineering Drawing and Geometric Projection (2); Human Rights; Thinking skills; Technical Report writing; Leadership Presentation skills; Project(A); Project (B) |
| | A9 | History of Engineering and technology; Technical English Language; Human Rights; Mathematics (3-B); Mechanics (3-B); Thinking skills; Mathematics(4-B); Thermodynamics; Summer Training (1); Management and Marketing; Environmental Sciences and occupational Safety; Leadership; Computer applications in Ship Engineering; Organization & Management of shipyards; Presentation skills; Project(A); Project (B) |
| | A10 | History of Engineering and technology; Technical English Language; Computer and Programming; Human Rights; Thinking skills; Technical Report writing; Summer Training (1); Management and Marketing; Ship hydrodynamics; Engineering Applications in Marine environment; Summer Training (2); Ship economy and feasibility studies; Project(A); Maritime law and insurance; Technology of Offshore Units; Construction of special marine units; Project (B) |
| Level B<br>Mechanical Engineering | B1 | Mathematics (3-B)<br>Drawing of Ships using computers<br>Princip1es of Ship Engineering; Engineering Metallurgy; Mathematics(4-B); Naval Architecture(1); Manufacturing and Shipbuilding; Theory of Ship Structures (1); Mechanics and Theory of Machines; Thermodynamics; Mathematics(5- B); Naval Architecture(2); Ship Structural Analysis (2); Fluid Mechanics and Marine applications; Ship Resistance; Ship Vibrations and Control; Energy Conservation in Marine Systems; Computational Geometric Modeling Related to Marine Applications; Marine Diesel Engines ; Ship powering and propulsion; Marine measurements and tests; Marine Power Plants; Design and Dynamics of Small marine crafts; Heat transfer, refrigeration &air conditioning; Ship Machinery and auxiliary engines; Ship performance; Marine Engineering (2) ; Propulsion of Marine Units; Technology of Offshore Units; Construction of special marine units; Ship Structural Design; Engineering methods for fighting marine pollution; Advanced Marine Engines; New and Renewable Energy |
| | B2 | Drawing of Ships using computers; Princip1es of Ship Engineering; Engineering Metallurgy; Mechanics and Theory of Machines; Thermodynamics; Marine Engineering(1); Summer Training (1); Ship Design(1); Ship hydrodynamics; Ship Construction(2); Ship design (2); Ship Vibrations and Control; Energy Conservation in Marine Systems; Computational Geometric Modeling Related to |

| | | |
|---|---|---|
| | | Marine Applications; Marine measurements and tests; ;Marine Power Plants'; Organization & Management of shipyards; Heat transfer, refrigeration &air conditioning; Marine Engineering (2); Technology of Offshore Units; Construction of special marine units |
| | B3 | Marine Engineering(1); Numerical Analysis and statistics; Machine Design and Marine systems; Ship Resistance; Ship Vibrations and Control; Energy Conservation in Marine Systems; Marine Diesel Engines; Marine Power Plants; Organization & Management of shipyards; Heat transfer, refrigeration &air conditioning; Ship Machinery and auxiliary engines; Marine Engineering (2); Ship Outfittings; Ship Structural Modeling |
| | B4 | Naval Architecture(1); Naval Architecture(2); Marine Engineering(1); Ship Design(1); Ship design (2); Cost accounting of ship building; Summer Training (2); Technology of Ship Repair & Conversion; Ship powering and propulsion; Heat transfer, refrigeration &air conditioning; Ship economy and feasibility studies; Maritime law and insurance; Propulsion of Marine Units; Ship Outfittings; Engineering methods for fighting marine pollution; Ship Production and Quality Control; Ship Inspections |
| Level C<br>Naval Architecture and Marine Engineering | C1 | Marine Engineering(1); Theory of ship structures (2); Summer Training (1); Ship Construction (1); Ship Design(1); Ship hydrodynamics; Ship Construction(2); Ship design (2); Ship Resistance; Ship Vibrations and Control; Energy Conservation in Marine Systems; Computational Geometric Modeling Related to Marine Applications; Computer applications in Ship Engineering; Marine Diesel Engines; Ship powering and propulsion; Marine measurements and tests; Marine Power Plants; Project Management and Risk; Design and Dynamics of Small marine crafts; Ship economy and feasibility studies; Ship Machinery and auxiliary engines; Ship performance; Project(A); Marine Engineering (2); Technology of Offshore Units; Construction of special marine units; Ship Outfittings; Ship Structural Design; Engineering methods for fighting marine pollution; Project (B);Advanced Marine Engines; New and Renewable Energy; Ship Structural Modeling |
| | C2 | Naval Architecture(1); Naval Architecture(2); Marine Engineering(1); Fluid Mechanics and Marine applications; Ship hydrodynamics; Machine Design and Marine systems; Ship Resistance; Computational Geometric Modeling Related to Marine Applications; Computer applications in Ship Engineering; Design and Dynamics of Small marine crafts; Ship performance; Project(A); Marine Engineering (2); Propulsion of Marine Units; Technology of Offshore Units; Construction of special marine units; Ship Structural Design; Project (B); Advanced Marine Engines; New and Renewable Energy; Ship Inspections; Ship Structural Modeling |
| | C3 | Manufacturing and Shipbuilding; Ship Construction (1); Ship Construction(2); Cost accounting of ship building; Summer Training (2); Technology of Ship Repair & Conversion; Project Management and Risk; Organization & Management of shipyards; Project (A); Ship Structural Design; Ship Production and Quality Control; Project (B) |
| | C4 | Manufacturing and Shipbuilding; Summer Training (2); Technology of Ship Repair & Conversion; Marine Diesel Engines; Ship powering |

| | | |
|---|---|---|
| | | and propulsion; Organization & Management of shipyards; Ship Machinery and auxiliary engines; Ship performance; Ship Outfittings; Advanced Marine Engines; New and Renewable Energy; Ship Structural Modeling |
| | C5 | Naval Architecture(1); Naval Architecture(2); Technology of Ship Repair & Conversion; Ship performance; Project(A); Propulsion of Marine Units; Ship Outfittings; Engineering methods for fighting marine pollution; Project (B); Ship Inspections |
| | C6 | Princip1es of Ship Engineering; Marine Engineering(1); Ship Resistance; Ship Vibrations and Control; Ship powering and propulsion; Ship economy and feasibility studies; Ship performance; Project(A); Engineering methods for fighting marine pollution; Ship Production and Quality Control |

## 6- Curriculum Structure and Contents

### 4. a- Program duration (5 years)

Program duration (5 years): 1 preparatory year + 4 specialized years

### 4. b- Program structure

4. b.i See Table

| **Year** | **No. hours/week** | | | | **Total /week** | **Average hours/week** | |
|---|---|---|---|---|---|---|---|
| | **First Term 15 weeks** | | **Second Term 15 weeks** | | | | |
| | **Lecture** | **Exerc./ Lab.** | **Lecture** | **Exerc./ Lab.** | Hr | **Lecture** | **Exerc./ Lab.** |
| Preparatory | 13 | 11 | 13 | 13 | 50 | 13 | 12 |
| First | 14 | 11 | 14 | 11 | 50 | 14 | 11 |
| Second | 12 | 13 | 14 | 11 | 50 | 13 | 12 |
| Third | 12 | 12 | 14 | 12 | 50 | 13 | 12 |
| Fourth | 10 | 14 | 10 | 16 | 50 | 10 | 15 |
| Total | **61** | **61** | **65** | **63** | 250 | 63 | 62 |

4.b.ii No. of hours per week (Third): Compulsory 21 Elective 4 Optional ---

(Fourth): Compulsory 21 Elective 4 Optional---

| Year | Humanities and Social Sciences | | Mathematics and basic sciences | | Basic Engineering sciences | | Applied Engineering and Design | | Computer Applications and ICT | | Projects and Practice | | Discretionary subjects | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st term | 2nd term | 1st term | 2nd term | 1st term | 2nd term | 1st term | 2nd term | 1st term | 2nd term | 1st term | 2nd term | 1st term | 2nd term | |
| Preparatory | 4 | 2 | 16 | 14 | 4 | 4 | - | - | - | 4 | - | - | - | 2 | **50** |
| First year | 2 | 2 | 8 | 4 | 5 | 5 | 8 | 8 | 4 | 2 | - | - | 2 | - | **50** |
| Second year | 2 | 4 | 4 | 4 | 5 | 5 | 7 | 6 | 2 | 1 | 2 | 2 | 3 | 3 | **50** |
| Third year | 2 | 2 | - | - | 5 | 5 | 8 | 6 | 5 | 4 | 2 | 5 | 3 | 3 | **50** |
| Fourth year | 4 | - | - | - | 6 | 6 | 6 | 6 | 2 | 2 | 7 | 7 | 2 | 2 | **50** |
| Total | 14 | 10 | 28 | 22 | 25 | 25 | 29 | 26 | 13 | 13 | 11 | 14 | 10 | 10 | **250** |
| **%** | **9.6** | | **20** | | **20** | | **22** | | **10.4** | | **10** | | **8** | | **100** |

4.b.iii Practical/Field Training:

Summer Training (1) [engineering drawing] – after the first year (4weeks),
Summer Training (2) [Field training] - after the second year (8weeks).

## 7- Program Courses

### 5.1 Preparatory (First Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program LOs Covered (By No.) |
|---|---|---|---|---|---|
| | | Lect. | Exer. | Lab. | |
| SCI 001 | Mathematics (1) | 4 | 2 | - | A1; A2 |
| SCI 002 | Mechanics (1) | 2 | 2 | - | A1; A2 |
| SCI 003 | Physics (1) | 4 | - | 2 | A1; A2 |
| SCI 004 | Engineering Chemistry | 4 | - | 2 | A1; A2; A8 |
| PRD 002 | Engineering drawing and Projection | 1 | 3 | - | A1; A3; A8 |
| HUF 001 | Technical English Language | - | 2 | - | A7; A9; A10 |
| HUU001 | History of Engineering and Technology | 2 | - | - | A8; A9; A10 |

**b- Elective – (None)**

**c- Optional – (None)**

## 5.2 Preparatory (Second Term)

### a. Compulsory

| Code No. | Course Title | No. of hours /week | | | Program ILOs Covered (By No.) |
|---|---|---|---|---|---|
| | | Lect. | Exer. | Lab. | |
| SCI 005 | Mathematic (2) | 4 | 2 | - | A1; A2 |
| SCI 006 | Mechanics (2) | 2 | 2 | - | A1; A2 |
| SCI 007 | Physics (2) | 4 | - | 2 | A1; A2 |
| PRD 001 | Production Technology | 2 | - | 4 | A1; A2; A4 |
| PRD 002 | Engineering drawing and Projection | 1 | 3 | - | A1; A3; A8 |
| CCE 001 | Computer and Programming | 2 | - | 2 | A1; A3; A10 |
| HUU002 | Human Rights | 2 | - | - | A8; A9; A10 |

**b- Elective – (None)**

**c- Optional – (None)**

## 5.3- First Year (First Term)

### a. Compulsory

| Code No. | Course Title | No. of hours /week | | | Programme ILO's covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Exer. | Lab. | |
| SCI 109 | Mathematics (3-B) | 2 | 2 | - | A1; A5; A9; B1 |
| SCI 113 | Mechanics (3-B) | 2 | 2 | - | A1; A2 |
| NME101 | Drawing of Ships using computers | 2 | 1 | 1 | A1; B1; B2 |
| NME102 | Principles of Ship Engineering | 2 | 1 | 1 | A1; A2; B1; B2; C6 |
| PRD110 | Engineering Metallurgy | 2 | - | 1 | A2; A4; B1; B2 |
| EPM104 | Electrical eng. & electronics | 2 | 1 | 1 | A3; A4; A5; A6 |
| HUU103 | Thinking skills | 2 | - | - | A8; A9; A10 |

**b- Elective – (None)**

**c- Optional – (None)**

### 5.4 – First Year (Second Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program ILO's covered (by No.) |
|---|---|---|---|---|---|
| | | Lec. | Exer. | Lab. | |
| SCI 119 | Mathematics(4-B) | 2 | 2 | - | A1; A5; A9; B1 |
| NME103 | Naval Architecture(1) | 2 | 1 | 1 | A1; B1; B4; C2; C5 |
| NME 104 | Manufacturing and Shipbuilding | 2 | 1 | 1 | A4; A7; B1; C3; C4 |
| NME105 | Theory of Ship Structures (1) | 2 | 2 | - | A1; A2; B1 |
| PRD 111 | Mechanics and Theory of Machines | 2 | 1 | - | A2; A4; B1; B2 |
| MPE 105 | Thermodynamics | 2 | 1 | 1 | A1; A5; A9; B1; B2 |
| HUF 102 | Technical Report writing | 2 | - | - | A8; A10 |

**b- Elective – (None)**

**c- Optional – (None)**

### 5.5 – Second Year (First Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program ILO's covered (by No.) |
|---|---|---|---|---|---|
| | | Lec. | Exer. | Lab. | |
| SCI 227 | Mathematics(5- B) | 2 | 2 | - | A1; A2; A10; B2 |
| NME 206 | Naval Architecture(2) | 2 | 1 | 1 | A1; B1; B4; C2; C5 |
| NME207 | Marine Engineering(1) | 2 | 1 | 1 | B2; B3; B4; C1; C2; C6 |
| NME 208 | Ship Structural Analysis (2) | 2 | 2 | 1 | A1; A4; B1; C1 |
| NME209 | Fluid Mechanics and Marine applications | 2 | 1 | 1 | A1; A2; B1; C2 |
| NME210 | Summer Training (1) | - | 2 | - | A9; A10; B2; C1 |
| HUU 204 | Management and Marketing | 2 | - | - | A7; A9; A10 |

**b- Elective – (None)**

**c- Optional – (None)**

### 5.6 – Second Year (Second Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program ILOs covered (by No.) |
|---|---|---|---|---|---|
| | | Lec. | Exer. | Lab. | |
| SCI 228 | Numerical Analysis and statistics | 2 | 2 | - | A1; A2; A6; B3 |
| NME211 | Ship Construction (1) | 2 | 2 | 1 | A1; A3; C1; C3 |
| NME212 | Ship Design(1) | 2 | 2 | - | A1; B2; B4; C1 |
| NME213 | Ship hydrodynamics | 2 | 1 | 1 | A1; A3; A10; B2; C1; C2 |
| PRD 222 | Machine Design and Marine systems | 2 | 2 | - | A3; A4; B3; C2 |
| HUF 203 | Engineering Applications in Marine environment | 2 | - | - | A3, A7; A10 |
| HUF 204 | Environmental Sciences and occupational Safety | 2 | - | - | A4; A8; A9 |

**b- Elective – (None)**

**a- Optional – (None)**

### 5.7 –Third Year (First Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program ILO's covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer | |
| NME314 | Ship Construction(2) | 2 | 1 | 1 | A3; B2; C1; C3 |
| NME315 | Ship design (2) | 2 | 2 | - | A3; B2; B4; C1 |
| NME316 | Cost accounting of ship building | 2 | 2 | - | A3; B4; C3 |
| NME317 | Ship Resistance | 2 | 1 | 1 | A7; B1; B3; C1; C2; C6 |
| NME 318 | Summer Training (2) | - | - | 2 | A4; A7; A10; B4; C3; C4 |
| NME32x | Elective (1) | 2 | 2 | - | *Following table* |
| HUU 305 | Leadership | 2 | - | - | A6; A7; A8; A9 |

**b- Elective (1) – (choose one according to the group selected by the student)**

| Code No. | Course Title | No. of hours /week | | | Program ILO's Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME323 | Ship Vibrations and Control | 2 | 0 | 2 | A1; B1; B2; B3; C1; C6 |
| NME 324 | Energy Conservation in Marine Systems | 2 | 0 | 2 | A1; B1; B2; B3; C1; C2 |
| NME325 | Computational Geometric Modeling Related to Marine Applications | 2 | 0 | 2 | A2; A4; B1; B2; C1; C2 |
| NME 326 | Technology of Ship Repair & Conversion | 2 | 0 | 2 | B4; C3; C4; C5 |

**c- Optional – (None)**

### 5.8 – Third Year (Second Term)

**a. Compulsory**

| Code No. | Course Title | No. of hours /week | | | Program ILO's Covered (by No.) |
|---|---|---|---|---|---|
| | | Lec. | Lab. | Exer | |
| NME319 | Computer applications in Ship Engineering | 2 | - | 2 | A9; B2; C1; C2 |
| NME320 | Marine Diesel Engines | 2 | 1 | 1 | A5; B1;B2; B3; C1; C4 |
| NME321 | Ship powering and propulsion | 2 | 1 | 1 | A3; B1; B4; C1; C4; C6 |
| NME322 | Marine measurements and tests | 2 | - | 2 | A1; B1; B2; C1 |
| NME 3xx | Elective (2) | 2 | 2 | - | *Following table* |
| MPE334 | Heat transfer, refrigeration &air conditioning | 2 | 1 | 1 | B1; B2; B3; B4 |
| HUF 305 | Presentation skills | 2 | - | - | A8; A9 |

**b- Elective (2) – (one course is specified according to the group previously selected)**

| Code No. | Course Title | No. of hours /week | | | Program ILO's Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME 327 | Marine Power Plants | 2 | 0 | 2 | A1; B1; B2; B3; C1 |
| NME 328 | Project Management and Risk | 2 | 0 | 2 | A4; A6; C1; C3 |
| NME 329 | Design and Dynamics of Small marine crafts | 2 | 0 | 2 | A1; B1; C1; C2 |
| NME 330 | Organization & Management of shipyards | 2 | 0 | 2 | A6; A9; B2; B3; C3; C4 |

**c- Optional – (None)**

## 5.9 – Fourth Year (First Term)

### a. Compulsory

| Code No. | Course Title | No. of hours /week | | | Program ILO's Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME431 | Ship economy and feasibility studies | 2 | 2 | - | A3; A10; B4; C1; C6 |
| NME432 | Ship Machinery and auxiliary engines | 2 | 2 | 1 | A5; B1; B3; C1; C4 |
| NME433 | Ship performance | 2 | 1 | 1 | B1; C1; C2; C4; C5; C6 |
| NME 44x | Elective (3) | 2 | 2 | - | *Following table* |
| NME434 | Project(A) | - | - | 5 | A7; A8; A9; C1; C2; C3; C5; C6 |
| HUD 401 | Maritime law and insurance | 2 | - | - | A4; A10; B4 |

**b- Elective (3) – (one course is specified according to the group previously selected)**

| Code No. | Course Title | No. of hours /week | | | Program ILOs Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME440 | Marine Engineering (2) | 2 | 0 | 2 | A1; B1; B2; B3; C1; C2 |
| NME441 | Propulsion of Marine Units | 2 | 0 | 2 | A1; B1; B4; C2; C5 |
| NME 442 | Technology of Offshore Units | 2 | 0 | 2 | A3; A10; B1; B2; C1; C2 |
| NME443 | Construction of special marine units | 2 | 0 | 2 | A3; A10; B1; B2; C1; C2 |

**c- Optional – (None)**

## 5.10 –Fourth Year (Second Term)

### a. Compulsory

| Code No. | Course Title | No. of hours /week | | | Program ILO's Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME435 | Ship Outfittings | 2 | 2 | 0 | B3; B4; C1; C4; C5 |
| NME436 | Ship Structural Design | 2 | 2 | 1 | B1; C1; C2; C3 |
| NME437 | Engineering methods for fighting marine pollution | 2 | 2 | 0 | A4; B1; B4; C1; C5; C6 |
| NME438 | Ship Production and Quality Control | 2 | 1 | 1 | A4; A6; B4; C3; C6 |
| NME 439 | Project (B) | 0 | 0 | 5 | A7; A8; A9; C1; C2; C3; C5 |
| NME44x | Elective (4) | 2 | 2 | 0 | |

### b- Elective (4) - (one course is specified according to the group previously selected)

| Code No. | Course Title | No. of hours /week | | | Program ILOs Covered (by No.) |
|---|---|---|---|---|---|
| | | Lect. | Lab. | Exer. | |
| NME444 | **Advanced Marine Engines** | 2 | 0 | 2 | A2; B1; C1; C2; C4 |
| NME445 | **New and Renewable Energy** | 2 | 0 | 2 | A2; B1; C1; C2; C4 |
| NME446 | **Ship Inspections** | 2 | 0 | 2 | A2; B4; C2; C5 |
| NME447 | **Ship Structural Modeling** | 2 | 0 | 2 | A2; B3; C1; C2; C4 |

### c- Optional – (None)

**6- Teaching and Learning Method:**

| Course code | Course name | Teaching and Learning Method: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Presentation and Movies | Discussion | Tutorial | Problem solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Discovering | Modelling | Playing |
| SCI 109 | Mathematics (3-B) | | | | | | | | | | | | | |
| SCI 113 | Mechanics (3-B) | | | | | | | | | | | | | |
| NME101 | Drawing of Ships using computers | X | | | X | | | | | | | | | |
| NME102 | Princip1es of Ship Engineering | X | X | X | X | X | | | | | X | | | |
| PRD110 | Engineering Metallurgy | X | | | X | X | | | | X | | | | |
| EPM104 | Electrical eng. & electronics | | | | | | | | | | | | | |
| HUU103 | Thinking skills | X | X | | | | | | | | | | | |
| HUF 102 | Technical report writing | X | X | | | | | | | | | | | |
| SCI 119 | Mathematics(4-B) | | | | | | | | | | | | | |
| NME103 | Naval Architecture(1) | X | | | X | X | | X | | | | | | |
| NME 104 | Manufacturing and Shipbuilding | X | | | X | | | X | | X | X | | | |
| NME105 | Ship Structural Analysis(1) | X | | | X | X | X | X | | | | X | | |
| PRD 111 | Mechanics and Theory of Machines | X | | X | | X | | | | | | | | X |
| MPE 105 | Thermodynamics | X | X | X | X | X | X | X | X | X | X | | | |
| HUF 102 | Technical Report writing | | | | | | | | | | | | | |
| SCI 227 | Mathematics(5- B) | | | | | | | | | | | | | |
| NME 206 | Naval Architecture(2) | X | | X | X | X | | X | | | X | | | |
| NME207 | Marine Engineering(1) | X | X | X | X | X | X | | | | | | | |
| NME 208 | Ship Structural Analysis | X | | X | X | X | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (2) | | | | | | | | | | | | | |
| NME209 | Fluid Mechanics and Marine applications | **X** | | | **X** | **X** | | | | | | | | |
| NME210 | Summer Training (1) | | | | **X** | | | | | | | | | |
| HUU 204 | Management and Marketing | | | | | | | | | | | | | |
| SCI 228 | Numerical Analysis and statistics | | | | | | | | | | | | | |
| NME211 | Ship Construction (1) | **X** | **X** | **X** | **X** | **X** | | **X** | **X** | **X** | | | | |
| NME212 | Ship Design(1) | **X** | | | **X** | **X** | | | | | | | | |
| NME213 | Ship hydrodynamics | **X** | | | **X** | **X** | | | | | | | | |
| PRD 222 | Machine Design and Marine systems | **X** | **X** | **X** | **X** | **X** | **X** | | | | **X** | | | |
| HUF 203 | Engineering Applications in Marine environment | **X** | **X** | **X** | | **X** | | **X** | | **X** | | | | |
| HUF 204 | Environmental Sciences and occupational Safety | | | | | | | | | | | | | |
| NME314 | Ship Construction(2) | **X** | **X** | **X** | **X** | | | | **X** | **X** | **X** | | | |
| NME315 | Ship design (2) | **X** | | **X** | **X** | **X** | | **X** | | **X** | **X** | | | |
| NME316 | Cost accounting of ship building | **X** | | | **X** | **X** | | | | | | | | |
| NME317 | Ship Resistance | **X** | **X** | **X** | **X** | **X** | | | | | **X** | | | |
| NME 318 | Summer Training (2) | | | | | | | | **X** | | **X** | | | |
| NME323 | Ship Vibrations and Control | **X** | **X** | **X** | | **X** | **X** | | | **X** | | **X** | **X** | |
| NME 324 | Energy Conservation in Marine Systems | **X** | | | **X** | **X** | **X** | **X** | | | | **X** | | |
| NME325 | Computational Geometric Modeling Related to Marine Applications | **X** | | **X** | **X** | **X** | | **X** | | | **X** | | | |
| NME 326 | Technology of Ship Repair & Conversion | **X** | | | **X** | **X** | | **X** | **X** | **X** | **X** | | | |
| HUU 305 | Leadership | **X** | **X** | **X** | | **X** | **X** | **X** | **X** | **X** | **X** | | | |
| NME319 | Computer applications in Ship Engineering | **X** | | **X** | **X** | **X** | | | | | | | | |
| NME320 | Marine Diesel Engines | **X** | **X** | **X** | **X** | **X** | | **X** | **X** | **X** | | | **X** | |
| NME321 | Ship powering and propulsion | **X** | **X** | | **X** | **X** | **X** | **X** | | **X** | | | | |
| NME322 | Marine measurements and tests | **X** | **X** | | **X** | | | | | **X** | | | | |
| NME 327 | Marine Power Plants | **X** | **X** | | | | | | | **X** | | | | |
| NME 328 | Project Management and Risk | **X** | | | | **X** | **X** | | | | | | | |
| NME 329 | Design and Dynamics of | **X** | | | **X** | **X** | | **X** | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Small marine crafts | | | | | | | | | | | | | |
| NME 330 | Organization & Management of shipyards | X | | | X | X | | | X | X | X | | | |
| MPE334 | Heat transfer, refrigeration &air conditioning | | | | | | | | | | | | | |
| HUF 305 | Presentation skills | X | X | | | | | | | | | | | |
| NME431 | Ship economy and feasibility studies | X | | | X | X | | X | | | | | | |
| NME432 | Ship Machinery and auxiliary engines | X | X | X | X | | X | X | | X | | | | |
| NME433 | Ship performance | X | X | X | X | X | | | | | | | | |
| NME434 | Project(A) | | | | | | X | X | X | X | X | X | | |
| HUD 401 | Maritime law and insurance | | | | | | | | | | | | | |
| NME440 | Marine Engineering (2) | X | X | X | X | X | X | | | | | | | |
| NME441 | Propulsion of Marine Units | X | X | X | X | X | X | | | X | | | | |
| NME 442 | Technology of Offshore Units | X | | X | X | X | | X | | | X | | | |
| NME443 | Construction of special marine units | X | X | X | X | X | | X | X | X | X | X | | |
| NME435 | Ship Outfittings | X | X | X | X | | | | X | X | | | | |
| NME436 | Ship Structural Design | X | X | X | X | X | | X | | | | | | |
| NME437 | Engineering methods for fighting marine pollution | X | X | X | X | | | | | X | X | | | |
| NME438 | Ship Production and Quality Control | X | X | X | X | | | | X | X | X | | | |
| NME 439 | Project (B) | | | X | | | X | X | X | X | X | X | X | |
| NME444 | Advanced Marine Engines | X | X | X | X | X | | X | X | X | | | X | |
| NME445 | New and Renewable Energy | X | X | | | | | | | X | | | | |
| NME446 | Ship Survey | X | | | X | X | | X | X | X | | | | |
| NME447 | Ship Structural Modeling | X | X | X | X | X | | X | | | | X | | |

## 7- Assessment Method

| Course code | Course name | Assessment Method: | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Written Exam | Oral Exam | Tutorial Assessment | Project Assessment | Model Assessment | Report Assessment | Quiz assessment | Presentation Assessment | Discussion | Laboratory Test | Home Exam | Monitoring |
| SCI 109 | Mathematics (3-B) | | | | | | | | | | | | |
| SCI 113 | Mechanics (3-B) | | | | | | | | | | | | |
| NME101 | Drawing of Ships using computers | | | X | | | | | | | | | |
| NME102 | Princip1es of Ship Engineering | X | X | X | | | X | X | X | X | | | |
| PRD110 | Engineering Metallurgy | X | X | X | | | X | X | | X | | | |
| EPM104 | Electrical eng. & electronics | | | | | | | | | | | | |
| HUF 102 | Technical report writing | X | | | | | | X | | | | | |
| HUU103 | Thinking skills | X | | | | | | X | | | | | |
| SCI 119 | Mathematics(4-B) | | | | | | | | | | | | |
| NME103 | Naval Architecture(1) | X | | X | | | X | | X | | | | |
| NME 104 | Manufacturing and Shipbuilding | X | X | X | | | X | | X | | | | |
| NME105 | Ship Structural Analysis(1) | X | | X | | | X | X | | X | | | |
| PRD 111 | Mechanics and Theory of Machines | X | | | X | | X | X | | X | | | |
| MPE 105 | Thermodynamics | X | X | X | X | | X | X | X | X | X | | |
| HUF 102 | Technical Report writing | | | | | | | | | | | | |
| SCI 227 | Mathematics(5- B) | | | | | | | | | | | | |
| NME 206 | Naval Architecture(2) | X | X | X | | | X | X | | X | | | |
| NME207 | Marine Engineering(1) | X | X | X | | | X | X | | X | | | |
| NME 208 | Ship Structural Analysis | X | | X | | | X | X | | X | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | (2) |  |  |  |  |  |  |  |  |  |  |  |  |
| NME209 | Fluid Mechanics and Marine applications | **X** |  | **X** |  |  | **X** | **X** |  |  | **X** |  |  |
| NME210 | Summer Training (1) |  |  | **X** |  |  |  |  |  |  |  |  |  |
| HUU 204 | Management and Marketing |  |  |  |  |  |  |  |  |  |  |  |  |
| SCI 228 | Numerical Analysis and statistics |  |  |  |  |  |  |  |  |  |  |  |  |
| NME211 | Ship Construction (1) | **X** |  | **X** | **X** |  | **X** | **X** | **X** | **X** | **X** |  | **X** |
| NME212 | Ship Design(1) | **X** |  | **X** |  |  | **X** | **X** |  |  |  |  |  |
| NME213 | Ship hydrodynamics | **X** | **X** | **X** |  |  |  |  |  |  |  |  |  |
| PRD 222 | Machine Design and Marine systems | **X** |  |  |  |  |  | **X** |  | **X** |  |  |  |
| HUF 203 | Engineering Applications in Marine environment | **X** |  |  |  |  |  | **X** |  | **X** |  |  |  |
| HUF 204 | Environmental Sciences and occupational Safety |  |  |  |  |  |  |  |  |  |  |  |  |
| NME314 | Ship Construction(2) | **X** | **X** | **X** |  |  | **X** |  |  | **X** |  |  |  |
| NME315 | Ship design (2) | **X** |  | **X** | **X** |  | **X** |  |  |  |  |  |  |
| NME316 | Cost accounting of ship building | **X** |  | **X** |  | **X** | **X** |  |  |  |  |  |  |
| NME317 | Ship Resistance | **X** | **X** | **X** |  |  | **X** | **X** | **X** |  |  |  |  |
| NME 318 | Summer Training (2) |  |  |  |  |  |  |  | **X** | **X** |  |  | **X** |
| NME323 | Ship Vibrations and Control | **X** |  |  |  | **X** | **X** | **X** | **X** | **X** |  |  |  |
| NME 324 | Energy Conservation in Marine Systems | **X** |  | **X** |  |  | **X** | **X** |  | **X** |  |  | **X** |
| NME325 | Computational Geometric Modeling Related to Marine Applications | **X** | **X** | **X** |  |  | **X** | **X** | **X** | **X** |  |  |  |
| NME 326 | Technology of Ship Repair & Conversion | **X** |  | **X** |  |  | **X** | **X** |  | **X** |  |  |  |
| HUU 305 | Leadership | **X** | **X** |  |  |  | **X** | **X** | **X** | **X** |  |  |  |
| NME319 | Computer applications in Ship Engineering | **X** |  | **X** |  |  |  | **X** |  |  | **X** |  |  |
| NME320 | Marine Diesel Engines | **X** | **X** | **X** |  |  | **X** |  |  | **X** |  | **X** |  |
| NME321 | Ship powering and propulsion | **X** | **X** | **X** |  |  | **X** |  | **X** | **X** |  |  |  |
| NME322 | Marine measurements and tests | **X** | **X** |  |  |  | **X** | **X** | **X** |  |  |  |  |
| NME 327 | Marine Power Plants | **X** | **X** |  |  |  | **X** | **X** | **X** |  |  |  |  |
| NME 328 | Project Management and Risk | **X** |  |  |  |  |  | **X** |  | **X** |  |  |  |
| NME 329 | Design and Dynamics of | **X** |  | **X** |  |  | **X** |  | **X** |  |  |  |  |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Small marine crafts | | | | | | | | | | | | |
| NME 330 | Organization & Management of shipyards | **X** | **X** | **X** | | | **X** | | | **X** | | | |
| MPE334 | Heat transfer, refrigeration &air conditioning | | | | | | | | | | | | |
| HUF 305 | Presentation skills | **X** | | | | | | **X** | | | | | |
| NME431 | Ship economy and feasibility studies | **X** | | **X** | **X** | | | | **X** | | | | |
| NME432 | Ship Machinery and auxiliary engines | **X** | **X** | **X** | | | **X** | **X** | | **X** | | **X** | |
| NME433 | Ship performance | **X** | **X** | **X** | | | **X** | | **X** | **X** | | | |
| NME434 | Project(A) | | | | | | **X** | | **X** | **X** | | | **X** |
| HUD 401 | Maritime law and insurance | | | | | | | | | | | | |
| NME440 | Marine Engineering (2) | **X** | **X** | **X** | | **X** | **X** | | **X** | | | | |
| NME441 | Propulsion of Marine Units | X | | X | | | X | X | | X | | | |
| NME 442 | Technology of Offshore Units | **X** | **X** | **X** | | | **X** | **X** | **X** | **X** | | | |
| NME443 | Construction of special marine units | **X** | | **X** | **X** | | **X** | **X** | **X** | **X** | | | **X** |
| NME435 | Ship Outfittings | **X** | **X** | **X** | | | **X** | | **X** | **X** | | | |
| NME436 | Ship Structural Design | **X** | | **X** | **X** | | **X** | **X** | | **X** | | | **X** |
| NME437 | Engineering methods for fighting marine pollution | **X** | **X** | **X** | | | **X** | | **X** | **X** | | | |
| NME438 | Ship Production and Quality Control | **X** | **X** | **X** | | | **X** | | | **X** | | | |
| NME 439 | Project (B) | | | | **X** | | **X** | | | **X** | | | **X** |
| NME444 | Advanced Marine Engines | **X** | **X** | **X** | | | **X** | | | **X** | | **X** | |
| NME445 | New and Renewable Energy | **X** | **X** | | | | **X** | **X** | **X** | | | | |
| NME446 | Ship Survey | **X** | | **X** | | | | | **X** | **X** | | | |
| NME447 | Ship Structural Modeling | **X** | | **X** | | | | **X** | **X** | **X** | | | **X** |

## 8- Program Admission Requirements

- **Admission to the preparatory year:** Having Egyptian Secondary education or equivalent certificate with major in Mathematics with the minimum grades determined by the National Admission Office.
- **Admission to the Naval Architecture and Marine Engineering Department:** According to the regulations set by the Faculty Council.

## 9- Regulations for Progression and Programme Completion

- **All Years (except the last year)**

  The student is considered successful if he passes the examinations in all courses of his class.
  - The student must get a minimum of 50% to pass each course.
  - To pass a level (Year) the student should not fail in more than two courses of his class or from lower classes.
- **Last Year**
  - To be graduated, the student must pass all the courses.
  - If he fails in one or two courses, not including the project, he has the opportunity to be retested in September, and he must pass these courses to be graduated.
  - If the student fails in the project; he must repeat it during the next academic year.

- **The Grades of Success:**

  The student achieves one of the following grades in the examinations results and in the general grade according to the marks achieved:
  - Distinction : from 85% of the total mark and upwards.
  - Very Good : from 75% to less than 85% of the total mark.
  - Good : from 65% to less than 75% of the total mark.
  - Pass :from 50% to less than 65% of the total mark.

  The grades of a failing student in a course is estimated in one of' the following grades:
  - Weak : from 30% of the total mark to less than 50%
  - Very Weak : Less than 30% of the total mark.

## 10- Evaluation of Program Learning Outcomes

| Evaluator | Tool | Sample |
|---|---|---|
| **1- Senior students** | Meeting + questionnaire | **Dept. Annual Scientific Conference** |
| **2- Alumni** | questionnaire | **During the Dept. Conference** |
| **3- Stakeholders ( Employers)** | Site visits | **Suez Canal Area Shipyards** |
| **4-External Evaluator(s) (External Examiner(s))** | Evaluation report | **Prof. Dr. A. El Heewy** |
| **5- Other** | --------- | **-----** |

**Head of the Department: Assoc'. Prof. Mostafa Mohamed Mostafa**

**Date: / / 2021**

# مصفوفة البرنامج

| Code No. | | Course Title | a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | a9 | a10 | b1 | b2 | b3 | b4 | c1 | c2 | c3 | c4 | c5 | c6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Preparatory** | | | | | | | | | | | | | | | | | | | | | | |
| SCI001 | | Mathematics (1) | X | X | | | | | | | | | | | | | | | | | | |
| SCI002 | | Mechanics (1) | X | X | | | | | | | | | | | | | | | | | | |
| SCI003 | | Physics (1) | X | X | | | | | | | | | | | | | | | | | | |
| SCI004 | | Chemical Engineering | X | X | | | | | | X | | | | | | | | | | | | |
| HUU001 | | Technical English Language | | | | | | | X | X | | | | | | | | | | | | |
| HUF001 | | History of Engineering and technology | | | | | | | X | | X | X | | | | | | | | | | |
| SCI005 | | Mathematics (2) | X | X | | | | | | | | | | | | | | | | | | |
| SCI006 | | Mechanics (2) | X | X | | | | | | | | | | | | | | | | | | |
| SCI007 | | Physics (2) | X | X | | | | | | | | | | | | | | | | | | |
| PRD001 | | Production Technology | X | X | | X | | | | | | | | | | | | | | | | |
| PRD002 | | Engineering Drawing and Geometric Projection (1) | X | | X | | | | | | | X | | | | | | | | | | |
| PRD003 | | Engineering Drawing and Geometric Projection (2) | X | | X | | | | | | | X | | | | | | | | | | |
| CCE001 | | Computer and Programming | X | | X | | | | | | | X | | | | | | | | | | |
| HUU 002 | | Human Rights | | | | | | | | X | X | X | | | | | | | | | | |
| **first year - 1st semester** | | | | | | | | | | | | | | | | | | | | | | |
| SCI 109 | | Mathematics (3-B) | X | | | | X | | | | X | | X | | | | | | | | | |
| SCI 113 | | Mechanics (3-B) | X | | | | | | | | X | | | | | | | | | | | |
| NME101 | | Drawing of Ships using computers | X | | | | | | | | | | X | X | | | | | | | | |
| NME102 | | Princip1es of Ship Engineering | X | X | | | | | | | | | X | X | | | | | | | | X |
| PRD110 | | Engineering Metallurgy | | X | | X | | | | | | | X | X | | | | | | | | |
| EPM104 | | Electrical eng. & electronics | | | X | X | X | X | | | | | | | | | | | | | | |
| HUU103 | | Thinking skills | | | | | | | | X | X | X | | | | | | | | | | |
| **first year - 2nd semester** | | | | | | | | | | | | | | | | | | | | | | |
| SCI 119 | | Mathematics(4-B) | X | | | | X | | | | X | | X | | | | | | | | | |
| NME103 | | Naval Architecture(1) | X | | | | | | | | | | X | | | X | | X | | | X | |
| NME 104 | | Manufacturing and Shipbuilding | | | | × | | | × | | | | × | | | | | | × | × | | |
| NME105 | | Theory of Ship Structures (1) | × | × | | | | | | | | | × | | | | | | | | | |
| PRD 111 | | Mechanics and Theory of Machines | X | | | X | | | | | | | X | X | | | | | | | | |
| MPE 105 | | Thermodynamics | X | | | | X | | | | X | | X | X | | | | | | | | |
| HUF 102 | | Technical Report writing | | | | | | | | X | | X | | | | | | | | | | |
| **second year - 1st semester** | | | | | | | | | | | | | | | | | | | | | | |
| SCI 227 | | Mathematics(5- B) | X | X | | | | | | | | X | X | | | | | | | | | |
| NME 206 | | Naval Architecture(2) | X | | | | | | | | | | X | | | X | | X | | | X | |
| NME207 | | Marine Engineering(1) | | | | | | | | | | | | X | X | X | X | X | | | | X |
| NME 208 | | Theory of Ship Structures (2) | X | | | X | | | | | | | X | | | | X | | | | | |
| NME209 | | Fluid Mechanics and Marine applications | X | X | | | | | | | | | X | | | | | X | | | | |
| NME210 | | Summer Training (1) | | | | | | | | | X | X | | X | | | X | | | | | |
| HUU 204 | | Management and Marketing | | | | | | | X | | X | X | | | | | | | | | | |
| **second year - 2nd semester** | | | | | | | | | | | | | | | | | | | | | | |
| SCI 228 | | Numerical Analysis and statistics | X | X | | | | X | | | | | | | X | | | | | | | |
| NME211 | | Ship Construction (1) | × | | × | | | | | | | | | | | | X | | × | | | |
| NME212 | | Ship Design(1) | X | | | | | | | | | | | X | | X | X | | | | | |
| NME213 | | Ship hydrodynamics | X | | X | | | | | | | X | | X | | | X | X | | | | |
| PRD 222 | | Machine Design and Marine systems | | | X | X | | | | | | | | | X | | | X | | | | |
| HUF 203 | | Engineering Applications in Marine environment | | | X | | | | X | | | X | | | | | | | | | | |
| HUF 204 | | Environmental Sciences and occupational Safety | | | | X | | | | X | X | | | | | | | | | | | |
| **third year - 1st semester** | | | | | | | | | | | | | | | | | | | | | | |
| NME314 | | Ship Construction(2) | | | × | | | | | | | | | × | | | X | | × | | | |
| NME315 | | Ship design (2) | | | X | | | | | | | | | X | | X | X | | | | | |
| NME316 | | Cost accounting of ship building | | | X | | | | | | | | | | | X | | | X | | | |
| NME317 | | Ship Resistance | X | X | | | | | X | | | | X | | X | | X | X | | | | X |
| NME 318 | | Summer Training (2) | | | | X | | | X | | | X | | | | X | | | X | X | | |
| NME323 | Elective (1) | Ship Vibrations and Control | X | | | | | | | | | | X | X | X | | X | | | | | X |
| NME 324 | | Energy Conservation in Marine Systems | X | | | | | | | | | | X | X | X | | X | X | | | | |
| NME325 | | Computational Geometric Modeling Related to Marine Applications | | X | | X | | | | | | | X | X | | | X | X | | | | |
| NME 326 | | Technology of Ship Repair & Conversion | | | | | | | | | | | | | | X | | | X | X | X | |
| HUU 305 | | Leadership | | | | | | X | X | X | X | | | | | | | | | | | |
| **third year - 2nd semester** | | | | | | | | | | | | | | | | | | | | | | |
| NME319 | | Computer applications in Ship Engineering | | | | | | | | | X | | | X | | | X | X | | | | |
| NME320 | | Marine Diesel Engines | | | | | X | | | | | | X | X | X | | X | | | X | | |
| NME321 | | Ship powering and propulsion | | | X | | | | | | | | X | | | X | X | | | X | | X |
| NME322 | | Marine measurements and tests | X | | | | | | | | | | X | X | | | X | | | | | |
| NME 327 | Elective (2) | Marine Power Plants | X | | | | | | | | | | X | X | X | | X | | | | | |
| NME 328 | | Project Management and Risk | | | | X | | X | | | | | | | | | X | | X | | | |
| NME 329 | | Design and Dynamics of Small marine crafts | X | | | | | | | | | | X | | | | X | X | | | | |
| NME 330 | | Organization & Management of shipyards | | | | | | X | X | | X | | | X | X | | | | X | X | | |
| MPE334 | | Heat transfer, refrigeration &air conditioning | | | | | | | | | | | X | X | X | X | | | | | | |
| HUF 305 | | Presentation skills | | | | | | | X | X | X | X | | | | | | | | | | |
| **fourth year - 1st semester** | | | | | | | | | | | | | | | | | | | | | | |
| NME431 | | Ship economy and feasibility studies | | | X | | | | | | | X | | | | X | X | | | | | X |
| NME432 | | Ship Machinery and auxiliary engines | | | | | X | | | | | | X | | X | | X | | | X | | |
| NME433 | | Ship performance | | | | | | | | | | | X | | | | X | X | | X | X | X |
| NME434 | | Project(A) | | | | | | | X | X | X | | | | | | X | X | X | | X | X |
| HUD 401 | | Maritime law and insurance | | | | X | | | | | | X | | | | X | | | | | | |
| NME440 | Elective(3) | Marine Engineering (2) | X | | | | | | | | | | X | X | X | | X | X | | | | |
| NME441 | | Propulsion of Marine Units | X | | | | | | | | | | X | | | X | | X | | | X | |
| NME 442 | | Technology of Offshore Units | | | X | | | | | | | X | X | X | | | X | X | | | | |
| NME443 | | Construction of special marine units | | | X | | | | | | | X | X | X | | | X | X | | | | |
| **fourth year - 2nd semester** | | | | | | | | | | | | | | | | | | | | | | |
| NME435 | | Ship Outfittings | | | | | | | | | | | | | X | X | X | | | X | X | |
| NME436 | | Ship Structural Design | | | | | | | | | | | X | | | | X | X | X | | | |
| NME437 | | Engineering methods for fighting marine pollution | | | | X | | | | | | X | X | | | X | X | | | | X | X |
| NME438 | | Ship Production and Quality Control | | | | X | | X | | | | | | | | X | | | X | | | X |
| NME 439 | | Project (B) | | | | | | | X | X | X | | | | | | X | X | X | | X | |
| NME444 | Elective(4) | Advanced Marine Engines | | X | | | | | | | | | X | | | | X | X | | X | | |
| NME445 | | New and Renewable Energy | | X | | | | | | | | | X | | | | X | X | | X | | |
| NME446 | | Ship Inspections | | X | | | | | | | | | | | | X | | X | | | X | |
| NME447 | | Ship Structural Modeling | | X | | | | | | | | | | | X | | X | X | | X | | |

# مجالس تبني المعايير الأكاديمية

جامعة بورسعيد
كلية الهندسة

## قسم الهندسة البحرية وعمارة السفن

## مجلس القسم المنعقد بتاريخ ١ مارس٢٠٢١

-----------------------------

اجتمع المجلس يوم الأثنين الموافق ١ مارس ٢٠٢١ في تمام الساعة الحادية عشرة صباحا برئاسة السيد الدكتور/ مصطفي محمد مصطفي القائم بعمل رئيس القسم وبحضور كل من السادة أعضاء هيئة التدريس الاتية أسماؤهم :

١. أ.د/ محمد احمد مسعد
٢. أ.د/ جلال محمد يونس
٣. أ.د/ ليلي بسيوني قمر
٤. أ.د/ مؤمن محمد جعفري
٥. أ.د/ هبه السيد الكيلانى
٦. أ.م.د/ سعد بهي الدين علي الدين
٧. أ.م.د/ اروى وفيق احمد حسين
٨. د/ محمد عبد اللطيف منصور
٩. د/ رانده رمضان عبد الغني
١٠. د/ وليد يحيي محمد علي
١١. د/ أمين محمد بسام

ثم انتقل المجلس لمناقشة جدول الأعمال علي النحو التالي :-

**أولا:** التصديق علي محضر جلسة الأحد الموافق ٣١ يناير ٢٠٢١.

**القرار:** صادق المجلس.

**ثانيا:** احاطة المجلس بقرارات مجلس الكلية الخاصة بالقسم.

**القرار:** احيط المجلس علما.

**ثالثا:** متابعة متطلبات الجودة وأعمال اللجان المنبثقة المطلوبة.

١. إحاطة المجلس بالموضوعات المتعلقة بالقسم والتي تم مناقشتها باللجان المنبثقة عن مجلس الكلية.

**القرار:** احيط المجلس علما.

٢. بشأن تبني المعايير الاكاديمية القومية القياسية (NARS 2018) الصادرة عن الهيئة القومية لضمان الجودة والاعتماد كمعايير قياسية مرجعية لتوصيف برنامج و مقررات مرحلة البكالوريوس (لائحة ٢٠١٤) بقسم الهندسة البحرية وعمارة السفن.

**القرار** : وافق المجلس.

٣. بخصوص تحديد الجدارات الواجب توافرها في خريجي برنامج البكالوريوس بقسم الهندسة البحرية وعمارة السفن - Level C Sub-Specialty

٢/١
٢٠٢١

3. بشأن اعتماد مصفوفة وتوصيف البرنامج وتوصيف مقررات مرحلة البكالوريوس ببرنامج الهندسة البحرية وعمارة السفن (لائحة 2014 – طبقا لـ NARS 2018) للعام الجامعي 2020 – 2021 وذلك بعد الاخذ في الاعتبار راي المراجع الداخلي والخارجي.

**القرار** : وافق المجلس.

**رابعا: شئون هيئة التدريس**

1. خطاب السيد ا.د عميد الكلية بشأن عمل كشف شهري بأسماء السادة أعضاء هيئة التدريس لصرف 200% ، الجودة وكذلك بدل الجامعة عن شهر مارس 2021.

**القرار:** احيط المجلس علما.

2. احاطة المجلس بقرار المجلس الاعلي للجامعات الخاص بتعديل الخريطة الزمنية للفصل الدراسي الثاني- وكذلك الامور المنظمة للدراسة.

**القرار:** احيط المجلس علما.

3. إحاطة المجلس بضروره استمرار اتباع الإجراءات الإحترازية المتعلقة بجائحة كورونا بالفصل الدراسي الثاني.

**القرار:** احيط المجلس علما مع التأكيد علي ضرورة توفيرادارة الكلية للوسائل والادوات التي تضمن النظافة والتعقيم الدوري لمعامل وقاعات التدريس.

4. إحاطة المجلس بضروره أن تكون محاضرات الاون لاين لجميع الفرق تفاعلية بين الطلاب واستاذ المادة وليس بإدراج ملف PDF او تسجيل المحاضرات فقط.

**القرار:** احيط المجلس علما مع التأكيد علي ضرورة توفير خدمة الانترنت بمكاتب الساده اعضاء هيئة التدريس وتقوية شبكة الانترنت بالكلية لكي تتم العملية التعليمية بالشكل المطلوب.

5. بشأن الاستقالة التي تقدم بها المهندس / كريم قطب عبد السلام – المعيد بقسم الهندسة البحرية وعمارة السفن.

**القرار:** اوصي المجلس بقبول الاستقالة من تاريخ تقديمها 25 مارس 2021.

**خامسا: شئون الطلاب**

1. احاطه المجلس بالتوزيع النهائي للطلاب علي موضوعات مشروع التخرج .

**القرار:** احيط المجلس علما.

٢/٢٠
٢٠٢١

## تمهيد:

- فى بداية الجلسة رحب السيد **أ.د/حسن محمد حسن**- عميد الكلية بالسادة أعضاء مجلس الكلية
- وتقدم بخالص الشكر لكلا من السادة الاتى اسماؤهم وذلك لعمل فيديو يوضح اهم المواد المتاحة للكلية طبقا لطلب هيئة ضمان الجودة والاعتماد لرفعه ضمن الوثائق المطلوب.
  - **السيدة الدكتوره/هبه عبد العاطى**- مدير وحدة الجودة لاخراج وكتابه التعليق الصوتي.
  - **المهندس/عبد الرحمن احمد صالح** - المعيد بقسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/مؤمن الهوارى**- طالب بالفرقة الثانية قسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/شادى عيسي**- طالب بالفرقة الثانية قسم الهندسة المدنية لقيامه بالتصوير والمونتاج.

## اولا:المصادقة:-

- التصديق علي مجلس الكلية الجلسة(٦) والذى عقد بتاريخ ١٤ /٢/ ٢٠٢١م

القرار: صادق المجلس

## ثانيا: إحاطة المجلس علما بشأن موضوعات اللجان المنبثقة عن مجلس الكلية

### الموضوع الاول:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/ ٢٠٢١م**

القرار: احيط المجلس علماً

### الموضوع الثانى:

بشان اقتراح لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/ ٢٠٢١م **بالموافقة** على شراء اجهزة ومعدات لمعمل الطاقة الشمسية بقيمة تقديرية فى حدود مبلغ ٣٠٠,٠٠٠ (ثلاثمائة الف جنيها لا غير) وذلك لاهميتها العملية والعلمية لطلاب القسم والعملية التعليمية.

القرار: وافق المجلس

### الموضوع الثالث:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المكتبات بتاريخ ٧ /٣/ ٢٠٢١م**

القرار: احيط المجلس علماً

## ثالثا: وحدة توكيد الجودة والاعتماد:

### الموضوع الاول :

بشأن عرض معايير NARS 2018 المتبناه للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨ . برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشيد

القرار: وافق المجلس

## الموضوع الثانى :

بشأن **الموافقة** على قائمة المراجعين الخارجيين للبرامج الاكاديمية (مرحلة البكالوريوس)٢٠٢١/٢٠٢٠ المرشحين من الاقسام العلمية على النحو التالى:-

| القسم | الاسم | الكليه/الجامعة |
|---|---|---|
| الهندسة المدنية | أ.د/ابراهيم هاشم | كليه الهندسة–جامعة المنوفيه |
| الهندسة الكهربية(شعبه قوى كهربيه) | أ.د/ابراهيم بدران | كليه الهندسة–جامعة المنصوره |
| الهندسة الكهربية(شعبه اتصالات) | أ.د/سيد ربيعي | كليه الهندسة–جامعة المنوفية |
| الهندسة الكهربية (شعبه حاسبات) | أ.د/ابراهيم بدران | كليه الهندسة– جامعة المنصوره |
| هندسة الانتاج التصميم الميكانيكي | أ.د/مصطفى شعبان | كليه الهندسة– جامعةعين شمس |
| الهندسة المعمارية والتخطيط العمراني | أ.د/محمد هشام السعودى | كليه الفنون الجميلة– جامعة الاسكندرية |
| الهندسة البحرية وعمارة السفن | أ.د/احمد الحيوي | كليه الهندسة–جامعة الاسكندرية |
| الهندسة الكيميائية | أ.د/فاطمة عاشور | كليه الهندسة–جامعة القاهرة |
| برنامج الغاز | أ.د/عطية محمد عطية | الجامعة البريطانية |
| برنامج التشيد | أ.د/ابراهيم هاشم | كليه الهندسة–جامعة منوف |
| الفيزيقا والرياضيات الهندسية | أ.د/ميرفت ابو الخير | كليه الهندسة – جامعة المنصوره |

**القرار:** وافق المجلس

## الموضوع الثالث :

بشأن **الموافقة** على قائمة المراجعين الداخلين للبرامج الاكاديمية (مرحلة البكالوريوس)٢٠٢١/٢٠٢٠ المرشحين من الاقسام العلمية على النحو التالى:-

| القسم | الاسم |
|---|---|
| الهندسة المدنية | أ.د/محمد محمد الغندور |
| الهندسة الكهربية(شعبه قوى كهربيه) | أ.د/صبحي سرى |
| الهندسة الكهربية(شعبه اتصالات) | أ.د/راوية يحي رزق |
| الهندسة الكهربية (شعبه حاسبات) | أ.د/راوية يحى رزق |
| هندسة الانتاج التصميم الميكانيكي | أ.د/شعبان عبده ابراهيم |
| الهندسة المعمارية والتخطيط العمراني | أ.د/نجلاء على مجاهد |
| الهندسة البحرية وعمارة السفن | أ.د/عادل عبد الله توفيق |
| الهندسة الكيميائية | أ.د/طه ابراهيم فراج |
| برنامج الغاز | أ.د/ممدوح جاد الله |
| برنامج التشيد | أ.د/محمد محمد الغندور |
| الفيزيقا والرياضيات الهندسية | أ.د/يوسف هاشم زهران |

**القرار:** وافق المجلس

# رابعا: شئون أعضاء هيئة التدريس

## الموضوع الاول:

بشأن اقتراح مجلس قسم هندسة الانتاج والتصميم الميكانيكي بجلسته المنعقدة في ٢٠٢١/٢/٢٨م **بالموافقة على تعيين المهندسة / الشيماء جمال عبد الناصر ابراهيم علي عثمان** – المدرس المساعد بذات القسم – بوظيفة مدرس بالقسم , حيث أنها حصلت على درجة دكتوراه الفلسفة في هندسة الانتاج والتصميم الميكانيكي طبقا لقرار أ.د/ رئيس الجامعة في ٢٠٢١/٢/٢٥م, علما بأنها على رأس العمل وملتزمة في عملها ومسلكها منذ تعيينها بالقسم .

**القرار:** وافق المجلس

جامعة بورسعيد
كلية الهندسة
Port Said University
Faculty of Engineering
مكتب عميد الكلية — Dean Office

**السيد الأستاذ الدكتور / ايمن محمد ابراهيم**

**رئيس جامعة بورسعيد**

**تحية طيبة وبعد ،،،،**

نحيط سيادتكم علما بموافقة مجلس الكليه بتاريخ ٢٠٢١/٣/١٣ على تبني معايير NARS 2018 للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨. برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشييد

لذا برجاء التكرم بالموافقه على عرض الموضوع على مجلس الجامعة

**وتفضلوا بقبول فائق الاحترام ،،**

**عميد الكلية**

٢٠٢١/١٢/٢٩

**أ.د / حسن محمد حسن**

ت: (٠٦٦) ٣٤٠٣٤٥٩ -٣٤٤٦١٠١
ف: (٠٦٦) ٣٤٠٠٩٣٦
Tel: (02-066) 3403459 -3446101
Fax: (02-066) 3400936
E-mail: dean_office@eng.psu.edu.eg

# توصيف المقررات

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI001** | | |
| **Year/ Level** | Preparatory- First semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Identify the essential knowledge about Calculus and some of its applications (Functions, Limits and continuity, Differentiation, Applications of Differentiation, and Partial Differentiation) and to have knowledge about Analytic Geometry and its applications (straight line, Ellipse, parabola, hyperbola, and circle equations). |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations. |
| **A1.2** | State acquaints with the continuity and different limits. |
| **A1.3** | Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola, and circle. |
| **A1.4** | Specify the problems to find its solutions. |
| **A1.5** | Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs. |
| **A1.6** | Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations. |
| **A2.1** | Acquire the experience to design differentiation problems and geometric problems and solve them. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• Functions.<br>• Limits and Continuity.<br>• Differentiation.<br>**Tutorials:**<br>• Recognize many functions with their graphs and properties.<br>• Evaluate the limits and the continuity of many functions<br>• Solve a variety of differentiation problems. | 1-4 |
| 2 | **Lectures:**<br>• Applications of Differentiation.<br>• Partial Differentiation.<br>**Tutorials:**<br>• Use the textbooks to solve some application of differentiation.<br>• Review solving problem of partial differentiation. | 5-8 |
| 3 | Midterm | 9 |
| 4 | **Lectures:**<br>• Equations of Straight lines.<br>• Circles and their applications.<br>**Tutorials:**<br>• Review examples of Circles and their applications | 10-11 |
| 5 | **Lectures:**<br>• Equations of Ellipse.<br>• Equations of parabola.<br>**Tutorials:**<br>• Solve problem Related to Equations of Ellipse and parabola. | 12-14 |
| 6 | Final Submission | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (online/ in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | X | | | | | x | | | | | | | | |
| | **A1.2** | X | x | | | | x | | | | | | | | |
| | **A1.3** | X | | X | | | x | x | | | | | | | |
| | **A1.4** | X | | X | x | | x | | | | | | | | |
| | **A1.5** | X | x | | | | x | | | | | | | | |
| | **A1.6** | X | x | | | | x | | | | | | | | |
| | **A2.1** | X | x | | | x | x | x | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1,3, A1.4, A1.6, A2.1 |
| 2 | Formative (quizzes- online quizzes) | A1.1, A1.2, A1.3, A1.4, A1.6, A2.1 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A1.4, A1.5, A1.6, A2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 2 | Formative (quizzes- online quizzes) | 10 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Advanced Engineering Mathematics, Erwin Kreyszig, Wiley, 10th edition ,2011 |
| 2 | William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc edition,2014 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| **1** | **Lectures:**<br>- Functions.<br>- Limits and Continuity.<br>- Differentiation.<br>**Tutorial:**<br>- Recognize many functions with their graphs and properties.<br>- Evaluate the limits and the continuity of many functions<br>- Solve a variety of differentiation problems. | 1 | A1.1, A1.2, A1.4 |
| **2** | **Lectures:**<br>- Applications of Differentiation.<br>- Partial Differentiation.<br>**Tutorial:**<br>- Use the textbooks to solve some application of differentiation.<br>- Review solving problem of partial differentiation. | 1 | A1.3, A1.4, A2.1 |
| **3** | Midterm | | A1.1, A1.2, A1.3, A1.4, A1.4, A2.1 |
| **4** | **Lectures:**<br>- Equations of Straight lines.<br>- Circles and their applications.<br>**Tutorial:**<br>- Review examples of Circles and their applications | 1 | A1.3, A1.6, A2.1 |
| **5** | **Lectures:**<br>- Equations of Ellipse.<br>- Equations of parabola.<br>**Tutorial:**<br>- Solve problem Related to Equations of Ellipse and parabola. | 1 | A1.3, A1.5, A1.6 |
| **6** | Final Submission | 1 | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.1 |

| **Course: Mathematics (1)** | |
|---|---|
| **Program Los** | **Course Los** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics | A1.1 Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations.<br>A1.2 State acquaint with the continuity and different limits.<br>A1.3 Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola and circle.<br>A1.4 Specify the problems to find its solutions.<br>A1.5 Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.<br>A1.6 Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Acquire the experience to design differentiation problems and geometric problems and solve them. |

**Course Coordinator: Dr. Mohamed Yousef Farghaly**

**Dr. Mohamed Khalil EL Gayyar**

**Dr. Youssef Mohamed Baghdadi**

**Dr. Moanis Abdel Tawab Moaz**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI002** | | |
| **Year/ Level** | Preparatory Year – First Semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Recognize the principles of the mechanics and statics of particles, moments, Equilibrium's equations and solve any problem in a simple and logical manner |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the mechanics and statics of particles. |
| **A1.2** | Recognize the laws of additions and multiplication of vectors. |
| **A1.3** | Define different methods to determine the resultant and moments of forces system |
| **A1.4** | Identify rectangular component of a force. |
| **A2.1** | Discuss the Reduction of a system of forces to one force and one couple. |
| **A2.2** | Evaluate Moment of force about a given Axis to the students |
| **A2.3** | Resolve the given force into a force at any point and a couple. |
| **A2.4** | Solve Equilibrium's equations of Rigid Bodies in two and three dimensions. |
| **A2.5** | Apply Distributed Forces: Centroids and Centers of Gravity. |
| **A2.6** | Solve some problems and collect some data. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures: Chapter 1**<br>-Introduction<br>-The meaning of mechanics, static's and Static's of particles.<br>-Vectors, addition of vectors.<br>-Resultant of several concurrent forces.<br>-Rectangular component of a force.<br>-Addition of forces by summing x& y components.<br>-Force defined by its magnitude and two points on its line of action<br>-Rigid Bodies & Equivalent Systems of Forces.<br>**Tutorials:**<br>• Solve the problems. | 1-4 |
| 2 | **Lectures: Chapter 2**<br>External and Internal Forces<br>-Vector product of two vectors and Applications.<br>-Moment of force about a point.<br>-Scalar product of two vectors and applications.<br>-Mixed Triple product of Three vectors and Applications.<br>-Moment of force about a given Axis.<br>-Moment of a Couple and Addition of couple -Resolution of a given force into a force at any point and a couple<br>-Reduction of a system of forces to one force and one couple.<br>**Tutorials:**<br>• Solve the problems. | 5-8 |
| 3 | **Midterm** | 9 |
| 4 | **Lectures: Chapter 3**<br>Equilibrium of Rigid bodies<br>-Reactions at Supports and Connections for a two Dim. Structure.<br>-Equilibrium of Rigid Bodies in two Dimensions.<br>-Equilibrium of a Two –Force and a Three –Force Body.<br>**Tutorials:**<br>• Solve the problems. | 10-12 |
| 5 | **Lectures: Chapter 4**<br>Distributed Forces: Centroids and Centers of Gravity<br>-Centers of Gravity Two-Dimensional body.<br>-Centroids of Areas and Lines & Determination of centroids by Integration.<br>-Distributed Forces: Centroids and Centers of Gravity.<br>-Centroids of Areas and Lines & Determination of centroids by Integration<br>**Tutorials:**<br>• Solve the problems. | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture) online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | | | x | | | | | | | | |
| | A1.2 | x | x | x | | x | | | | | | | | | |
| | A1.3 | x | x | x | | x | x | | | | | | | | |
| | A1.4 | x | x | | | | | | | | | | | | |
| | A2.1 | x | x | | | x | | x | | | | | | | |
| | A2.2 | x | x | | | | | | | | | | | | |
| | A2.3 | x | x | | | | x | | | | | | | | |
| | A2.4 | x | x | | | | x | | | | | | | | |
| | A2.5 | x | x | | | | x | | | | | | | | |
| | A2.6 | x | x | | | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3 |
| **2** | Formative (quizzes- online quizzes) | A2.4, A2.5, |
| **3** | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6. |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | 9 |
| **2** | Formative (quizzes- online quizzes) | Every week |
| **3** | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | 15 |
| **2** | Formative (quizzes- online quizzes) | 15 |
| **3** | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Erwin Kreyszig, "Advanced Engineering Mathematics” John Wiley & Sons Inc., 10th Edition, 2011 |
| **2** | Ferdinand P. Beer and E. Russell Johnston, Jr.”Vector Mechanics for Engineers” – Statics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York, 2010. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Chapter 1**<br>-Introduction<br>-The meaning of mechanics, static's and Static's of particles.<br>-Vectors, addition of vectors.<br>-Resultant of several concurrent forces.<br>-Rectangular component of a force.<br>-Addition of forces by summing x& y components.<br>-Force defined by its magnitude and two points on its line of action<br>-Rigid Bodies & Equivalent Systems of Forces. | 1 | A1.1, A1.2, A1.3, A1.4 |
| 2 | **Chapter 2**<br>- External and Internal Forces<br>-Vector product of two vectors and Applications.<br>-Moment of force about a point.<br>-Scalar product of two vectors and applications.<br>-Mixed Triple product of Three vectors and Applications.<br>-Moment of force about a given Axis.<br>-Moment of a Couple and Addition of couple -Resolution of a given force into a force at any point and a couple<br>-Reduction of a system of forces to one force and one couple. | 1 | A2.1, A2.2, A2.3 |
| 3 | Midterm | 1 | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3 |

| | | | |
|---|---|---|---|
| **4** | **Chapter 3**<br>Equilibrium of Rigid bodies<br>-Reactions at Supports and Connections for a two Dim. Structure.<br>-Equilibrium of Rigid Bodies in two Dimensions.<br>-Equilibrium of a Two –Force and a Three –Force Body. | 1 | A2.4 |
| **5** | **Chapter 4**<br>Distributed Forces: Centroids and Centers of Gravity<br>-Centers of Gravity Two-Dimensional body.<br>-Centroids of Areas and Lines & Determination of centroids by Integration.<br>-Distributed Forces: Centroids and Centers of Gravity.<br>-Centroids of Areas and Lines & Determination of centroids by Integration | 1 | A2.5, A2.6. |

| Course: Mechanics (1) | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1- Identify the mechanics and statics of particles.<br>A1-2- Recognize the laws of additions and multiplication of vectors.<br>A1-3- Define different methods to determine the resultant and moments of a System of forces system.<br>A-1-4- Identify rectangular component of a force. |
| A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Discuss the Reduction of a system of forces to one force and one couple.<br>A2-2 Evaluate Moment of force about a given Axis to the students.<br>A2-3 Resolve the given force into a force at any point and a couple.<br>A2-4 Solve Equilibrium's equations of Rigid Bodies in two and three dimensions.<br>A2-5 Apply Distributed Forces: Centroids and Centers of Gravity.<br>A2-6 Solve some problems and collect some data. |

**Course Coordinator: Prof. Dr. Abdalla Wassf Isaac.**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI003** | | |
| **Year/ Level** | Preparatory year -First semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Describe phenomena and theories of waves and heat, type of modulus of elasticity, Newton's law of cooling and thermodynamics laws. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Distinguish between the fine measurements. |
| **A1.2** | Describe the waves, its properties, the interference of waves and the parameters which effect on it. |
| **A1.3** | Identify the temperature scales, the different kinds of Thermometers, thermal heat conductivity for different materials and the Triple point. |
| **A1.4** | Recognize the Kinetic Theory of gases, the Heat engine, Otto Cycle, Heat pump Cooling cycle by vapor pressure and the Meaning of Entropy. |
| **A1.5** | Show the types of substances according to Elasticity materials problems and different laws of thermodynamic. |
| **A2.1** | Evaluate the results given from experiments. |
| **A2.2** | Analyze data given from experiments. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>• Material Properties.<br>• Temperature measurement and Specific Heat.<br>**Labs/Tutorials:**<br>• Practicing on measuring instruments (micrometer, spherometer, and vernier).<br>• Evaluate the acceleration due to gravity experimentally using simple pendulum. | 1-3 |
| **2** | **Lectures:**<br>• Elasticity<br>• Heat transfer<br>**Labs/Tutorials:**<br>• Evaluate the thermal conductivity coefficient of rubber material.<br>• Observe the latent heat of condensation the water.<br>• Assess the relation between stress and strain of a string. | 4-5 |
| **3** | **Lectures:**<br>• Fluids<br>• Properties of gases and Vapors<br>**Labs/Tutorials:**<br>• Identify the specific weight of liquid. | 6-7 |
| **4** | **Lectures:**<br>• Surface tension.<br>• Thermodynamics<br>**Labs/Tutorials:**<br>• Evaluate the surface tension of a liquid by experiment.<br>• Determinate the linear expansion coefficient for a metallic road.<br>• Assess the relation between stress and strain of a string. | 8 |
| **5** | Midterm | 9 |
| **6** | **Lectures:**<br>• Viscosity<br>• Heat Engines<br>**Labs/Tutorials:**<br>• Analyze the rigidity coefficient of a wire experimentally. | 10-12 |
| **7** | **Lectures:**<br>• Acoustic waves<br>• Entropy<br>**Labs/Tutorials:**<br>• Final practical examination | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online/in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| **A-Level** | **A1.1** | x | x | | | | x | | | | | | | | |
| | **A1.2** | x | x | | x | x | | | | | | | | | |
| | **A1.3** | x | x | x | | x | x | | | | | | | | |
| | **A1.4** | | x | x | x | | | | | | x | | | | |
| | **A1.5** | | | x | | | | | | | | | | | |
| | **A2.1** | | x | | | x | | x | | | | x | | | x |
| | **A2.2** | | x | | x | x | | | | | | x | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.2, A1.3 |
| 2 | Practical | A2.1, A2.2 |
| 3 | Oral Examination | A1.1, A1.2, A1.3 |
| 4 | Formative (quizzes- online quizzes- reports) | A1.1, A1.2, A1.4 |
| 5 | Final Term Examination (written) | A1.2, A1.3, A1.4, A1.5 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes- reports) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes- presentation) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Serway R. A., Jewett J. W. “Physics” ,5 th Edition,2013 |
| 2 | Mckie D., Mckie C.,” Essentials of crystallography” ,1st Edition,2011. |
| 3 | Kittle C.: Introduction to solid state physics 9th Edition, 2013. |
| 4 | أساسيات الفيزياء – تأليف بوش – الطبعة الخامسة 2011 ترجمة د. سعيد الجزيري & د. محمد أمين سليمان. |
| 5 | أساسيات الفيزياء الكلاسيكية والمعاصرة – تأليف أ. د. رأفت كامل واصف – الطبعة الأولي 2011. |
| 6 | فيزياء الجوامد – تأليف أ. د. محمد أمين سليمان و أ. د. أحمد فؤاد باشا و أ. د. شريف خيري 2013 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Material Properties.<br>• Temperature measurement and Specific Heat.<br>**Labs:**<br>• Practicing on measuring instruments (micrometer, spherometer, and vernier).<br>• Evaluate the acceleration due to gravity experimentally using simple pendulum. | 1 | A1.1, A1.3, A2.1, A2.2 |
| 2 | **Lectures:**<br>• Elasticity<br>• Heat transfer<br>**Labs:**<br>• Evaluate the thermal conductivity coefficient of rubber material.<br>• Observe the latent heat of condensation the water.<br>• Assess the relation between stress and strain of a string. | 1 | A1.5, A2.1, A2.2 |
| 3 | **Lectures:**<br>• Fluids<br>• Properties of gases and Vapors<br>**Labs:**<br>• Identify the specific weight of liquid. | 1 | A1.4, A2.1, A2.2 |
| 4 | **Lectures:**<br>• Surface tension.<br>• Thermodynamics<br>**Labs:**<br>• Evaluate the surface tension of a liquid by experiment.<br>• Determinate the linear expansion coefficient for a metallic road.<br>• Assess the relation between stress and strain of a string. | 1 | A2.1, A2.2 |

| | | | |
|---|---|---|---|
| **5** | Midterm | 1 | A1.2, A1.3 |
| **6** | **Lectures:**<br>- Viscosity<br>- Heat Engines<br>**Labs:**<br>- Analyze the rigidity coefficient of a wire experimentally. | 1 | A2.2 |
| **7** | **Lectures:**<br>- Acoustic waves<br>- Entropy<br>**Labs:**<br>- Final practical examination | 1 | A1.2, A1.3, A1.4, A1.5, A2.1 |

| **Course: Physics (1)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Distinguish between the fine measurements.<br>A1.2 Describe the waves, its properties, the interference of waves and the parameters which effect on it.<br>A1.3 Identify the temperature scales, the different kinds of Thermometers, thermal heat conductivity for different materials and the Triple point.<br>A1.4 Recognize the Kinetic Theory of gases, the Heat engine, Otto Cycle, Heat pump Cooling cycle by vapor pressure and the Meaning of Entropy.<br>A1.5 Show the types of substances according to Elasticity materials problems and different laws of thermodynamic. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Evaluate the results given from experiments.<br>A2.2 Analyze data given from experiments. |

**Course Coordinator: Ass. Prof. Dr. Abdel Naser Ahmed Mansour**

**Dr. Fatma Fathy El - Sanabary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI004** | | |
| **Year/ Level** | Preparatory Year | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | - | 2 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Identify essential knowledge of basic principles, laws and theories of physical Chemistry, applied chemistry, which are necessary for engineering students. Quantitative and theoretical study of the properties and structure of matter and their relation to the interaction of matter with energy will be discussed. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Recognize the ability to solve quantitative problems in matter changes |
| **A1.2** | Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure |
| **A1.3** | Recognize the equations of physical chemistry |
| **A1.4** | Define different topics and theories of physical chemistry |
| **A1.5** | State the difference between organic and inorganic samples |
| **A2.1** | Show the difference between the different types of polymers |
| **A2.2** | Investigate the behavior of gases |
| **A2.3** | Estimate the difference between the physical and chemical properties of different matters |
| **A2.4** | Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied |
| **A2.5** | Identify the Physical behavior of solid, liquid gas and mixed phase |
| **A8.1** | Communicate verbally with the colleagues in the lab |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Chapter 1: physical chemistry**<br>-Introduction to physical Chemistry<br>-Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units<br>-Properties of gases -The perfect gas - gas laws -Problems -The real gas -Molecular interactions – Van der Waals equation.<br>-Kinetics theory of gases- Problems<br>**Chapter 2: Organic Chemistry**<br>-Introduction to organic chemistry:<br>-Lewis symbols, chemical bonding - electronic distributions Nomenclature of organic compounds – hybridization of orbital<br>-Physical properties of organic compounds, aliphatic compounds and their derivatives effect of structure on the chemical properties<br>**Chemistry lab**:<br>-Introduction to the quantitative & qualitative analysis<br>-Standardization of sodium Carbonate solution<br>-Standardization of Hydrochloric acid solution using sodium Hydroxide<br>Solution | 1-3 |
| 2 | **Chapter 3: chemical thermodynamics and thermochemistry**<br>-First and second law of thermodynamics – heats of reactions – laws of heat reactions - standard states – spontaneous of chemical reaction – entropy and free energy<br>**Chapter 4: Electrochemistry:**<br>-Electrolysis -Application of electrochemistry on the corrosion of metals<br>**Chemistry lab**:<br>-Titration of strong acid against strong base<br>-Analysis of alkaline mixture | 4-6 |
| 3 | **Chapter 5: Chemical equilibrium**:<br>-Law of mass action and reversible reactions<br>-Ionic theory – ionization of water - titration process and titration curves – indicators – hydrolysis of salts. Solubility product & common ion effect<br>**Chemistry lab**:<br>-Analysis of acidic mixture | 7-8 |
| 4 | **Midterm** | 9 |
| 5 | **Chapter 6: Natural gas & Petroleum oil:**<br>-Composition of natural gas – process of separation<br>**Petroleum oil:**<br>-Composition – Classification – Separations<br>**Chemistry lab**:<br>-Identification of metal cations | 10-11 |
| 6 | **Chapter 7: Polymer chemistry:**<br>-Introduction – classification of polymers - Mechanism of | 12-15 |

| | | |
|---|---|---|
| | polymerization – free radical mechanism competitive reactions<br>-Anionic and cationic Mechanism of polymerization – copolymers<br>-Mechanical properties of polymers - relation between mechanical properties & Temperature<br>**Chemistry lab**:<br>-Identification of metals cations | |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (online/ in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | x | x | | | x | | | | | | | | | |
| | **A1.2** | x | x | | | | | | | | | | | | |
| | **A1.3** | x | x | | | x | | | | | | | | | |
| | **A1.4** | x | x | | | x | | | | | | | | | |
| | **A2.5** | x | x | | | | | | | | | | | | |
| | **A2.1** | x | x | | | | | x | | | | | | | x |
| | **A2.2** | x | x | | | | | | | | | | | | x |
| | **A2.3** | x | x | | | | | | | | | | | | x |
| | **A2.4** | x | x | | | | | x | | | | | | | |
| | **A2.5** | x | x | | | | x | | | | | | | | |
| | **A8.1** | | | | | | x | | | | | | | | x |

## 6. Teaching and Learning Methods low capacity and outstanding Student:

| **No.** | **Teaching Method** |
|---|---|
| **1** | Additional Tutorials |
| **2** | Online lectures and assignments |

# 7. Student assessment:

## 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1-1, A1-2, A1-3, A1-4, A1-5, A2-4, A2-5 |
| 2 | Practical | A2-1, A2-2, A2-3, A8-1 |
| 3 | Oral Examination | A1-1, A1-2, A1-3, A1-4, A1-5 |
| 4 | Formative (quizzes- online quizzes- reports) | A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, |
| 5 | Final Term Examination (written) | A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5, A8-1, |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 8 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes- reports) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes- presentation -reports) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Atkins. Peter, Julio de Paula, James Keeler, "Physical chemistry ", 11th ed, Oxford University Press, 2019. |
| 2 | I.N. Levine, " Physical chemistry”, 6th ed, The McGraw-Hill Companies, 2009. |
| 3 | J. Brady and G. Humistom "General chemistry, Principles and structure", 5th ed. John Wiley and Sons Inc., 1990. |
| 4 | Francis A Carey, Robert M Giuliano, 11th ed, Mc Graw Hill Education, 2017. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | laboratory Usage: |
| 3 | Library Usage |
| 4 | White Board |
| 5 | Data Show System |
| 6 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Chapter 1: physical chemistry**<br>-Introduction to physical Chemistry<br>-Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units<br>-Properties of gases -The perfect gas - gas laws -Problems -The real gas -Molecular interactions – Van der Waals equation. Kinetics theory of gases- Problems<br>**Chapter 2: Organic Chemistry**<br>-Introduction to organic chemistry:<br>-Lewis symbols, chemical bonding - electronic distributions Nomenclature of organic compounds – hybridization of orbital<br>-Physical properties of organic compounds, aliphatic compounds, and their derivatives effect of structure on the chemical properties<br>**Chemistry lab**:<br>-Introduction to the quantitative & qualitative analysis<br>-Standardization of sodium Carbonate solution<br>-Standardization of Hydrochloric acid solution using sodium Hydroxide solution | 1 | A1-1<br>A1-2<br>A1-3<br>A1-4<br>A1-5<br>A2-1<br>A2-2<br>A2-3<br>A8-2 |
| 2 | **Chapter 3: chemical thermodynamics and thermochemistry**<br>-First and second law of thermodynamics – heats of reactions – laws of heat reactions - standard states – spontaneous of chemical reaction – entropy and free energy<br>**Chapter 4: Electrochemistry:**<br>-Electrolysis -Application of electrochemistry on the corrosion of metals<br>**Chemistry lab**:<br>-Titration of strong acid against strong base<br>Analysis of alkaline mixture | 1 | A1-1<br>A1-2<br>A1-3<br>A1-4<br>A8-2 |
| 3 | **Chapter 5: Chemical equilibrium**:<br>-Law of mass action and reversible reactions<br>Ionic theory – ionization of water - titration process and titration curves – indicators – hydrolysis of salts. Solubility product & common ion effect<br>**Chemistry lab**:<br>-Analysis of acidic mixture | 1 | A2-1<br>A2-2<br>A2-3<br>A2-4<br>A8-1 |
| 4 | **Midterm** | 1 | A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5, |
| 5 | **Chapter 6: Natural gas & Petroleum oil:**<br>-Composition of natural gas – process of separation | 1 | A1-1<br>A1-4 |

| | | | |
|---|---|---|---|
| | **Petroleum oil:**<br>-Composition – Classification – Separations<br>**Chemistry lab**:<br>-Identification of metal cations | | A2-3<br>A2-4<br>A8-1 |
| **6** | **Chapter 7: Polymer chemistry:**<br>-Introduction – classification of polymers - Mechanism of polymerization – free radical mechanism competitive reactions<br>-Anionic and cationic Mechanism of polymerization – copolymers<br>-Mechanical properties of polymers - relation between mechanical properties & Temperature<br>**Chemistry lab**:<br>-Identification of metals cations | 1 | A1-4<br>A3-4<br>A2-5<br>A8-1 |

| **Course :Engineering Chemistry** | |
|---|---|
| **Program LOs** | **Course Los** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1- Recognize the ability to solve quantitative problems in matter changes.<br>A1-2 Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure.<br>A1-3 Recognize the equations of physical chemistry.<br>A1-4 Define different topics and theories of physical chemistry.<br>A1-5 State the difference between organic and inorganic samples. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Show the difference between the different types of polymers.<br>A2-2 Investigate the behavior of gases.<br>A2-3 Estimate the difference between the physical and chemical properties of different matters.<br>A2-4 Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied.<br>A2.5 Identify the Physical behavior of solid, liquid gas and mixed phase |

| | |
|---|---|
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Communicate verbally with the colleagues in the lab |

**Course Coordinator: Prof. Dr. Walid Fathallah**

**Dr. Sameh Mekawy**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Production Engineering & Mechanical Design | | |
| **Course Code** | **PRD002** | | |
| **Year/ Level** | Preparing year – First semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 1 | 3 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Provide the basic knowledge and skills of the concepts and principles of engineering drawing and fundamental of drawing projections. The basic principles of drawing with several applications are also studied. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the materials related to the parts of machines. |
| **A1.2** | Analyze the engineering problems that are used in engineering drawing. |
| **A3.1** | Apply the computer software (AutoCAD) for different drawing exercises. |
| **A3.2** | Employ the image and samples of machines drawing applications. |
| **A10.1** | Solve the different types of drawing exercises. |
| **A10.2** | Recognize the characteristics and processes related to the different machines and symbol drawing. |
| **A10.3** | Use engineering drawing and mechanics drawing handbook. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>• Introduction of principles of engineering lines used in drawing.<br>**Tutorials:**<br>• Drawing of some exercise for different line weights. | 1 |
| **2** | **Lectures:**<br>• Geometric construction theories of view derivation.<br>**Tutorials:**<br>• Drawing of some exercise on geometric construction. | 2 |
| **3** | **Lectures:**<br>• Orthographic projection of engineering bodies.<br>**Tutorials:**<br>• Drawing of some exercise for projection. | 3-4 |
| **4** | **Lectures:**<br>• Projection of point, lines, surfaces, and bodies.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for projection of a very simple shapes. | 5 |
| **5** | **Lectures:**<br>• How to divide of engineering drawing board and general engineering drawing.<br>**Tutorials:**<br>• Drawing of some exercise on how to divide an engineering drawing board. | 6 |
| **6** | **Lectures:**<br>• Drawing engineering operations and some application on it.<br>**Tutorials:**<br>• Drawing of some exercise on engineering operations. | 7-8 |
| **7** | Midterm | 9 |
| **8** | **Lectures:**<br>• Drawing of simple isometrics and its projections.<br>**Tutorials:**<br>• Drawing of some exercise for simple isometrics. | 10-11 |
| **9** | **Lectures:**<br>• Drawing of complicated isometrics with inclined surfaces.<br>**Tutorials:**<br>• Drawing of some exercise for complicated isometrics. | 12-13 |
| **10** | **Lectures:**<br>• Drawing of the third projection with the knowledge of the other projectors.<br>**Tutorials:**<br>• Some exercise on the drawing of the third projection with the knowledge of the other projectors. | 14-15 |

## 5. Teaching and Learning Methods:

| LO’s | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | x | x | | | | | | | | | |
| | A1.2 | x | x | | x | | x | | | x | | | | | |
| | A3.1 | x | x | | x | x | x | x | | | | | | | |
| | A3.2 | x | x | | x | | | | | | | | | | |
| | A8.1 | x | x | | x | | | | | x | x | x | | | |
| | A8.2 | x | x | | x | x | x | x | | | | | | | |
| | A8.3 | | | | | | | | | | x | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

# 7. Student assessment:

## 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A3.2, A8.1, A8.2 |
| 2 | Formative (quizzes- online quizzes) | A1.1, A1.2, A3.1, A3.2, A8.1, A8.2, A8.3 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A3.1, A3.2, A8.1, A8.2 |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes) | Every 3 weeks |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 15 |
| 2 | Formative (quizzes- online quizzes) | 15 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

# 8. List of References:

| No. | Reference List |
|---|---|
| 1 | K. L. Narayana, P. Kannaiah, and K. Venkata Reddy ' Machine Drawing' New Age International (P) Ltd., 2006. |
| 2 | Fatehy El-shrif, ' Mechanical Drawing' Helwan Univ., 1975. |
| 3 | C. Simmons, D. Maguive, and N. Phelps, 'Manual of Engineering Drawing', Elsevier Ltd., 2009. |
| 4 | K. R. Hart 'Engineering Drawing with Problems and Solutions' ELBS, 1984. |
| 5 | Book," Engineering Drawing", prepared by staff of production engineering and Machine design department |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Introduction of principles of engineering lines used in drawing.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for different line weights. | 1 | A1.1 |
| 2 | **Lectures:**<br>• Geometric construction theories of view derivation.<br>**Labs/Tutorials:**<br>• Drawing of some exercise on geometric construction. | 1 | A1.2 |
| 3 | **Lectures:**<br>• Orthographic projection of engineering bodies.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for projection. | 1 | A1.2, A3.2, A10.1 |
| 4 | **Lectures:**<br>• Projection of point, lines, surfaces, and bodies.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for projection of a very simple shapes. | 1 | A1.2, A3.2, A10.1, A10.2 |
| 5 | **Lectures:**<br>• How to divide of engineering drawing board and general engineering drawing.<br>**Labs/Tutorials:**<br>• Drawing of some exercise on how to divide an engineering drawing board. | 1 | A1.2, A3.2, A10.1, A10.2 |
| 6 | **Lectures:**<br>• Drawing engineering operations and some application on it.<br>**Labs/Tutorials:**<br>• Drawing of some exercise on engineering operations. | 1 | A1.2, A3.2, A10.1, A10.2, A10.3 |

| | | | |
|---|---|---|---|
| **7** | Midterm | 1 | A1.1, A1.2, A3.2, A10.1, A10.2 |
| **8** | **Lectures:**<br>• Drawing of simple isometrics and its projections.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for simple isometrics. | 1 | A1.2, A3.1, A3.2, A10.1, A10.2 |
| **9** | **Lectures:**<br>• Drawing of complicated isometrics with inclined surfaces.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for complicated isometrics. | 1 | A1.2, A3.1, A3.2, A10.1, A10.2, A10.3 |
| **10** | **Lectures:**<br>• Drawing of the third projection with the knowledge of the other projectors.<br>**Labs/Tutorials:**<br>• Some exercise on the drawing of the third projection with the knowledge of the other projectors. | 1 | A1.2, A3.1, A3.2, A10.1, A10.2, A10.3 |

| **Course: Engineering Drawing and Geometric Projection (1)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Identify the materials related to the parts of machines.<br>A1.2 Analyze the engineering problems that are used in engineering drawing. |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Apply the computer software (AutoCAD) for different drawing exercises.<br>A3.2 Employ the image and samples of machines drawing applications. |
| A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies. | A10.1 Solve the different types of drawing exercises.<br>A10.2 Recognize the characteristics and processes related to the different machines and symbol drawing.<br>A10.3 Use engineering drawing and mechanics drawing handbook. |

**Course Coordinator: Prof. Dr. Gamal Abdel Nasser**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Electrical Engineering | | |
| **Course Code** | **HUU001** | | |
| **Year/ Level** | Preparatory year- First semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | --- | --- |

## 2. Course Aims:

| No. | Aim |
|---|---|
| 2 | Use techniques, skills, and some English grammar and rules necessary for effectively writing numbers, equations, symbols, and some different types of technical documents such as reports, proposals, letters, and presentations. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A7-1** | Work independently and within a team to prepare different types of technical reports and presentations. |
| **A7-2** | Choose the most adequate dictionaries to follow in writing the technical documents. |
| **A8-1** | Communicate effectively with colleges to identify the characteristics of a good technical report. |
| **A8-2** | Practice the rules and principles of technical writing. |
| **A8-3** | Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations. |

## 4. Course Contents:

| **Week No.** | **Topic** | **Total Hours** | **Contact hrs** | | |
|---|---|---|---|---|---|
| | | | **Lec.** | **Tut.** | **Lab.** |
| Week 1-2 | Review of English Grammar and Mechanics of Language (Capitalization –Punctuation) | 4 | 4 | -- | -- |
| Week-3 | Some characteristics of Technical Language (Abbreviation) | 2 | 2 | -- | -- |
| Week 4-5 | How to write numbers, units, equations, symbols, and units of measure | 4 | 4 | -- | -- |
| Week 6-8 | Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies, Clichés, Nouns as adjectives, and Misused and troublesome words and phrases | 6 | 6 | -- | -- |
| Week 9 | Midterm Exam | 2 | 2 | -- | -- |
| Week 10-11 | Rules and Principals of technical writing | 4 | 4 | -- | -- |
| Weeks 12-13 | Good technical writing | 4 | 4 | | |
| Week 14-5 | Applications of technical writing<br>• Letters<br>• reports<br>• manuals<br>• proposals<br>• presentations | 4 | 4 | -- | -- |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online-In class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | **A7-1** | X | X | | | X | | X | | | | X | | | |
| | **A7-2** | X | X | | | X | | X | | | X | X | | | |
| | **A8-1** | X | X | | | X | | | | | | | | | |
| | **A8-2** | X | | | | X | X | | | | | | | | |
| | **A8-3** | X | | X | X | X | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials. |
| 2 | Online lectures and documentation. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A7-1, A7-2, A8-1, A8-2, A8-3 |
| 2 | Formative (quizzes - online quizzes - reports) | A7-1, A7-2, A8-1, A8-2, A8-3 |
| 3 | Final Term Examination (written) | A7-1, A7-2, A8-1, A8-2, A8-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (online written) | Week 9 |
| 2 | Formative (quizzes - online quizzes - reports) | Throughout the semester |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes - online quizzes - reports) | 01 |
| 3 | Final Term Examination (written) | 01 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | D. J. Weatherford, “Technical Writing in Engineering Professions“, 2016. |
| 2 | Phillip A. Laplante, “Technical Writing: A Practical Guide for Engineers and Scientists”, CRC Press, 2$^{nd}$ edition, July 2018. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Sound System Facility |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | Review of English Grammar and Mechanics of Language (Capitalization –Punctuation) | 2 | A7-1, A8-1, A8-2 |
| 2 | Some characteristics of Technical Language (Abbreviation) | 2 | A7-1, A8-1, A8-2 |
| 3 | How to write numbers, units, equations, symbols, and units of measure | 2 | A7-1, A8-2, A8-3 |
| 4 | Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies, Clichés, Nouns as adjectives, and Misused and troublesome words and phrases | 2 | A7-2, A8-2 |
| 5 | Midterm Exam | 2 | A7-1, A7-2, A8-1, A8-2, A8-3 |
| 6 | Rules and Principals of technical writing | 2 | A7-2, A8-2, A8-3 |
| 7 | Good technical writing | 2 | A7-2, A8-2, A8-3 |
| 8 | Applications of technical writing<br>• letters<br>• reports<br>• manuals<br>• proposals<br>• presentations | 2 | A7-1, A8-2, A8-3, |
| 9 | Final written exam | 2 | A7-1, A7-2, A8-1, A8-2, A8-3, |

| Course: Technical English Language | |
|---|---|
| **Program LOs** | **Course LOs** |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. | A7-1 Work independently and within a team to prepare different types of technical reports and presentations. |
| | A7-2 Choose the most adequate dictionaries to follow in writing the technical documents. |
| A8- Communicate effectively graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Communicate effectively with colleges to identify the characteristics of a good technical report. |
| | A8-2 Practice the rules and principles of technical writing. |
| | A8-3 Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations. |

**Course Coordinator: Dr. Hosam Elashkar**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1 Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Electrical Engineering | | |
| **Course Code** | **HUF001** | | |
| **Year/ Level** | Preparatory year- First semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | **2** | **--** | **--** |

## 2 Course aims:

| **No.** | **Aim** |
|---|---|
| 1 | Apply a wide spectrum of knowledge for society driving engineering developments and engineering developments changing society with the main emphasis placed on developments and changes over the past three hundred years. |

## 3 Learning Outcomes (LOs):

| | |
|---|---|
| **A7.1** | Recognize the importance and the evolution of engineering education. |
| **A9.1** | Identify the responsibilities and job description of engineers in different positions. |
| **A10.1** | Demonstrate the skill of making good communication using internet or brief presentation. |
| **A10.2** | Use the internet to communicate and present summaries or opinions. |

## 4 Course Contents:

| **No.** | **Topics** | **Week** |
|---|---|---|
| 1 | **Lectures:**<br>• Definitions: art, science, technology and engineering. | **1-2** |
| 2 | **Lectures:**<br>• Relationship between civilizations and natural and social sciences. | **3-4** |
| 3 | **Lectures:**<br>• Development of different engineering fields. | **5-6** |
| 4 | **Lectures:**<br>• Historical relationship between sciences and technology. | **7-8** |
| 5 | **MID-TERM EXAM** | **9** |
| 6 | **Lectures:**<br>• The impact of the engineering evolution on societal and economic development. | **10-12** |
| 7 | **Lectures:** | **13-15** |

| | | |
|---|---|---|
| | • Various examples on the aspects of engineering activities. | |

## 5 Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online/in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A7.1 | x | | | x | x | | | | | | x | | | |
| | A9.1 | x | | x | x | x | x | x | | | | x | | | |
| | A10.1 | x | | x | x | x | x | x | | | | x | | | |
| | A10.2 | x | | | x | x | | | x | | | | | | |

## 6 Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Online lectures and assignments |

## 7 Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A7.1, A9.1, A10.1 |
| 2 | Exercises & Reports | A7.1, A9.1, A10.1, A10.2 |
| 3 | Formative (quizzes- online quizzes- presentation) | A7.1, A9.1, A10.1, A10.2 |
| 4 | Final Term Examination (written) | A7.1, A9.1, A10.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Exercises & Reports | Weekly |
| 3 | Formative (quizzes- online quizzes- presentation) | 6th -11th |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Exercises & Reports | 5 |
| 3 | Formative (quizzes- online quizzes- presentation) | 5 |
| 4 | Final Term Examination (written) | 80 |
| **Total** | | 100% |

## 8 List of References:

| No. | Reference List |
|---|---|
| 1 | Course notes |
| 2 | Essential books (text books)<br>● ملاحظات المنهج<br>● الكتب الضرورية (كتب دراسية)<br>● كتاب تاريخ الهندسة والتكنولوجيا + اسطوانة مدمجة، اعداد أ.د عاطف علم الدين<br>● تاريخ العلوم والتكنولوجيا الهندسية<br>● د. أحمد علي العريان – عالم الكتب 6991.<br>● تاريخ العلوم والتكنولوجيا في العصور القديمة والوسطى<br>● د. مصطفى محمود سليمان – الهيئة المصرية العامة للكتاب 6991.<br>● التنمية التكنولوجية مفهومها ومتطلباتها<br>● د. يعقوب فهد العبيد – الدار الدولية للنشر والتوزيع 6999.<br>● الطاقة في عالم الغد (الحقائق، والخيارات الواقعية، وبرنامج الإنجاز )<br>● لجنة مجلس الطاقة العالمي – الطبعة العربية 6991.<br>• Brain, M. The Engineering Book: From the Catapult to the Curiosity Rover, 250 Milestones in the History of Engineering (Sterling Milestones), 2015 |

## 9 Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Reports |
| 3 | White Board |

| | |
|---|---|
| 4 | Data Show System |
| 5 | Presenter |

## 10 Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>Definitions: art, science, technology and engineering. | 1 | A7.1, A9.1, A10.1 |
| 2 | **Lectures:**<br>Relationship between civilizations and natural and social sciences. | 1 | A9.1, A10.2 |
| 3 | **Lectures:**<br>Development of different engineering fields. | 1 | A9.1, A10.1, A10.2 |
| 4 | **Lectures:**<br>Historical relationship between sciences and technology. | 1 | A9.1, A10.1, A10.2 |
| 5 | **MID-TERM EXAM** | 1 | A7.1, A9.1, A10.1 |
| 6 | **Lectures:**<br>The impact of the engineering evolution on societal and economic development. | 1 | A9.1, A10.1, A10.2 |
| 7 | **Lectures:**<br>Various examples on the aspects of engineering activities. | 1 | A9.1, A10.1, A10.2 |

| Course: Engineering and Technology History | |
|---|---|
| **Program LOs** | **Course LOs** |
| **A7.** Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. | **A7.1** Recognize the importance and the evolution of engineering education. |
| **A9.** Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | **A9.1** Identify the responsibilities and job description of engineers in different positions. |
| **A10.** Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | **A10.1** Demonstrate the skill of making good communication using internet or brief presentation.<br>**A10.2** Use the internet to communicate and present summaries or opinions. |

**Course Coordinator: Prof. Dr. Attef Alam Eldeen**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

<table>
<tr><td><b>Program Title</b></td><td colspan="3">B. Sc. in Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Department offering the Program</b></td><td colspan="3">Naval Architecture and Marine Engineering</td></tr>
<tr><td><b>Department Responsible for the Course</b></td><td colspan="3">Physics and Mathematical Engineering</td></tr>
<tr><td><b>Course Code</b></td><td colspan="3"><b>SCI005</b></td></tr>
<tr><td><b>Year/ Level</b></td><td colspan="3">Preparatory year- Second semester</td></tr>
<tr><td rowspan="2"><b>Teaching Hours</b></td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>2</td><td>-</td></tr>
</table>

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Identify all techniques of integration, Numerical integration, and Fundamental Theorem of Calculus. As well as partial fraction-Mathematical, Complex Numbers-Determinates-Matrices-Theory of reminder and Synthetic Division-Theory of equations-set theory. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Recognize integration by using: Substitution-Integration by parts- Numerical methods. |
| **A1.2** | Define the Complex Numbers-Determinates-Matrices. |
| **A1.3** | Recognize integration of exponential and logarithmic functions using Trigonometric substitutions. |
| **A1.4** | Solve the matrices problems. |
| **A1.5** | Estimate integral with finite sum and Integrating by using: Trapezoidal rule-Simpson's rule. |
| **A1.6** | Use the method of Gauss elimination. |
| **A1.7** | Analyze the fraction to its partial fractions. |
| **A2.1** | Solve a variety of Theory of reminder and Synthetic division problems. |
| **A2.2** | Apply the Theory of equations-set theory to solve different problems. |
| **A2.3** | Estimate to read and understand, write, and construct mathematical proofs. |
| **A2.4** | Use the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations. |
| **A2.5** | Evaluate the area between two curves. |
| **A2.6** | Relate derivatives and integrals (Fundamental Theorem of calculus). |
| **A2.7** | Apply integration methods to find areas. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>• Indefinite integrals.<br>• Integration methods.<br>• Partial fractions.<br>• Mathematical induction.<br>• Complex numbers.<br>**Tutorials:**<br>• Solve multiple Indefinite integrals. | 1-4 |
| **2** | **Lectures:**<br>• Definite integral - improper integral.<br>• Determinates - Matrices -Theory of reminder and Synthetic division.<br>• Theory of equations.<br>**Tutorials:**<br>• Evaluate definite integral and improper integral. | 5-8 |
| **3** | Midterm | 9 |
| **4** | **Lectures:**<br>• Applications (areas, arc length, volume)<br>• Sequences and infinite series.<br>**Tutorials:**<br>• Solve the problems of sequences and infinite series. | 10-11 |
| **5** | **Lectures:**<br>• Numerical integration (trapezoidal rule, Simpson's rule)<br>• Set theory.<br>**Tutorials:**<br>• Solve the problems of numerical integration and Set theory. | 12-14 |
| **6** | Final submission | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online/ in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | X | x | | | | x | | | | | | | | |
| | A1.3 | X | x | | | | x | | | | | | | | |
| | A1.4 | X | x | | | | x | | | | | | | | |
| | A1.5 | X | x | | | | x | | | | | | | | |
| | A1.6 | X | x | | | | x | | | | | | | | |
| | A1.7 | X | x | | | | x | | | | | | | | |
| | A2.1 | X | | | | | x | | | | | | | | |
| | A2.2 | X | | X | | | x | | | | | | | | |
| | A2.3 | X | | X | | | x | | | | | | | | |
| | A2.4 | X | | X | | | x | | | | | | | | |
| | A2.5 | X | | X | | | x | | | | | | | | |
| | A2.6 | X | | | | | x | | | | | | | | |
| | A2.7 | X | | | | X | x | x | | | | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4, A1.5, A1.7, A2.1, A2.3, A2.6 |
| 2 | Formative (quizzes- online quizzes) | A1.1, A2.3, A1.3, A1.5, A1.7, A2.6 |
| 3 | Final Term Examination (written) | A1.1, A1.2 A1.3, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 2 | Formative (quizzes- online quizzes) | 10 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Calculus 5e, James Stewart, McMaster university, Thomson, Australia, 2003. |
| 2 | Erwin Kreyszig :"Advanced Engineering Mathematics" John Wiley & Sons, N.Y 10th edition, 2011) |
| 3 | - William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc,4th edition,2014 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| **1** | **Lectures:**<br>• Integration methods.<br>• Partial fractions.<br>• Mathematical induction.<br>• Complex numbers.<br>**Tutorials:**<br>• Solve multiple Indefinite integrals | 1 | A1.1, A1.2, A1.3, A1.7, A2.3, A2.6 |
| **2** | **Lectures:**<br>• Definite integral - improper integral.<br>• Determinates - Matrices -Theory of reminder and Synthetic division.<br>• Theory of equations.<br>**Tutorials:**<br>• Evaluate definite integral and improper integral. | 1 | A1.4, A1.5, A2.1 |
| **3** | Midterm | 1 | |
| **4** | **Lectures:**<br>• Applications (areas, arc length, volume)<br>• Sequences and infinite series.<br>**Tutorials**<br>• Solve the problems of sequences and infinite series. | 1 | A1.4, A1.5, A1.6, A2.4, A2.5, A2.7 |
| **5** | **Lectures:**<br>• Numerical integration (trapezoidal rule, Simpson's rule).<br>• Set theory.<br>**Tutorials**<br>• Solve the problems of numerical integration and Set theory**.** | 1 | A1.4, A2.2 |
| **6** | Final submission of the project. | 1 | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7 |

| **Course: Mathematics (2)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics | A1.1 Recognize integration by using: Substitution-Integration by parts- Numerical methods.<br>A1.2 Define the Complex Numbers- |

| | |
|---|---|
| | Determinates-Matrices.<br>A1.3 Recognize integration of exponential and logarithmic functions using Trigonometric substitutions.<br>A1.4 Solve the matrices problems.<br>A1.5 Estimate integral with finite sum and Integrating by using: Trapezoidal rule-Simpson's rule.<br>A1.6 Use the method of Gauss elimination.<br>A1.7 Analyze the fraction to its partial fractions. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Solve a variety of Theory of reminder and Synthetic division problems.<br>A2.2 Apply the Theory of equations-set theory to solve different problems.<br>A2.3 Estimate to read and understand, write, and construct mathematical proofs.<br>A2.4 Use the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations.<br>A2.5 Evaluate the area between two curves.<br>A2.6 Relate derivatives and integrals (Fundamental Theorem of calculus).<br>A2.7 Apply integration methods to find areas. |

**Course Coordinator: Dr. Mohamed Yousef Farghaly**

**Dr. Mohamed Khalil EL Gayyar**

**Dr. Youssef Mohamed Baghdadi**

**Dr. Moanis Abd Eltawab**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
|---|---|---|---|
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI006** | | |
| **Year/ Level** | Preparatory Year -Second semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Identify the principles of dynamics, Rectilinear and Curvilinear motion, the Linear momentum, Angular momentum of particles, and solve any problem in a simple and logical manner |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the Rectilinear motion of particles (Position, Velocity, and acceleration). |
| **A1.2** | Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration). |
| **A1.3** | Define the Linear Momentum of particles, rate of change of Linear Momentum. |
| **A1.4** | Identify the equations of motion. |
| **A2.1** | Discuss the Angular momentum of particles. |
| **A2.2** | Evaluate the Trajectory of particles under a central force. |
| **A2.3** | Resolve the equations of motion in different coordinates**.** |
| **A2.4** | Solve the Projectiles problems. |
| **A2.5** | Apply to the Central Impact of two Spheres. |
| **A2.6** | Solve the Loss of Kinetic Energy during the Impact of two Spheres. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures: Chapter 1**<br>- Kinematics of particles.<br>- Rectilinear motion of particles (Position, Velocity and acceleration).<br>- Curvilinear motion of a particles (Position vector, Velocity and Acceleration).<br>**Tutorials:**<br>• Solve the Position, Velocity and acceleration problems.<br>• Review examples of the Curvilinear motion of a particle | 1-4 |
| 2 | **Lectures: Chapter 2**<br>- Kinetics of particles.<br>- Newton's Second law of motion.<br>- Equations of motion in different coordinates.<br>- Angular momentum of a particles.<br>- Kepler's Laws of Planetary motion.<br>- Trajectory of a particles under a central force.<br>**Tutorials:**<br>-Solve the problems. | 5-8 |
| 3 | **Midterm** | 9 |
| 4 | **Lectures: Chapter 3**<br>- Projectiles<br>**Tutorials:**<br>- Solve the Projectiles problems. | 10-11 |
| 5 | **Lectures: Chapter 4**<br>- Impact.<br>- Equations of Impact of a Sphere on a Fixed Body.<br>- Central Impact of two Spheres.<br>- Oblique Central Impact of two Spheres.<br>- Loss of Kinetic Energy.<br>**Tutorials:**<br>Solve the problems. | 12-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture) online/ in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | | | x | | | | | | | | |
| | A1.2 | x | x | | | x | | | | | | | | | |
| | A1.3 | x | x | | | x | x | | | | | | | | |
| | A1.4 | x | x | | | | | | | | | | | | |
| | A2.1 | x | x | | | x | | x | | | | | | | |
| | A2.2 | x | x | | | | | | | | | | | | |
| | A2.3 | x | x | | | | x | | | | | | | | |
| | A2.4 | x | x | | | | x | | | | | | | | |
| | A2.5 | x | x | | | | x | | | | | | | | |
| | A2.6 | x | x | | | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

# 7. Student assessment:

## 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3 |
| 2 | Formative (quizzes- online quizzes) | A2.4, A2.5, |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6. |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 15 |
| 2 | Formative (quizzes- online quizzes) | 15 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

# 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, 2010. |
| 2 | Ferdinand P. Beer and E. Russell Johnston, Jr."Vector Mechanics for Engineers" Dynamics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York 2014. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Chapter 1**<br>- Kinematics of particles.<br>- Rectilinear motion of particles (Position, Velocity and acceleration).<br>- Curvilinear motion of a particles (Position vector, Velocity and Acceleration). | 1 | A1.1, A1.2, A1.3, A1.4 |
| 2 | **Chapter 2**<br>- Kinetics of particles.<br>- Newton's Second law of motion.<br>- Equations of motion in different coordinates.<br>- Angular momentum of a particles.<br>- Kepler's Laws of Planetary motion.<br>- Trajectory of a particles under a central force. | 1 | A2.1, A2.2, A2.3 |
| 3 | Midterm | 1 | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3 |
| 4 | **Chapter 3**<br>- Projectiles | 1 | A2.4 |
| 5 | **Chapter 4**<br>- Impact.<br>- Equations of Impact of a Sphere on a Fixed Body.<br>- Central Impact of two Spheres.<br>- Oblique Central Impact of two Spheres.<br>- Loss of Kinetic Energy. | 1 | A2.5, A2.6. |

| **Course :Mechanics(2)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Identify the Rectilinear motion of particles (Position, Velocity, and acceleration).<br>A1.2 Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration).<br>A1.3 Define the Linear Momentum of particles, rate of change of Linear Momentum.<br>A1.4 Identify the equations of motion. |
| A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Discuss the Angular momentum of particles.<br>A2-2 Evaluate the Trajectory of particles under a central force.<br>A2-3 Resolve the equations of motion in different coordinates.<br>A2-4 Solve the Projectiles problems.<br>A2-5 Apply to the Central Impact of two Spheres.<br>A2-6 Solve the Loss of Kinetic Energy during the Impact of two Spheres. |

**Course Coordinator: Dr. Amr Hassan Abdalla**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | **SCI007** | | |
| **Year/ Level** | Preparatory year – Second semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Describe the electricity and magnetism laws, properties of light as a wave and its laws, the applications of laser and types of optical lens. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the basics of electric field and its laws, the relation between the magnetic potential and the magnetic field intensity, the nature of light waves. |
| **A1.2** | Distinguish between the electric conductors and insulators, between different properties of light and between images formed by various lenses. |
| **A1.3** | Recognize the electric field by using Gauss's Law, the Capacitors, effect of an insulator inside a capacitor. |
| **A1.4** | Recognize the Magnetic fields, Magnetic forces, and the optical instruments and lenses. |
| **A2.1** | Investigate Snell's law of light refraction, ohm's law experiment and Stefan Boltzmann's radiation law. |
| **A2.2** | Evaluate different parameters of optical lenses and the prism, the electrochemical equivalent of copper, magnetic dipole constant of magnetic by magnetometer. |
| **A2.3** | Show the different parameters through the lens maker's equation and the angular magnification for optical instruments. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>**Chapter 1: The Electric field**<br>• The Electric field due to a continuous distribution of charge (charged wire-charged ring-charged plate).<br>• The effect of the electric field on a charged point.<br>• The effect of the electric field on the Electric Dipole examples.<br>**Chapter 1: Nature of light**<br>• Light as a corpuscle and as a wave.<br>• Measurements of the speed of light (Fizeau method) -Wave front -Huygens's principle.<br>• Reflection of Light: The Laws of reflection- rotation of reflected planes - Spherical Mirror and its type -The relation between focal Length and the radius of curvature.<br>• The general law of spherical mirrors.<br>• Concave mirror and its cases of formed images.<br>• Convex Mirror and its cases of formed images.<br>**Labs/Tutorials:**<br>• Determination the power of convex lens. | 1-3 |
| 2 | **Lectures:**<br>**Chapter2: Electric Flux**<br>• Electric flux and Gauss's law<br>• Applications of Gauss's law<br>**Chapter2: Refraction of Light**<br>• Refraction of light -The index of refraction -The laws of refraction -Deriving the Snell's law of refraction using Huygens's principle -Refraction by plane-parallel plate. Total internal reflection -The critical angle and its application.<br>• Fiber optics -Types of fiber optics (single-mode, multi-mode).<br>• The physical basic for transport of light through the fiber optics -The components of the fiber optics -The advantage of fiber optics -Practical application on using of the fiber optics. Images formed by refraction at spherical surfaces.<br>**Labs/Tutorials:**<br>• Determination of refractive index of water by liquid lens method. | 4-5 |
| 3 | **Lectures:**<br>**Chapter 3: Electric Potential**<br>• Electric Potential - Potential difference (in a uniform field-not a uniform field- a continuous distribution of charge).<br>• The potential for (a charged wire- a charged sphere) –The electric potential energy –The relation between the electric field and the | 6-8 |

| | | |
|---|---|---|
| | electric potential.<br>**Chapter 3: Thin Lenses and Optical Instruments**<br>• Thin lenses and optical instruments - Thin lens equation and lens-Makers' Equation -The lateral magnification-fundamental principles of light by lenses (converging lens- diverging lens) - Graphical method of forming images by converging lens and diverging lens - The Power of lens -Combination of thin lenses -Thin Lenses in Contac -The simple magnifier –The compound Microscope –The Astronomical Telescope.<br>**Labs/Tutorials:**<br>• Determination of apex angel and refractive index of prism by using spectrometer. | |
| **4** | **Midterm exam** | 9 |
| **5** | **Lectures:**<br>**Chapter 4: Capacitors**<br>• Capacitors – The parallel plate capacitor – Cylindrical capacitor – Spherical capacitor.<br>• Electric volume energy density – Effect of a conductor inside a capacitor -Effect of an insulator inside a capacitor.<br>**Chapter4: Interference Diffraction and Polarization of Light**<br>• Diffraction and polarization of light - Interference of light waves and conditions for Interference -Young's Double Slit experiment Lloyd's mirror - Interference in thin films, find of constructive and destructive -Application on Interference in thin films - Newton's Rings -The Michelson interferometer.<br>**Labs/Tutorials:**<br>• Determination of the electrochemical equivalent of copper.<br>• Determination of radius of curvature of convex lens by using Newton's rings. | 10-11 |
| **6** | **Lectures:**<br>**Chapter 5: Electric current**<br>• Electric current and Ohm's Law Solving electrical circuit by using Kirchhoff's Law.<br>**Chapter 5: Diffraction**<br>• Fraunhofer Diffraction -Fresnel Diffraction – Single slit diffraction -The diffraction grating - Resolving power of the diffraction grating -Polarization of light waves -Polarization by selective absorption polarization by reflection.<br>• Polarization by Double Refraction.<br>• Polarization by Scattering.<br>**Labs/Tutorials:**<br>• Investigate ohm's low experiment. | 12-13 |

| | | |
|---|---|---|
| 7 | **Lectures:**<br>**Chapter 6: Magnetic field**<br>- Magnetic fields and Magnetic forces (magnetic field intensity - magnetic induction-magnetic flux - magnetic moment - magnetic voltage) - The relation between the magnetic potential and the magnetic field intensity. Magnetic effect for the electric current (Biot - Savart Law- Magnetic induction of a circular conductor - Magnetic induction of a straight conductor).<br>**Chapter 6: Laser Emission**<br>- Laser emission - Types of laser emission - Population inversion by optical pumping - Gaseous laser (Helium-Neon) -The holography (Pictures in three dimensions)-Fluorescence and phosphorescence-Laser application (Industrial, Medical, Military, and daily application).<br>**Labs/Tutorials:**<br>- Determination of magnetic dipole constant of magnetic by magnetometer**.** | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| **A-Level** | **A1.1** | x | | | | | x | | | | | | | | |
| | **A1.2** | x | x | | x | | x | | | | | | | | |
| | **A1.3** | x | x | | | | x | | | | | | | | |
| | **A1.4** | x | x | | | | x | | | | | | | | |
| | **A2.1** | x | | | | | x | | | | | | | | x |
| | **A2.2** | x | | | | | x | | | | | | | | x |
| | **A2.3** | x | | | | | x | | | | | | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, |
| 2 | Practical | A2.1, A2.2, A2.3 |
| 3 | Oral Examination | A1.1, A1.2, A1.3, A1.4 |
| 4 | Formative (quizzes- online quizzes- Reports.) | A1.1, A1.2, A1.3, A1.4 |
| 5 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes- reports) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes- presentation reports) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | أساسيات الفيزياء - تأليف بوش - الطبعة الخامسة 1122 ترجمة د. سعيد الجزيري & د. محمد أمين سليمان |
| 2 | أساسيات الفيزياء الكلاسيكية والمعاصرة تأليف د/رأفت كامل واصف - الطبعة الأولى (1122) |
| 3 | فيزياء الجوامد - تأليف أ. د. محمد أمين سليمان و أ. د. أحمد فؤاد باشا و أ. د. شريف خيري (1122) |
| 4 | Wahab. “Essentials of crystallography” second Edition, Narosa Publishing House, 2014 |
| 5 | Kittel C.” Introduction to Solid State Physics” Wiley; 8th edition, 2018 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• The Electric field due to a continuous distribution of charge (charged wire-charged ring-charged plate).<br>• The effect of the electric field on a charged point.<br>• The effect of the electric field on the Electric Dipole examples.<br>• Light as a corpuscle and as a wave.<br>• Measurements of the speed of light (Fizeau method) -Wave front - Huygens's principle.<br>• Reflection of Light: The Laws of reflection-rotation of reflected planes - Spherical Mirror and its type -The relation between focal Length and the radius of curvature.<br>• The general law of spherical mirrors.<br>• Concave mirror and its cases of formed images.<br>• Convex Mirror and its cases of formed images.<br>**Labs/Tutorials:**<br>• Determination of refractive index of water by liquid lens method. | 1 | A1.1, A2.2 |
| 2 | **Lectures:**<br>• Electric flux and Gauss's law<br>• Applications of Gauss's law<br>• Refraction of light -The index of refraction -The laws of refraction -Deriving the Snell's law of refraction using Huygens's principle -Refraction by plane-parallel plate. Total internal reflection -The critical angle and its application.<br>• Fiber optics -Types of fiber optics (single-mode, multi-mode).<br>• The physical basic for transport of light through the fiber optics -The components of the fiber optics -The advantage of fiber optics -Practical application on using of the fiber optics. Images formed by refraction at spherical surfaces.<br>**Labs/Tutorials:**<br>• Determination of refractive index of water by liquid lens method. | 1 | A1.1, A1.2 , A1.3, A2.2 |
| 3 | **Lectures:** | 1 | A2.2, A2.3, A1.1, |

| | | | |
|---|---|---|---|
| | • Electric Potential - Potential difference (in a uniform field-not a uniform field- a continuous distribution of charge).<br>• The potential for (a charged wire- a charged sphere) –The electric potential energy –The relation between the electric field and the electric potential.<br>• Thin lenses and optical instruments - Thin lens equation and lens-Makers' Equation -The lateral magnification-fundamental principles of light by lenses (converging lens- diverging lens) - Graphical method of forming images by converging lens and diverging lens -The Power of lens -Combination of thin lenses -Thin Lenses in Contac -The simple magnifier –The compound Microscope –The Astronomical Telescope.<br>**Labs/Tutorials:**<br>• Determination of apex angel and refractive index of prism by using spectrometer.. | | A1.2 |
| **4** | Midterm | 1 | A1.1, A1.2, A1.3 |
| **5** | **Lectures:**<br>• Capacitors – The parallel plate capacitor – Cylindrical capacitor – Spherical capacitor.<br>• Electric volume energy density – Effect of a conductor inside a capacitor -Effect of an insulator inside a capacitor.<br>• Diffraction and polarization of light - Interference of light waves and conditions for Interference - Young's Double Slit experiment Lloyd's mirror - Interference in thin films, find of constructive and destructive -Application on Interference in thin films - Newton's Rings -The Michelson interferometer.<br>**Labs/Tutorials:**<br>• Determination of the electrochemical equivalent of copper.<br>• Determination of radius of curvature of convex lens by using Newton's rings. | 1 | A1.1, A1.2, A1.3,<br>A2.2 |
| **6** | **Lectures:**<br>• Electric current and Ohm's Law Solving electrical circuit by using Kirchhoff's Law.<br>• Fraunhofer Diffraction -Fresnel Diffraction – Single slit diffraction -The diffraction grating - Resolving power of the diffraction grating - Polarization of light waves -Polarization by | 1 | A1.1, A1.2, A1.3,<br>A2.2, A2.3 |

| | | | |
|---|---|---|---|
| | selective absorption polarization by reflection.<br>- Polarization by Double Refraction.<br>- Polarization by Scattering.<br>**Labs/Tutorials:**<br>- Investigate ohm's low experiment. | | |
| **7** | **Lectures:**<br>- Services within neighborhoods Magnetic fields and Magnetic forces (magnetic field intensity - magnetic induction-magnetic flux - magnetic moment - magnetic voltage) - The relation between the magnetic potential and the magnetic field intensity. Magnetic effect for the electric current (Biot - Savart Law- Magnetic induction of a circular conductor - Magnetic induction of a straight conductor).<br>- Laser emission - Types of laser emission - Population inversion by optical pumping - Gaseous laser (Helium-Neon) -The holography (Pictures in three dimensions)-Fluorescence and phosphorescence-Laser application (Industrial, Medical, Military, and daily application).<br>**Labs/Tutorials:**<br>- Determination of magnetic dipole constant of magnetic by magnetometer**.** | 1 | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3 |
| **8** | Final Term Examination | 1 | A1.1, A1.2, A1.3, A1.4 |

| **Course: Physics (2)** | |
|---|---|
| **Program LOs** | **Course LOs** |

| | |
|---|---|
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics. | A1.1 Identify the basics of electric field and its laws, the relation between the magnetic potential and the magnetic field intensity, the nature of light waves.<br>A1.2 Distinguish between the electric conductors and insulators, between different properties of light and between images formed by various lenses.<br>A1.3 Recognize the electric field by using Gauss's Law, the Capacitors, effect of an insulator inside a capacitor.<br>A1.4 Recognize the Magnetic fields, Magnetic forces, and the optical instruments and lenses. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Investigate Snell's law of light refraction, ohm's law experiment and Stefan Boltzmann's radiation law.<br>A2.2 Evaluate different parameters of optical lenses and the prism, the electrochemical equivalent of copper, magnetic dipole constant of magnetic by magnetometer.<br>A2.3 Show the different parameters through the lens maker's equation and the angular magnification for optical instruments. |

**Course Coordinator: Ass. Prof. Dr. Abdel Naser Ahmed Mansour**

**Dr. Fatma Fathy El-Sanabary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

<table>
<tr><td><b>Program Title</b></td><td colspan="3">B. Sc. in Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Department offering the Program</b></td><td colspan="3">Naval Architecture and Marine Engineering</td></tr>
<tr><td><b>Department Responsible for the Course</b></td><td colspan="3">Production Engineering & Mechanical Design</td></tr>
<tr><td><b>Course Code</b></td><td colspan="3"><b>PRD001</b></td></tr>
<tr><td><b>Year/ Level</b></td><td colspan="3">Preparatory year</td></tr>
<tr><td rowspan="2"><b>Teaching Hours</b></td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>0</td><td>2</td></tr>
</table>

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Identify the basic knowledge for both manufacturing and industrial engineering beside the information about engineering materials, workshop safety and bench work. Acquire knowledge and skills in the use of hand tools, layout tools, measuring tools and machine tools |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the classification of engineering materials according to their crystal structures and their main properties. |
| **A1.2** | Recognize the tools and the methods that are used in designing and manufacturing of casting processes. |
| **A1.3** | Demonstrate the essential knowledge to understand and conduct forming and cutting processes. |
| **A2.1** | Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements. |
| **A2.2** | Select a proper material and a suitable process considering design requirements to obtain a certain product. |
| **A2.3** | Use measuring instruments and workshops to conduct the practical part of the course. |
| **A4.1** | Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and industrial safety requirements and environmental issues during conducting the workshops. |
| **A4.2** | Apply safe systems at work to observe the appropriate steps to manage risk during conducting the workshops. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>- Introduction to engineering materials.<br>**Labs/Tutorials:**<br>- Carpentry workshop. | 1 |
| **2** | **Lectures:**<br>- Crystal structures of metals and alloys.<br>**Labs/Tutorials:**<br>- Models Workshop. | 2-3 |
| **3** | **Lectures:**<br>- Metal alloys – Powder metallurgy.<br>**Labs/Tutorials:**<br>- Casting Processes Workshop. | 4 |
| **4** | **Lectures:**<br>- Casting processes.<br>**Labs/Tutorials:**<br>- Welding Workshop. | 5-6 |
| **5** | **Lectures:**<br>- Forming processes (forging, rolling, extrusion and drawing).<br>**Labs/Tutorials:**<br>- Workbench Processes Workshop. | 7-8 |
| **6** | Midterm | 9 |
| **7** | **Lectures:**<br>- Cutting processes (turning, planning, milling, drilling and grinding).<br>**Labs/Tutorials:**<br>- Lathing Workshop. | 10-11 |
| **8** | **Lectures:**<br>- Welding processes<br>**Labs/Tutorials:**<br>- Machine workshop. | 12 |
| **9** | **Lectures:**<br>- Bench Work (Filling, Taping, Drilling and Sawing).<br>**Labs/Tutorials:**<br>- Electricity Workshop. | 13 |
| **10** | **Lectures:**<br>- Measuring tools, quality and safely.<br>**Labs/Tutorials:**<br>- Laboratory measurements and measuring instrumentations. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | | x | x | | | | | | | | |
| | A1.2 | x | x | | | x | x | | | | | | | | |
| | A1.3 | x | x | | | x | x | | | | | | | | |
| | A2.1 | x | | | | x | | | | x | | | | | x |
| | A2.2 | x | | | | x | x | | | | | | | | x |
| | A2.3 | x | | x | | x | | | | x | | | | | x |
| | A4.1 | x | | x | | x | x | | | | | | | | |
| | A4.2 | x | | x | | x | | | | x | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A2.1, A2.2, A4.1 |
| 2 | Practical | A2.1, A2.2, A2.3, |
| 3 | Formative (quizzes- online quizzes- presentation ) | A1.1, A1.2, A1.3, A2.1, A2.2, A2.3, A4.1, A4.2 |
| 4 | Final Term Examination (written) | A1.1, A1.2, A1.3, A2.1, A2.2, A4.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical | 15 |
| 3 | Formative (quizzes- online quizzes- presentation ) | Every 3 weeks |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical | 10 |
| 3 | Formative (quizzes- online quizzes- presentation ) | 20 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Mittemeijer, E. J. Fundamentals of Materials Science: The Microstructure–Property Relationship Using Metals as Model Systems, 2010. |
| 2 | Fundamentals of Manufacturing for Engineers, Published by University College London (UCL), 1996. |

## 9. Facilities Required for Teaching and Learning:

| **No.** | **Facility** |
|---|---|
| **1** | Lecture Classroom |
| **2** | Lab Facilities |
| **3** | White Board |
| **4** | Data Show System |
| **5** | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| **1** | **Lectures:**<br>• Introduction to engineering materials.<br>**Labs/Tutorials:**<br>• Carpentry workshop. | 1 | A1.1, A1.2, A4.2 |
| **2** | **Lectures:**<br>• Crystal structures of metals and alloys.<br>**Labs/Tutorials:**<br>• Models Workshop. | 1 | A1.1, A1.2 |
| **3** | **Lectures:**<br>• Metal alloys – Powder metallurgy.<br>**Labs/Tutorials:**<br>• Casting Processes Workshop. | 1 | A1.1, A1.3, A2.2, A2.3, A4.1 |
| **4** | **Lectures:**<br>• Casting processes.<br>**Labs/Tutorials:**<br>• Welding Workshop. | 1 | A1.1, A1.2, A2.3, A4.2 |
| **5** | **Lectures:**<br>• Forming processes (forging, rolling, extrusion and drawing).<br>**Labs/Tutorials:**<br>• Workbench Processes Workshop. | 1 | A1.3, A2.2, A2.3, A4.1 |
| **6** | Midterm | 1 | A.1, A1.2, A1.3, A2.1, A2.2, A4.1 |
| **7** | **Lectures:**<br>• Cutting processes (turning, planning, milling, drilling, and grinding).<br>**Labs/Tutorials:**<br>• Lathing Workshop. | 1 | A1.3, A2.2, A2.3, A4.1 |
| **8** | **Lectures:**<br>• Welding processes<br>**Labs/Tutorials:**<br>• Machine workshop. | 1 | A2.1, A2.2, A2.3, A4.1, A4.2 |
| **9** | **Lectures:**<br>• Bench Work (Filling, Taping, Drilling and Sawing).<br>**Labs/Tutorials:**<br>• Electricity Workshop. | 1 | A1.3, A2.2, A4.2 |

| | | | |
|---|---|---|---|
| **10** | **Lectures:**<br>• Measuring tools, quality and safely.<br>**Labs/Tutorials:**<br>• Laboratory measurements and measuring instrumentations. | 1 | A2.2, A2.3 |

| Course: Production Technology | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics. | A1.1 Identify the classification of engineering materials according to their crystal structures and their main properties.<br>A1.2 Recognize the tools and the methods that are used in designing and manufacturing of casting processes.<br>A1.3 Demonstrate the essential knowledge to understand and conduct forming and cutting processes. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements.<br>A2.2 Select a proper material and a suitable process considering design requirements to obtain a certain product.<br>A2.3 Use measuring instruments and workshops to conduct the practical part of the course. |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4.1 Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and Industrial safety requirements and environmental issues during conducting the workshops.<br>A4.2 Apply safe systems at work to observe the appropriate steps to manage risk during conducting the workshops. |

**Course Coordinator: Prof. Dr. Ahmed Nassef**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Production Engineering & Mechanical Design | | |
| **Course Code** | **PRD003** | | |
| **Year/ Level** | Preparing year – Second semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 1 | 3 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Provide the Student, the basic knowledge and skills of the concepts and principles of engineering drawing and fundamental of drawing projections. The basic principles of drawing with several applications are also studied. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Identify the materials related to the parts of machines. |
| **A1.2** | Analyze the engineering problems that are used in engineering drawing. |
| **A3.1** | Apply the computer software (AutoCAD) for different drawing exercises. |
| **A3.2** | Use the image and samples of machines drawing applications. |
| **A10.1** | Identify the different type of drawing exercise. |
| **A10.2** | Study the characteristics and processes related to the different machines and symbol drawing. |
| **A10.3** | Use engineering drawing and mechanics drawing handbook. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>• Review on the drawing of the third projector with the knowledge of the other projections.<br>**Tutorials:**<br>• Drawing of some exercise for third projector. | 1 |
| **2** | **Lectures:**<br>• How to make a section in the engineering drawing.<br>**Tutorials:**<br>• Drawing of some exercise on simple section geometrics. | 2 |
| **3** | **Lectures:**<br>• Definition of the different Types in section bodies.<br>**Tutorials:**<br>• Drawing of some exercise for section bodies. | 3-4 |
| **4** | **Lectures:**<br>• Intersections of bodies and surfaces and development of surfaces.<br>**Tutorials:**<br>• Exercise on the intersections of bodies. | 5 |
| **5** | **Lectures:**<br>• How to draw the screw and nut in screwed joints.<br>**Tutorials:**<br>• Drawing of some exercise on screws and nuts. | 6 |
| **6** | **Lectures:**<br>• Drawing of the sections for different types of screwed joints.<br>**Tutorials:**<br>• Drawing some exercise on the sections for different types of screwed joints. | 7-8 |
| **7** | Midterm | 9 |
| **8** | **Lectures:**<br>• Identification for different of steel sections.<br>**Tutorials:**<br>• Steel construction, Symbols of electrical circuits, fasteners. | 10-11 |
| **9** | **Lectures:**<br>• Drawing of the sections for different types of steel joints.<br>**Tutorials:**<br>• Some exercise on the sections for different types of steel joints. | 12-13 |
| **10** | **Lectures:**<br>• Assembly of some mechanical components.<br>**Labs:**<br>• Computer aided drafting using solid work program. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | x | x | | | | | | | | | |
| | A1.2 | x | x | | x | | x | | | | | | | | |
| | A3.1 | x | x | | x | x | x | x | | | | | | | |
| | A3.2 | x | x | | x | | | | | | | | | | |
| | A8.1 | x | x | | x | | | | | | x | x | | | |
| | A8.2 | x | x | x | x | x | x | x | | | | | | | |
| | A8.3 | | | x | | | | | | | x | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A3.2, A8.1, A8.2 |
| 2 | Formative (quizzes- online quizzes) | A1.1, A1.2, A3.1, A3.2, A8.1, A8.2, A8.3 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A3.1, A3.2, A8.1, A8.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes) | Every 3 weeks |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 15 |
| 2 | Formative (quizzes- online quizzes) | 15 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References:

| No. | Reference List |
|---|---|
| 1 | K. L. Narayana, P. Kannaiah, and K. Venkata Reddy ' Machine Drawing' New Age International (P) Ltd., 2006. |
| 2 | Fatehy El-shrif, ' Mechanical Drawing' Helwan Univ., 1975. |
| 3 | C. Simmons, D. Maguive, and N. Phelps, 'Manual of Engineering Drawing', Elsevier Ltd., 2012. |
| 4 | K. R. Hart 'Engineering Drawing with Problems and Solutions' ELBS, 1984. |
| 5 | Book,” Engineering Drawing”, prepared by staff of production engineering and Machine design department |

## 9. Facilities Required for Teaching and Learning:

| **No.** | **Facility** |
|---|---|
| **1** | Lecture Classroom |
| **2** | White Board |
| **3** | Data Show System |
| **4** | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| **1** | **Lectures:**<br>• Review on the drawing of the third projector with the knowledge of the other projections.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for third projector. | 1 | A1.1 |
| **2** | **Lectures:**<br>• How to make a section in the engineering drawing.<br>**Labs/Tutorials:**<br>• Drawing of some exercise on simple section geometrics. | 1 | A1.2 |
| **3** | **Lectures:**<br>• Definition of the different Types in section bodies.<br>**Labs/Tutorials:**<br>• Drawing of some exercise for section bodies. | 1 | A1.2, A3.2, A8.1 |
| **4** | **Lectures:**<br>• Intersections of bodies and surfaces and development of surfaces.<br>**Labs/Tutorials:**<br>• Exercise on the intersections of bodies. | 1 | A1.2, A3.2, A8.1, A8.2 |
| **5** | **Lectures:**<br>• How to draw the screw and nut in screwed joints.<br>**Labs/Tutorials:**<br>• Drawing of some exercise on screws and nuts. | 1 | A1.2, A3.2, A8.1, A8.2 |
| **6** | **Lectures:**<br>• Drawing of the sections for different types of screwed joints.<br>**Labs/Tutorials:**<br>• Drawing some exercise on the sections for different types of screwed joints. | 1 | A1.2, A3.2, A8.1, A8.2, A8.3 |
| **7** | Midterm | 1 | A1.1, A1.2, A3.2, A8.1, A8.2 |
| **8** | **Lectures:**<br>• Identification for different of steel sections.<br>**Labs/Tutorials:**<br>• Steel construction, Symbols of electrical circuits, fasteners. | 1 | A1.2, A3.1, A3.2, A8.1, A8.2 |

| | | | |
|---|---|---|---|
| **9** | **Lectures:**<br>- Drawing of the sections for different types of steel joints.<br>**Labs/Tutorials:**<br>- Some exercise on the sections for different types of steel joints. | 1 | A1.2, A3.1, A3.2, A8.1, A8.2, A8.3 |
| **10** | **Lectures:**<br>- Assembly of some mechanical components.<br>**Labs/Tutorials:**<br>- Computer aided drafting using solid work program. | 1 | A1.2, A3.1, A3.2, A8.1, A8.2, A8.3 |

| Course: Engineering Drawing and Geometric Projection (2) | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Identify the materials related to the parts of machines.<br>A1.2 Analyze the engineering problems that are used in engineering drawing. |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Apply the computer software (AutoCAD) for different drawing exercises.<br>A3.2 Use the image and samples of machines drawing applications. |
| A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies. | A10.1 Apply the different type of drawing exercise.<br>A10.2 Study the characteristics and processes related to the different machines and symbol drawing.<br>A10.3 Use engineering drawing and mechanics drawing handbook. |

**Course Coordinator: Prof. Dr. Gamal Abdel Nasser**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Electrical Engineering | | |
| **Course Code** | **CCE001** | | |
| **Year/ Level** | Preparatory year – 2nd Semester | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 0 | 2 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **1** | Describe an introduction to personal computer, operating systems, filling systems, introduction to word processing, spread sheet theory, introduction to data base, multi-media and presentations, introduction to computer networks. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Define the concept of personal computers. |
| **A1.2** | Describe and review of basic computer languages. |
| **A3.1** | Describe the different word processing tools. |
| **A3.2** | Develop spreadsheets exercises. |
| **A3.3** | Create different types and designs of presentations. |
| **A10.1** | Prepare different database panes. |
| **A10.2** | Apply different techniques to relate surfing the network. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | **Lectures:**<br>- Introduction to PC<br>**Labs/Tutorials:**<br>- Operating Systems (DOS – WINDOWS) | 1-2 |
| **2** | **Lectures:**<br>- Filling Systems<br>**Labs/Tutorials:**<br>- Word Processing. | 3-4 |
| **3** | **Lectures:**<br>- Introduction to Computer Network<br>**Labs/Tutorials:**<br>- Application of Network Surfing. | 5-6 |
| **4** | **Lectures:**<br>- Introduction to Data Base.<br>**Labs/Tutorials:**<br>- Access Database. | 7-8 |
| **5** | Midterm | 9 |
| **6** | **Lectures:**<br>- Multimedia & Presentation.<br>**Labs/Tutorials:**<br>- Spreadsheet Theory. | 10-12 |
| **7** | **Lectures:**<br>- General Revision<br>**Labs/Tutorials:**<br>- General Revision | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online/in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | x | x | | x | | | | | | | | |
| | A1.2 | x | x | | x | x | | x | x | | | | x | | |
| | A3.1 | x | x | | x | x | x | | x | | | | | | |
| | A3.2 | x | x | | x | | | x | | | | | | | |
| | A3.3 | x | x | | x | | x | | | | | | | | x |
| | A10.1 | | x | | x | | | x | | | | | | | x |
| | A10.2 | | x | | x | | x | | | | | | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Online lectures and assignments |

# 7. Student assessment:

## 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | A1.1, A1.2, A3.1, A3.2 |
| **2** | Practical | A10.1 |
| **3** | Formative (quizzes- online quizzes) | A1.1, A1.2, A3.1, A3.2, |
| **4** | Final Term Examination (written) | A1.1, A1.2, A3.1, A3.2, A10.1, A10.2 |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | 9 |
| **2** | Practical | 15 |
| **3** | Formative (quizzes- online quizzes) | Every week |
| **4** | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination (written/ online) | 01 |
| **2** | Practical | 20 |
| **3** | Formative (quizzes- online quizzes) | 01 |
| **4** | Final Term Examination (written) | 01 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | "Computers - Timeline of Computer History - Computer History Museum". Retrieved 9 January 2017. |
| **2** | Ackerman, Dan (22 August 2013). "Don't buy a new PC or Mac before you read this". CNET. CBS Interactive. Retrieved 5 October 2014. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Introduction to PC<br>**Labs/Tutorials:**<br>• Operating Systems (DOS – WINDOWS) | 1 | A1.1 |
| 2 | **Lectures:**<br>• Filling Systems<br>**Labs/Tutorials:**<br>• Word Processing. | 1 | A3.1 |
| 3 | **Lectures:**<br>• Introduction to Computer Network<br>**Labs/Tutorials:**<br>• Application of Network Surfing. | 1 | A1.1, A1.2, A10.2 |
| 4 | **Lectures:**<br>• Introduction to Data Base.<br>**Labs/Tutorials:**<br>• Access Database. | 1 | A1.1, A1.2, A3.3, A10.2 |
| 5 | Midterm | 1 | A1.1, A1.2, A3.3, A10.2 |
| 6 | **Lectures:**<br>• Multimedia & Presentation.<br>**Labs/Tutorials:**<br>• Spreadsheet Theory. | 1 | A3.2 |
| 7 | **Lectures:**<br>• General Revision<br>**Labs/Tutorials:**<br>• General Revision | 1 | A1.1, A1.2, A3.1, A10.2 |

| Course: Computer and programming | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Define the concept of personal computers.<br>A1.2 Describe and review of basic computer languages. |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Describe the different word processing tools.<br>A3.2 Develop spreadsheets exercises.<br>A3.3 Create different types and designs of presentations. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10.1 Prepare different database panes.<br>A10.2 Apply different techniques to relate surfing the network. |

**Course Coordinator: Dr. Walaa Elsayed Saber**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

<table>
<tr><td><b>Program Title</b></td><td colspan="3">B. Sc. in Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Department offering the Program</b></td><td colspan="3">Naval Architecture and Marine Engineering</td></tr>
<tr><td><b>Department Responsible for the Course</b></td><td colspan="3">Electrical Engineering</td></tr>
<tr><td><b>Course Code</b></td><td colspan="3"><b>HUU002</b></td></tr>
<tr><td><b>Year/ Level</b></td><td colspan="3">Preparatory year- Second semester</td></tr>
<tr><td rowspan="2"><b>Teaching Hours</b></td><td>Lectures</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>2</td><td>---</td><td>---</td></tr>
</table>

## 2. Course Aims:

| No. | Aim |
|---|---|
| **4** | Identify the basic knowledge and skills of political significance of human rights, the idea of “universal” human rights, its global politics for condemning these and other crimes against humanity. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A8-1** | Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation. |
| **A8-2** | Work independently and within a team for class project and assignments. |
| **A9-1** | Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals. |
| **A9-2** | Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights |
| **A10-1** | Organize and manage time and resources effectively; for short-term and longer-term commitments. |
| **A10-2** | Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society. |
| **A10-3** | Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS |

## 4. Course Contents:

| *Week No.* | *Topic* | *Total Hours* | *Contact hrs* | | |
|---|---|---|---|---|---|
| | | | **Lec.** | **Tut.** | **Lab.** |
| *Week 1-2* | What are human rights? (Or the problem of definitions). | 4 | 4 | -- | -- |
| *Week-3* | Foundations of rights: enlightenment history and theory. | 2 | 2 | -- | -- |
| *Week 4* | The united nations: structure and function. | 2 | 2 | -- | -- |
| *Week 5* | Genocide, international criminal law, and human rights courts. | 2 | 2 | -- | -- |
| *Week 6* | The interrelatedness of rights. | 2 | 2 | -- | -- |
| *Week 7* | Types of rights 1: civil and political rights. | 2 | 2 | -- | -- |
| *Weeks 8* | Types of rights: economic, social, and cultural rights. | 2 | 2 | | |
| *Week 9* | Midterm Exam | 2 | 2 | | |
| *Week 10* | Human rights in Egypt. | 2 | 2 | | |
| *Week 11* | Social movements, social media, and representations of rights. | 2 | 2 | -- | -- |
| *Week 12* | Human rights narratives. | 2 | 2 | | |
| *Week 13* | “Special rights”: women’s rights. | 2 | 2 | | |
| *Week 14-15* | Group project discussion and presentation | 4 | 4 | | |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online-In class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A8-1 | X | | X | X | X | | X | X | | | X | | | |
| | A8-2 | X | | | X | | | X | X | | X | | | | |
| | A9-1 | X | | | | X | | X | | | | | | | |
| | A9-2 | X | | X | | X | | X | | | | | | | |
| | A10-1 | X | | | X | | | | X | | | X | | | |
| | A10-2 | X | | | | X | | X | | | | | | | |
| | A10-3 | X | | | | X | | X | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and documentation. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A8-1, A8-2, A9-1, A9-2, A10-2, A10-3 |
| 2 | Formative (quizzes- online quizzes- presentation - reports) | A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3 |
| 3 | Final Term Examination (written) | A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | Week 9 |
| 2 | Formative (quizzes- online quizzes- presentation - reports) | Throughout the semester |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 01 |
| 2 | Formative (quizzes- online quizzes- presentation - reports) | 01 |
| 3 | Final Term Examination (written) | 01 |
| Total | | 100% |

## 8. List of References:

| No. | Reference List |
|---|---|
| 1 | Surya P. Subedi, OBE, QC, The Effectiveness of the UN Human Rights System: Reform and the Judicialisation of Human Rights, 2019 |
| 2 | Daniel Moeckli, Sangeeta Shah, Sandesh Sivakumaran, David Harris, International Human Rights Law 1st Edition, Oxford University Press; 2010. |
| 3 | Reis Monteiro, A., Ethics of Human Rights. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Sound System Facility |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | What are human rights? (Or the problem of definitions). | 4 | A8-1, A8-2, A9-1 |
| 2 | Foundations of rights: enlightenment history and theory. | 4 | A8-1, A8-2, A9-1, A9-2 |
| 3 | The united nations: structure and function. | 4 | A8-1, A8-2, A9-1, A9-2 |
| 4 | Genocide, international criminal law, and human rights courts. | 4 | A8-1, A8-2, A10-3 |
| 5 | The interrelatedness of rights. | 4 | A8-1, A8-2, A10-2 |
| 6 | Types of rights 1: civil and political rights. | 4 | A8-1, A8-2, A10-2 |
| 7 | Types of rights: economic, social, and cultural rights. | 4 | A8-1, A8-2, A10-2 |
| 8 | Midterm Exam | 4 | A8-1, A8-2, A9-1, A9-2, A10-2, A10-3 |
| 9 | Human rights in Egypt. | 4 | A9-1, A9-2, A10-2 |
| 10 | Social movements, social media, and representations of rights. | 4 | A9-1, A10-2 |
| 11 | Human rights narratives. | 4 | A9-1, A10-2 |
| 12 | "Special rights": women's rights. | 4 | A9-1, A10-2 |
| 13 | Group project discussion and presentation | 4 | A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3 |

| Course: Human Rights | |
|---|---|
| **Program LOs** | **Course Los** |
| A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation. |
| | A8-2 Work independently and within a team for class project and assignments. |
| A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals. |
| | A9-2 Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Organize and manage time and resources effectively; for short-term and longer-term commitments. |
| | A10-2 Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society. |
| | A10-3 Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS |

**Course Coordinator: Dr. Mona Hamouda**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | |
|---|---|---|
| **Program title** | B. Sc. in Naval Architecture & Marine Engineering | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | |
| **Course Code** | SCI 109 | |
| **Year/ Level** | First year- 1st semester | |
| **Specialization** | Major | |
| **Teaching Hours** | Lectures | Tutorial |
| | 2 | 2 |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply the essential knowledge to understand of Some basic of calculus: Multiple Integrals, The normal and tangent plane, Surface Integration, Differential equations of the first order (basic definitions, separable, homogeneous, exact equations) , Partial derivatives applications, Maxima of Multivariate functions, Higher order differential equations: (homogeneous and non-homogeneous), Simultaneous, Curvature and Special curves. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Define the different classification of equations. |
| A1.2 | Recognize the different between the different type of differential equations. |
| A1.3 | Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters. |
| A1.4 | Identify the different between the double Integral and the triple Integral. |
| A1.5 | Recognize the different between the Maximum and minimum of function of two Variables |
| A1.6 | Recognize the concepts and theories of Fourier series. |
| A5.1 | Practice the classification of differential equations. |
| A5.2 | Distinguish the homogeneous and non-homogeneous equations. |
| A5.3 | Apply the different methods to solve the second order differential equations and determine the particular solutions. |
| A5.4 | Solve multiple integrals in any other area. |
| A5.5 | Show functions of several variables in various fields. |
| A9.1 | Use the text- books to solve some problems and collect some data. |
| B1.1 | Distinguish between the different kinds of the differential equations of the first order (or second order). |
| B1.2 | Acquire the operator method and variation of parameters to find the general solution for the second order differential equations. |
| B1.3 | Evaluate double integrals, changing the order of integration, using polar coordinates. |
| B1.4 | Evaluate triple integral, using cylindrical and spherical coordinates. |
| B1.5 | Apply the limits; discuss continuity, and studying differentiability, of functions of several variables. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>Chapter 1: First Order Differential Equations:<br>• Introduction about Classification of the Differential Equations<br>• Separation of Variables,<br>• Homogeneous Equations<br>• Exact Equations<br>• Integrating Factors<br>• Linear Equations<br>• Bernoulli's Equation<br>**Tutorials:**<br>• Apply the classification of differential equations.<br>• Practice of solving differential equations | 1-4 |
| 2 | **Lectures:**<br>Chapter 2: Higher Order Linear Differential Equation.<br>• Homogeneous equations with constant coefficients.<br>• Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters.<br>**Tutorials:**<br>• Apply the different methods to solve the second order differential equations and determine the particular solutions. | 5-7 |
| 3 | **Lectures:**<br>Chapter 3: Multiple Integrals<br>• Double integral<br>• Triple integral<br>• Surface integration<br>**Tutorials:**<br>• Evaluate the double Integral, the triple Integral and the area between two curves.<br>• Solve multiple integrals in any other area. | 8 |
| 4 | **Lectures:**<br>Chapter 4: Functions of Several Variables<br>• Partial derivatives<br>• Euler's Theorem for homogeneous Functions<br>• Exact differentials<br>• Taylor series of a function of two variables<br>• Maximum and minimum of a function of two variables<br>**Tutorials:**<br>• Apply the limits, discuss continuity , and solve differentiability, of functions of several variable.<br>• Use of text- books to solve some problems and collect some data. | 10-12 |

| | | |
|---|---|---|
| 5 | **Lectures:**<br>Chapter 5: Fourier series<br>(Periodic functions - triangular series - Fourier series of functions of the **2-pi** cycle - Fourier series of even and odd functions - Fourier series of functions with different cycles).<br>**Tutorials:**<br>Use of text- books to solve some problems and collect some data. | 13-15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture(on line / in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial(on line / in class)** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | x | x | | | | | | | | | | | | | |
| | **A1.2** | x | x | | | | x | | | | | | | | | |
| | **A1.3** | x | x | x | | | x | | | | | | | | | |
| | **A1.4** | x | x | | | | x | | | | | | | | | |
| | **A1.5** | x | x | x | | | x | x | | | | | | | | |
| | **A1.6** | x | x | x | | | x | x | | | | | | | | |
| | **A5.1** | x | x | | | | x | x | | | | | | | | |
| | **A5.2** | x | x | | | | x | | | | | | | | | |
| | **A5.3** | x | x | | | | x | x | | | | | | | | |
| | **A5.4** | x | x | x | | | x | | | | | | | | | |
| | **A5.5** | x | | | | | x | x | | | | | | | | |
| | **A9.1** | | | | | x | x | x | x | | | | | | | |
| **B-Level** | **B1.1** | x | x | x | | | x | x | | | | | | | | |
| | **B1.2** | x | x | x | | | x | | | | | | | | | |
| | **B1.3** | x | x | | | | x | x | | | | | | | | |
| | **B1.4** | x | x | | | | x | x | | | | | | | | |
| | **B1.5** | x | x | x | | | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |
| 3 | Lecture (online / in class ) |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A5.1, A5.2, A5.3, B1.1, B1.2 |
| 2 | Formative (quizzes- online quizzes- sheets) | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A5.1, A5.2, A5.3 , A5.4, A5.5, A9.1, B1.1, B1.2, B1.3, B1.4, B1.5 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A5.1, A5.2, A5.3, A5.4, A5.5, A9.1, B1.1, B1.2, B1.3, B1.4, B1.5 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes- sheets) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 3 | Formative (quizzes- online quizzes- sheets) | 10 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Sheply L. Ross, John Wiley and Sons, “Differential equations 3$^{rd}$ Edition”, copy right 1984, by john Wiley & Sons, Inc., published simultaneously in Canada 2017. |
| **2** | Dennis G. Zill and Michael R. Cullen, “Differential Equations with Boundary Problem”, seven edition, PWS Publishers; published simultaneously in Canada. |
| **3** | William E. Boyce, Richard: " Elementary Differential Equations and Boundary Value |

| | |
|---|---|
| | Problems", 8th Edition Wiley, Publisher John Wiley & Sons, Inc., 2014. |
| **4** | K. A. Stroud and Dexter J. Booth, “Advanced Engineering Mathematics” publisher Palgrave Macmillan, 2011. |
| **5** | Erwin Kreyszig, Kreyszig Textbook: “Advanced Engineering Mathematics, 10th Edition- slader. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>Chapter 1: First Order Differential Equations:<br>• Introduction about Classification of the Differential Equations<br>• Separation of Variables,<br>• Homogeneous Equations<br>• Exact Equations<br>• Integrating Factors<br>• Linear Equations<br>• Bernoulli’s Equation<br>**Tutorials:**<br>• Apply the classification of differential equations.<br>• Practice of solving differential equations | 1 | A1.1, A1.2, A5.1 |
| 2 | **Lectures:**<br>Chapter 2: Higher Order Linear Differential Equation.<br>• Homogeneous equations with constant coefficients.<br>• Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters.<br>**Tutorials:**<br>• Apply the different methods to solve the second order differential equations and determine the | 1 | A1.3, A5.2 , A5.3,<br>B1.1, B1.2 |

| | | | |
|---|---|---|---|
| | particular solutions. | | |
| 3 | **Lectures:**<br>Chapter 3: Multiple Integrals<br>- Double integral<br>- Triple integral<br>- Surface integration<br>**Tutorials:**<br>- Evaluate the double Integral, the triple Integral and the area between two curves.<br>- Solve multiple integrals in any other area. | 1 | A1.4, B1.3, B1.4 |
| 4 | **Lectures:**<br>Chapter 4: Functions of Several Variables<br>- Partial derivatives<br>- Euler's Theorem for homogeneous Functions<br>- Exact differentials<br>- Taylor series of a function of two variables<br>- Maximum and minimum of a function of two variables<br>**Tutorials:**<br>- Apply the limits, discuss continuity, and solve differentiability, of functions of several variables.<br>- Use of text- books to solve some problems and collect some data. | 1 | A1.5, A5.4 , A5.5 ,<br>B1.5, A9.1 |
| 5 | **Lectures:**<br>Chapter 5: Fourier series<br>(Periodic functions - triangular series - Fourier series of functions of the **2-pi** cycle - Fourier series of even and odd functions - Fourier series of functions with different cycles).<br>**Tutorials:**<br>Use of text- books to solve some problems and collect some data. | | A1.6 |

| **Course: Math 3-B** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Define the different classification of equations.<br>A1.2 Recognize the different between the |

| | |
|---|---|
| | different type of differential equations.<br>A1.3 Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters.<br>A1.4 Identify the different between the double Integral and the triple Integral.<br>A1.5 Recognize the different between the Maximum and minimum of function of two Variables.<br>A1.6 Recognize the concepts and theories of Fourier series. |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | A5.1 Practice the classification of differential equations.<br>A5.2 Distinguish the homogeneous and non-homogeneous equations.<br>A5.3 Apply the different methods to solve the second order differential equations and determine the particular solutions.<br>A5.4 Solve multiple integrals in any other area.<br>A5.5 Show functions of several variables in various fields. |
| A9. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A9.1 Use the text- books to solve some problems and collect some data. |
| B1. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1.1 Distinguish between the different kinds of the differential equations of the first order (or second order).<br>B1.2 Acquire the operator method and variation of parameters to find the general solution for the second order differential equations.<br>B1.3 Evaluate double integrals, changing the order of integration, using polar coordinates.<br>B1.4 Evaluate triple integral, using cylindrical |

| | |
|---|---|
| | and spherical coordinates.<br>B1.5 Apply the limits, discuss continuity, and studying differentiability, of functions of several variable. |

**Course Coordinator: Dr. Mohamed K. El Gayyar**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | SCI 113 | | |
| **Year/ Level** | First year -1st Semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | - |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use the required techniques and skills to analyze any problem in a simple and logical manner and to apply to its solution a few, well-understood, basic principles of the dynamics course (mechanics-3B) |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Identify the Second moment (moment of Inertia) |
| A1.2 | Identify the Product of Inertia. |
| A1.3 | Define the Virtual work and its applications. |
| A1.4 | Determine of the orbit shape . |
| A2.1 | Identify the translation, Rotation and general plane motion. |
| A2.2 | Analyze plane motion in terms of a parameters. |
| A2.3 | Define the equations of motion of a rigid body. |
| A2.4 | Evaluate the principle of work and energy for a rigid body. |
| A2.5 | Apply the systems of rigid bodies. |
| A2.6 | Evaluate the principle of impulse and momentum for the plane motion of a rigid body. |

| Course : Mechanics 3B | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A-1-1- Identify the Second moment (moment of Inertia)<br>A-1-2 Identify the Product of Inertia.<br>A-1-3- Define the Virtual work and its applications.<br>A-1-4- Determine of the orbit shape . |
| A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A-2-1 Identify the translation, Rotation and general plane motion.<br>A-2-2 Analyze plane motion in terms of a parameters.<br>A-2-3 Define the equations of motion of a rigid body.<br>A-2-4 Evaluate the principle of work and energy for a rigid body.<br>A-2-5 Apply the systems of rigid bodies.<br>A-2-6 Evaluate the principle of impulse and momentum for the plane motion of a rigid body. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures: Chapter 1 & 2**<br>- Distributed forces Moment of Inertia.<br>- Moment of Inertia in a plane.<br>- Moment of Inertia of a rectangular area.<br>- Polar, volume and mass moment of Inertia.<br>- Radius of gyration of an area and mass.<br>-The Virtual work and its applications.<br>**Tutorials**:<br>• Solve the problems the Moment of Inertia<br>• Review examples of The Virtual work and its applications. | 1-4 |
| 2 | **Lectures: Chapter3:**<br>- Motion under central forces.<br>- Determination of the orbit.<br>- Dependence of the orbit shape on initial conditions.<br>- Kinematics of rigid bodies.<br>- Equations defining the rotation of a rigid body about a fixed axis.<br>- Absolute and relative velocity and acceleration in plane motion.<br>- Analysis of plane motion in terms of a parameter.<br>**Tutorials:**<br>-Solve the problems. | 5-7 |
| 3 | **Lectures: Chapter4:**<br>- Plane motion of rigid body.<br>- Equations of motion for rigid body.<br>**Tutorials:**<br>-Solve the problems | 9-10 |
| 4 | **Lectures: Chapter 5 & 6:**<br>- Plane motion of rigid body, energy and momentum methods.<br>- Principle of work and energy for a rigid body.<br>- Principle of impulse and momentum for the plane motion of a rigid body.<br>- Conservation of angular momentum.<br>- Mechanical vibrations.<br>- vibrations without damping (free vibration of particles).<br>- Damped vibrations (damped free vibrations<br>**Tutorials:**<br>Solve the problems. | 11-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture) online/ in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | | | x | x | | | | | | | | |
| | A1.2 | x | x | | | x | | | | | | | | | | |
| | A1.3 | x | x | | | x | x | x | | | | | | | | |
| | A1.4 | x | x | | | | x | | | | | | | | | |
| | A2.1 | x | x | | | x | | | x | | | | | | | |
| | A2.2 | x | x | | | | x | | | | | | | | | |
| | A2.3 | x | x | | | | | x | | | | | | | | |
| | A2.4 | x | x | | | | | x | | | | | | | | |
| | A2.5 | x | x | | | | | x | | | | | | | | |
| | A2.6 | x | x | | | | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2 |
| 2 | Formative (quizzes- online quizzes- sheets) | A2.3,A2.4 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6. |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes- sheets) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 15 |
| 2 | Formative (quizzes- online quizzes- sheets) | 15 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | • Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, 2010. |
| **2** | • Ferdinand P. Beer and E. Russell Johnston, Jr." Vector Mechanics for Engineers" Dynamics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York 2014. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Chapter 1 & 2**<br>- Distributed forces Moment of Inertia.<br>- Moment of Inertia in a plane.<br>- Moment of Inertia of a rectangular area.<br>- Polar, volume and mass moment of Inertia.<br>- Radius of gyration of an area and mass.<br>-The Virtual work and its applications. | 1 | A1.1, A1.2. |
| 2 | **Chapter3:**<br>- Motion under central forces.<br>- Determination of the orbit.<br>- Dependence of the orbit shape on initial conditions.<br>- Kinematics of rigid bodies.<br>- Equations defining the rotation of a rigid body about a fixed axis.<br>- Absolute and relative velocity and acceleration in plane motion.<br>- Analysis of plane motion in terms of a parameter. | 1 | A1.3 ,A1.4, A2.1, A2.2. |
| 3 | Midterm | 1 | A1.1, A1.2, A1.3. A1.4,A2.1, A2.2 |
| 4 | **Chapter4:**<br>- Plane motion of rigid body.<br>- Equations of motion for rigid body. | 1 | A2.3 |
| 5 | **Chapter 5 & 6:**<br>- Plane motion of rigid body, energy and momentum methods.<br>- Principle of work and energy for a rigid body.<br>- Principle of impulse and momentum for the plane motion of a rigid body.<br>- Conservation of angular momentum.<br>- Mechanical vibrations.<br>- vibrations without damping (free vibration of particles). | 1 | A2.4A2.5, A2.6. |

| | | | |
|---|---|---|---|
| | - Damped vibrations (damped free vibrations | | |

**Course Coordinator: Dr. Amr Hassan Abdalla**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 101 | | |
| **Year/ Level** | First year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 2 | Use modern engineering tools to draw the ship lines and structural connection between different structural elements of the hull. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize the different terminology of Naval Architecture and the geometry of ship's hull. |
| A1-2 | Recognize the forms of ship lines and structural connections applied in ship construction. |
| B1-1 | Establish the basic requirements for Naval Architecture and Marine Engineering Drawings. |
| B1-2 | Differentiate between the different systems of ship construction. |
| B2-1 | Choose the suitable connection to be applied in order to maintain the local rigidity of the hull. |

| Course: Drawing of Ships by using computer | |
|---|---|
| **Program LOs** | **Course LOs** |
| A.1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A.1.1 - Recognize the different terminology of Naval Architecture and the geometry of ship's hull |
| | A.1.2 - Recognize the forms of ship lines and structural connections applied in ship construction |
| B.1 Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B.1.1 - Establish the basic requirements for Naval Architecture and Marine Engineering Drawings. |
| | B.1.2 - Differentiate between the different systems of ship construction |
| B.2 Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B.2.1 - Choose the suitable connection to be applied in order to maintain the local rigidity of the hull. |

## 4. Course Contents:

| *Week No.* | *Topic* | *Week* |
|---|---|---|
| *Week-1* | Ship Types, Ship Geometry ,Principal Dimensions, and | *Week-1* |
| *Week-2* | Types of Lines ,Table of Offsets | *Week-2* |
| *Week-3* | Drawing of body plan | *Week-3* |
| *Week-4* | Drawing of breadth plan | *Week-4* |
| *Week-5* | Drawing of ship profile, buttocks and diagonal | *Week-5* |
| *Week-6* | Introduction to structural Connections, Sections Used in | *Week-6* |
| *Week 7* | Introduction to AUTOCAD | *Week 7* |
| *Week 8* | Bracketed Connections | *Week 8* |
| *Week-9* | Mid-term exam | *Week-9* |
| *Week-10* | Scallops (Cut outs) | *Week-10* |
| *Week-11* | Tripping Brackets | *Week-11* |
| *Week-12* | Mid ship sections | *Week-12* |
| *Week-13* | Ship connections workshop | *Week-13* |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | | | x | | | | | | | x | x | |
| | A1-2 | x | x | | | | x | | | | | | | x | x | |
| B-Level | B1-1 | x | x | | | | x | | | | | | | x | x | |
| | B1-2 | x | x | | | | x | | | | | | | x | x | |
| | B2-1 | x | x | | | | x | | | | | | | x | x | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | A1.1, A1.2 |
| 2 | Drawing assignments | A1.1, A1.2, B1.1, B1.2,B2.1 |
| 3 | Practical Exam in computer Lap. | A1.1, A1.2, B1.1, B1.2,B2.1 |
| 4 | Final Term Examination | A1.1, A1.2, B1.1, B1.2,B2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 9th |
| 2 | Drawing assignments | Every week |
| 3 | Practical Exam in computer Lap. | 15th |
| 4 | Final Term Examination | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | 01 |
| 2 | Drawing assignments | 10 |
| 3 | Practical Exam | 20 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | J.P. Comstock "Principals of Naval Architecture" SNAME Publications, 1967 & 1986 |
| **2** | L., Thomas, 2004'" Ship Design and Construction", Publisher Society of Naval Architects and Marine Engineers (SNAME) ISBN978-0-939773-40-4 |
| **3** | D. J. Eyres "Ship Construction", SBN10 0750680709-ISBN13 9780750680707 |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | White Board |
| 2 | Data Show System |
| 3 | Cartoon Models made by the lecturer |
| 4 | Lap tops or desk tops computers |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| *Week-1* | Ship Types, Ship Geometry ,Principal Dimensions, and Form Coefficients | 2 | A1.1, A1.2 |
| *Week-2* | Types of Lines ,Table of Offsets | 2 | A1.1, A1.2 |
| *Week-3* | Drawing of body plan | 2 | A1.1, A1.2 |
| *Week-4* | Drawing of breadth plan | 2 | A1.1, A1.2 |
| *Week-5* | Drawing of ship profile, buttocks and diagonal | 2 | A1.1, A1.2 |
| *Week-6* | Introduction to structural Connections, Sections Used in Ship Construction | 2 | B1.1, B1.2,B2.1 |
| *Week 7* | Introduction to AUTOCAD | 2 | B1.1, B1.2,B2.1 |
| *Week-8* | Bracketed Connections | 2 | B1.1, B1.2,B2.1 |
| *Week-10* | Scallops (Cut outs) | 2 | B1.1, B1.2,B2.1 |
| *Week-11* | Tripping Brackets | 2 | B1.1, B1.2,B2.1 |
| *Week-12* | Mid ship sections | 2 | B1.1, B1.2,B2.1 |
| *Week-13* | Ship connections workshop | 2 | B1.1, B1.2,B2.1 |

**Course Coordinator: Assoc. Prof. Dr. Arwa Wafiq Hussein**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 102 | | |
| **Year/ Level** | First year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| **No.** | **Aim** |
|---|---|
| 1 | Apply the engineering knowledge about the ship sciences, the general dimensions and the calculations of the hydrostatic characteristics of a ship. It teaches floatation of ships and the stability problems at small angle of inclination. This course provides also knowledge about types of ships, stresses acting on ships, and the different types of construction also the organizations, which govern design and construction of ships. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize the different rules for numerical integration. |
| A1-2 | Acquaint with the theory of floatation |
| A1-3 | Acquaint with the initial stability of ships |
| A2-1 | Recognize the functions and features of the different types of ships |
| A2-2 | Classify the types of ship construction and learn about the societies associated with safety of ships |
| B1-1 | Identify the stresses applied to ships |
| B1-2 | Differentiate positions of equilibrium of ships |
| B2-1 | Calculate the areas, volumes, centers and form co-efficient of ships |
| B2-2 | Assess the stability problems at small angle of inclination |
| C6-1 | Predicate the hydrostatic characteristics of ships |
| C6-2 | Perform the inclining experiment |
| C6-3 | Predicate the alteration in stability of ships due to transverse, longitudinal and vertical shift of weight and due to free surface |
| C6-4 | Apply the gained knowledge in the forthcoming courses of naval architecture and ship design |

| **Course:** Introduction to ship engineering | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Recognize the different rules for numerical integration. |
| | A1-2 Acquaint with the theory of floatation |
| | A1-3 Acquaint with the initial stability of ships |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Recognize the functions and features of the different types of ships |
| | A2-2 Classify the types of ship construction and learn about the societies associated with safety of ships |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Identify the stresses applied to ships |
| | B1-2 Differentiate positions of equilibrium of ships |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Calculate the areas, volumes, centers and form co-efficient of ships |
| | B2-2 Assess the stability problems at small angle of inclination |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Predicate the hydrostatic characteristics of ships |
| | C6-2 Perform the inclining experiment |
| | C6-3 Predicate the alteration in stability of ships due to transverse, longitudinal and vertical shift of weight and due to free surface |
| | C6-4 Apply the gained knowledge in the forthcoming courses of naval architecture and ship design |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Function of ships | 1 |
| 2 | Ship Form calculations | 2-4 |
| 3 | Stability of ships | 5-8 |
| 4 | The Ship, Features and types | 01-10 |
| 5 | Ship stresses and ship building materials | 12 |
| 6 | Major structural items | 13 |
| 7 | Organizations and regulations+ load lines rules | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | X | X | | X | X | X | X | | | | | | | | |
| | A1-2 | X | X | | X | X | X | X | | | | | | | | |
| | A1-3 | X | X | | X | X | X | X | | | | | | | | |
| | A2-1 | X | X | | X | X | | | | | | | | | | |
| | A2-2 | X | X | | X | X | | | | | | | | | | |
| B-Level | B1-1 | X | X | | X | X | | | | | | | | | | |
| | B1-2 | X | X | | X | X | | | | | | | | | | |
| | B2-1 | X | X | | X | X | X | X | | | | | | | | |
| | B2-2 | X | X | | X | X | X | X | | | | | | | | |
| C-Level | C6-1 | X | X | | X | X | X | X | | X | | | | | | |
| | C6-2 | X | X | | X | X | X | X | | | | | | | | X |
| | C6-3 | X | X | | X | X | X | X | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **C6-4** | **x** | **x** | | **x** | **x** | | **x** | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1,A1-2, B2-1, C6-1, C6-2 |
| 2 | Practical Examination | A2-2, B2-2, C6-2 |
| 3 | Oral Examination | C6-3, C6-4 |
| 4 | Formative (quizzes – presentation -sheets) | A1-3, A2-1, B2-2 |
| 5 | Final Term Examination (written) | A1-1, A1-2, A1-3, A2-1, A2-2, B1-1, B1-2, B2-1, B2-2, C6-3, C6-4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes – presentation -sheets) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes – presentation -sheets) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | J.P. Comstock “Principals of Naval Architecture” SNAME Publications, 1989, Vol.III |
| **2** | K.J. Rawson & E.C. Tupper “Basic Ship Theory” Longman Publications, 1980, Vol.I |
| **3** | E.C. Tupper “Introduction to Naval Architecture” 3rd Edition, Butterworth, London 1996 |
| 4 | Periodicals, Web sites, etc |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Function of ships | 1 | A2-1 |
| 2 | Ship Form calculations | 1 | A1-1, B2-1, C6-1, C6-2 |
| 3 | Stability of ships | 1 | A1-2, A1-3, B1-2, B2-2, C6-3, C6-4 |
| 4 | The Ship, Features and types | 1 | A2-1, |
| 5 | Ship stresses and ship building materials | 1 | B1-1 |
| 6 | Major structural items | 1 | A2-2 |
| 7 | Organizations and regulations+ load lines rules | 1 | A2-2 |

**Course Coordinator: Prof. Dr. Eng. Laila Bassiony Kamar**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval architecture and Marine Engineering | | |
| **Department offering the Program** | Naval architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Production Engineering & Mechanical Design | | |
| **Course Code** | **PRD110** | | |
| **Year/ Level** | First year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | -- | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply the fundamentals of material science and manufacturing processes affect material microstructures, properties, cost, energy and power requirements, shape limitations and dimensional tolerances, and time to manufacture components. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2.1 | Assess different behaviors of engineering materials and the technique used to measure the crystal lattice parameters and determine its types. |
| A2.2 | Asses the advanced engineering materials and their applications and advanced technology for refractory materials and corrosion. |
| A4.1 | Establish crystal structure theories, X-ray diffraction theory, Diffusion theories, and Phase diagrams and alloying theories. |
| B1.1 | Analyze relevant information from phase diagrams of alloy and the type of failure from different fracture surfaces. |
| B1.2 | Design of new materials according to applications need. |
| B2.1 | Improve component design considering surface treatments and welding. |
| B2.2 | Manage use of hardness testers, tensile and universal testing machines, fatigue testing machine, and impact fracture testing machine |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1,2 | **INTRODUCTION TO MATERIAL SCIENCE**<br>Classification of materials - Advanced materials - Modern materials' needs - Selection of materials - Environmental effects on material behavior<br>• **Lab:** Using the electrical furnace for melting aluminum | 1,2 |
| 3,4 | **CRYSTAL STRUCTURE**<br>Cubic crystals - Hexagonal crystals - Crystallographic directions and planes - Densities and packing factors of crystalline structures - Close-packed structures - X-ray diffraction | 3,4 |

| | | |
|---|---|---|
| 5,6 | **MECHANICAL TESTING**<br>Tensile test specimens - Stress-strain behavior - Stress-strain behavior of metals polymers - Hardiness measurements<br>• **Lab:** Determine the tensile behavior of specimen. Mechanical properties such as modulus of elasticity, yield strength, ultimate strength, and ductility. | 5,6 |
| 7 | **Corrosion** and Application for case study<br>• **Lab:** case study for corrosion in the field | 7 |
| 8 | Midterm | 8 |
| 9 | **Welding Metallurgy** | 9 |
| 10,11 | **PHASE DIAGRAMS**<br>Introduction - Solubility limit Phases - Microstructure - Phase equilibrium -Binary isomorphism systems - The iron-carbon system - The iron-iron carbide (Fe-$Fe_3$c) phase diagram - development of microstructures in iron-carbon alloys - The influence of alloying elements<br>• **Lab:** Examination of microstructure for measuring grains | 10,11 |
| 12,13 | **DIFFUSION AND DIFFUSION MECHANISM**<br>Diffusion mechanisms - Steady-state diffusion - Non steady-state diffusion - Factors that influence diffusion diffusing species<br>• **Lab:** Determine the Hardness of specimen (Brinel………). | 12,13 |
| 14 | **INTRODUCTION TO CERAMICS**<br>• Introduction - Type of ceramics - Applications | 14 |
| 15 | **INTRODUCTION TO POLYMERS**<br>Introduction - Type of polymers - Applications | 15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | A2.1 | x | x | x | | x | x | x | | | | x | | | | |
| | A2.2 | x | x | x | | x | | | | | | | | | | |
| | A4.1 | x | x | x | x | | x | | x | | x | | x | x | x | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B-Level** | B1.1 | x | x | x | | | x | | x | | | x | | | x | |
| | B1.2 | x | x | x | | | x | | x | | | x | | | x | |
| | B2.1 | x | x | x | | | x | | x | x | | x | | x | x | x |
| | B2.2 | x | x | x | | | x | | x | x | | x | | | x | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A2.1, A2.2, A4.1, B1.1, B2.2 |
| 2 | Practical Examination | A2.2, A4.1, B1.1 |
| 3 | Oral Examination | B1.2, B2.1, B2.2 |
| 4 | Formative (quizzes – presentation - online) | A2.1, A2.2, A4.1, B1.1, B1.2, B2.1, B2.2 |
| 5 | Final Term Examination (written) | A2.1, A2.2, A4.1, B1.1, B1.2, B2.1, B2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 8 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes – presentation - online) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 01 |
| 2 | Practical/ Oral Examination | 15 |

| | | |
|---|---|---|
| 3 | Formative (quizzes – presentation - online) | 5 |
| 4 | Final Term Examination (written) | 45 |
| Total | | 70 (100%) |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | J.F. Shackelford; Introduction to materials Science for Engineering, 4th, ed, John Wiley&Sons, Inc, Upper saddle River, NJ, 1996. |
| **2** | L.Francisc: "Materials Processing", ebook ISBN 9780123851338, 2015. |
| **3** | W.D. Callister:Materials Science and Engineering, 4th, ed, John Wiley&Sons, Inc, Upper saddle River, NJ, 1997. |
| **34** | H.E. Et al : " The Testing of Engineering Materials", McGraw Hill, Inc., 1982. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1,2 | **INTRODUCTION TO MATERIAL SCIENCE**<br>Classification of materials - Advanced materials - Modern materials' needs - Selection of materials - Environmental effects on material behavior<br>• **Lab:** Using the electrical furnace for melting aluminum | 1 | A2.1,<br>A2.2 |
| 3,4 | **CRYSTAL STRUCTURE**<br>• Cubic crystals - Hexagonal crystals - Crystallographic directions and planes - Densities and packing factors of crystalline structures - Close-packed structures - X-ray diffraction | 1 | A2.1,<br>A4.1 |
| 5,6 | **MECHANICAL TESTING**<br>Tensile test specimens - Stress-strain behavior - Stress-strain behavior of metals polymers - Hardiness measurements<br>• **Lab:** Determine the tensile behavior of specimen. Mechanical properties such as modulus of elasticity, yield strength, ultimate strength, and ductility. | 1 | B2.2 |
| 7 | **Corrosion** and Application for case study | 1 | A2.2, |

| | | | |
|---|---|---|---|
| | - **Lab:** case study for corrosion in the field | | B1.1 |
| 8 | - Midterm | 1 | |
| 9 | **Welding Metallurgy** | 1 | B2.1 |
| 10,11 | **PHASE DIAGRAMS**<br>Introduction - Solubility limit Phases - Microstructure - Phase equilibrium -Binary isomorphism systems - The iron-carbon system - The iron-iron carbide (Fe-$Fe_3c$) phase diagram - development of microstructures in iron-carbon alloys - The influence of alloying elements<br>- **Lab:** Examination of microstructure for measuring grains | 1 | A4.1,<br>B1.1 |
| 12,13 | **DIFFUSION AND DIFFUSION MECHANISM**<br>Diffusion mechanisms - Steady-state diffusion - Non steady-state diffusion - Factors that influence diffusion diffusing species<br>- **Lab:** Determine the Hardness of specimen (Brinel………). | 1 | A4.1 |
| 14 | **INTRODUCTION TO CERAMICS**<br>- Introduction - Type of ceramics - Applications | 1 | B1.2,<br>B2.1 |
| 15 | **INTRODUCTION TO POLYMERS**<br>- Introduction - Type of polymers - Applications | 1 | B1.2,<br>B2.1 |

nnnnnnnnnnnnnnnn

| Course: Engineering Metallurgy | |
|---|---|
| **Program LOs** | **Course LOs** |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Assess different behaviors of engineering materials and the technique used to measure the crystal lattice parameters and determine its types.<br>A2.2 Asses the advanced engineering materials and their applications and advanced technology for refractory materials and corrosion. |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4.1 Establish crystal structure theories, X-ray diffraction theory, Diffusion theories, and Phase diagrams and alloying theories. |

| | |
|---|---|
| B1. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation , Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations . | B1.1 Analyze relevant information from phase diagrams of alloy and the type of failure from different fracture surfaces.<br>B1.2 Design of new materials according to applications need. |
| B2. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2.1 Improve component design considering surface treatments and welding.<br>B2.2 Manage use of hardness testers, tensile and universal testing machines, fatigue testing machine, and impact fracture testing machine. |

**Course Coordinator: Prof. Dr. Shaban Mohamed Ibrahim Abdou**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Marine Engineering and Naval Architecture | | |
| **Department offering the Program** | Marine Engineering and Naval Architecture | | |
| **Department Responsible for the Course** | Electrical Power and Machines Engineering | | |
| **Course Code** | EPM104 | | |
| **Year/ Level** | First year- 1st semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Recognize the fundamental elements and components of the electrical engineering and other related topics. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3.1 | Identify the basic principles of electrical engineering |
| A3.2 | Categorize types of electrical machines |
| A4.1 | Outline the design of the electrical lighting system |
| A4.2 | Show connections of fuses and outlets. |
| A5.1 | Describe knowledge of mathematics, science and electrical engineering to the solution of electrical engineering problems, principles and application |
| A5.2 | Investigate types of electrical distribution system |
| A6.1 | Recognize electrical hazards, and electrical safety. |

| Course: **Fundamentals in Electrical Engineering** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3. Characteristics of engineering materials related to the discipline.. | A3.1 Identify the basic principles of electrical engineering.<br>A3.2 Categorize types of electrical machines |
| A4. Principles of design including elements design, process and/or a system related to specific disciplines. | A4.1 Outline the design of the electrical lighting system<br>A4.2 Show connections of fuses and outlets |
| A5:Methodologies of solving engineering problems, data collection and interpretation | A5.1 Describe knowledge of mathematics, science and electrical engineering to the solution of electrical engineering problems, principles and application |

| | |
|---|---|
| | A5.2 Investigate types of electrical distribution system |
| A6: Quality assurance systems, codes of practice and standards, health, safety requirements and environmental issues. | A6.1 Recognize electrical hazards, and electrical safety. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• Introduction of electrical engineering.<br>• Importance of marine electrical power system.<br>• Sources of electrical power generation.<br>• Shipboard electrical power installations.<br>**Practical:**<br>• Recognition of different electric circuit components | 1 |
| 2 | **Lectures:**<br>• Basics of electrical circuits<br>**Practical:**<br>• Verification of series and parallel connections. | 2 |
| 3 | **Lectures:**<br>• AC circuit elements.<br>• Series and parallel circuit connections.<br>• Power and power factor in AC circuits.<br>**Practical:**<br>• verify the ohm's law for the given electrical circuit. | 3 |
| 4 | **Lectures:**<br>• Kirchiff voltage law.<br>• Kirchiff current law.<br>**Practical:**<br>• verify the Kirchiff voltage law<br>• verify the Kirchiff voltage law | 4-5 |
| 5 | **Lectures:**<br>• Three phase electrical system.<br>• Introduction of the electrical machines<br>**Practical:**<br>• Recognition of delta and star connections | 6-7 |
| 7 | **Lectures:** | 8 |

| | | |
|---|---|---|
| | - Electric power generating stations<br>- Transformers, fuses and outlets<br>**Practical:**<br>- Verification of aforementioned experiments in three phase connection | |
| 8 | **Lectures:**<br>- Design of electrical lighting<br>**Practical:**<br>- Measurement of voltage and current in three phase connection. | 10 |
| 9 | **Lectures:**<br>- Electrical hazards, and electrical safety.<br>**Practical:**<br>- Illustrative examples | 11-14 |
| 10 | **Lectures:**<br>Practical exam | 15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (online/in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A3.1** | x | x | x | | | x | x | | | | | | | | x |
| | **A3.2** | x | x | | | x | | | x | | | | | | | x |
| | **A4.1** | x | x | | | | | | | | | | | | | |
| | **A4.2** | x | | | | x | | | x | | | | | | | |
| | **A5.1** | x | x | | | x | x | x | | x | | | | | | x |
| | **A5.2** | x | | | x | x | x | x | | | | x | | | | |
| | **A6.1** | x | | | x | x | x | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A3.1, A5.1, A3.2 |
| 2 | Practical Examination | A3.1, A5.1, A3.2 |
| 3 | Formative (quizzes- online quizzes- presentation) | A3.1, A3.2, A4.1, A4.2, A5.1, A6.1 |
| 4 | Final Term Examination (written) | A3.1, A3.2, A4.1, A4.2, A5.1, A6.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes- presentation) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes- presentation) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | J. David Irwin, R. Mark Nelms, BASIC ENGINEERING CIRCUIT ANALYSIS, 11th edition, John Wiley & Sons, Inc, January 2015. |
| **2** | Abdelhay A. Sallam and Om P. Malik, "Electric Distribution Systems," 2st Edition, Wiley, IEEE Press, 2019. |
| **3** | Stephen J. Chapman Electric, " Machinery Fundamentals," 5th Edition, McGraw-Hill, 2012. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Introduction of electrical engineering.<br>• Importance of marine electrical power system.<br>• Sources of electrical power generation.<br>• Shipboard electrical power installations.<br>**Practical:**<br>• Recognition of different electric circuit components | 1 | A3.1 |
| 2 | **Lectures:**<br>• Basics of electrical circuits<br>**Practical:**<br>• Verification of series and parallel connections. | 1 | A3.1, A5.1 |
| 3 | **Lectures:**<br>• AC circuit elements. | 1 | A3.1, A5.1 |

| | | | |
|---|---|---|---|
| | • Series and parallel circuit connections.<br>• Power and power factor in AC circuits.<br>**Practical:**<br>• verify the ohm's law for the given electrical circuit. | | |
| 4 | **Lectures:**<br>• Kirchiff voltage law.<br>• Kirchiff current law.<br>**Practical:**<br>• verify the Kirchiff voltage law<br>• verify the Kirchiff voltage law | 1 | A3.1, A5.1 |
| 5 | **Lectures:**<br>• Three phase electrical system.<br>• Introduction of the electrical machines<br>**Practical:**<br>• Recognition of delta and star connections | 1 | A3.1, A5.1, A3.2 |
| 6 | Midterm | 1 | A3.1, A5.1, A3.2 |
| 7 | **Lectures:**<br>• Electric power generating stations<br>• Transformers, fuses and outlets<br>**Practical:**<br>• Verification of aforementioned experiments in three phase connection | 1 | A3.1, A3.2, A5.1, A5.2 |
| 8 | **Lectures:**<br>• Design of electrical lighting<br>**Practical:**<br>• Measurement of voltage and current in three phase connection. | 1 | A4.1 |
| 9 | **Lectures:**<br>• Electrical hazards, and electrical safety.<br>**Practical:**<br>• Illustrative examples | 1 | A6.1 |
| 10 | • Practical exam | 1 | A3.1, A5.1, A3.2 |

**Course Coordinator: Dr. Mai Mahmoud Eladany**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | HUU 103 | | |
| **Year/ Level** | First year- First Semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | - | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Apply the core concepts of creativity and critical thinking (Definition, Theories, Factors, and Features) to get the ability to develop and realize the relation between creativity and critical thinking skills with help of applications in everyday life. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A8.1 | Communicate effectively with colleagues to recognize the basic types of Thinking. |
| A9.1 | Use the different types of thinking to give innovative improvements of daily problems. |
| A10.1 | Apply the different types of thinking to give modifications of a case study as the Sustainable development goals. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• **The concept of thinking, creativity, memory, Improving thinking skills, the difference between thinking and Improving thinking skills, the most important characteristics of Improving thinking skills** | 1-2 |
| 2 | **Lectures:**<br>• **The components of Improving thinking skills, the importance of thinking in our life, the role of each of the axes of the educational process in Improving thinking skills, the difference between thinking, creativity and innovation** | 3 |
| 3 | **Lectures:**<br>• **Types of thinking, basic thinking, basic thinking skills, creative thinking, creative thinking skills, critical thinking - stages of the creative process.** | 4-6 |

| | | |
|---|---|---|
| | • **A case study on Sustainable development goals.** | |
| 4 | **Lectures:**<br>• **The meaning of scientific thinking, complex thinking, - a map of basic thinking skills - examples of each type of thinking skills from the field of specialization.** | 7 |
| 5 | **Midterm** | 8 |
| 6 | **Lectures:**<br>• **The difference between a good thinker and a bad thinker - traits and characteristics of a critical thinker** | 9 |
| 7 | **Lectures:**<br>• **Planning - the method of solving problems in a scientific way, steps for feeling a problem and how to solve it - training in the method of problem solving through problems in the field of specialization.**<br>• **A case study on the future required jobs 2030-2050.** | 10 |
| 8 | **Lectures:**<br>**Thinking strategies (brainstorming - the theory of the six hats) and how to apply this strategy in the field of specialization.** | 11-12 |
| 9 | **Lectures:**<br>**Various exercises in the field of specialization to develop thinking skills** | 13-14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A8-1 | x | | | x | | x | x | | x | | | | | | |
| | A9-1 | x | | | x | | x | x | | x | | | | | | |
| | A10-1 | x | | | x | | x | x | | x | | | | | | |

## 6. Teaching and Learning Methods 0f Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A8-1, A9-1, A10-1 |
| 2 | Formative (quizzes- online quizzes- presentation – role play) | A8-1, A9-1, A10-1 |
| 3 | Final Term Examination (written) | A8-1, A9-1, A10-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes- presentation – role play) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10= 20% |
| 2 | Formative (quizzes- online quizzes- presentation – role play) | - |
| 4 | Final Term Examination (written) | 40= 80% |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | محمد ماهر الجمال, التفكير العلمي ودور المؤسسات التربوية في تنميته, دار الوفاء للطباعة والنشر, القاهرة 1997 |
| **2** | حسن حسين زيتون، رؤية معاصرة في تنمية العقول المفكرة، عالم الكتب القاهرة 3002. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Online facilities. |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lectures :**<br>**The concept of thinking, creativity, memory, improving thinking skills, the difference between thinking and Improving thinking skills, the most important characteristics of Improving thinking skills** | 1 | A8-1, A9-1, A10-1 |
| 2 | **Lectures:**<br>**The components of Improving thinking skills, the importance of thinking in our life, the role of each of the axes of the educational process in Improving thinking skills, the difference between thinking, creativity and innovation** | 1 | A8-1, A9-1, A10-1 |
| 3 | **Lectures:**<br>**Types of thinking, basic thinking, basic thinking skills, creative thinking, creative thinking skills, critical thinking - stages of the creative process.**<br>• **A case study on Sustainable development goals.** | 1 | A8-1, A9-1, A10-1 |
| 4 | **Lectures:**<br>**The meaning of scientific thinking, complex thinking, - a map of basic thinking skills - examples of each type of thinking skills from the field of specialization.** | 1 | A8-1, A9-1, A10-1 |
| 5 | **Midterm** | 1 | A8-1, A9-1, A10-1 |
| 6 | **Lectures:**<br>**The difference between a good thinker and a bad thinker - traits and characteristics of a critical thinker** | 1 | A8-1, A9-1, A10-1 |
| 7 | **Lectures:**<br>**Planning - the method of solving problems in a scientific way, steps for feeling a problem and how to solve it - training in the method of problem solving through problems in the field of specialization.** | 1 | A8-1, A9-1, A10-1 |

| | | | |
|---|---|---|---|
| | **A case study on the future required jobs 2030-2050.** | | |
| 8 | **Lectures:**<br>**Thinking strategies (brainstorming - the theory of the six hats) and how to apply this strategy in the field of specialization.** | 1 | A8-1, A9-1, A10-1 |
| 9 | **Lectures:**<br>**Various exercises in the field of specialization to develop thinking skills** | 1 | A8-1, A9-1, A10-1 |

| **Course: Electromagnetic Waves** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Communicate effectively with colleagues to recognize the basic types of Thinking. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Use the different types of thinking to give innovative improvements of daily problems. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Apply the different types of thinking to give modifications of a case study as the Sustainable development goals. |

**Course Coordinator: Dr. Heba Youssef Soliman.**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information:

| | | |
|---|---|---|
| **Program title** | B. Sc. in Naval Architecture & Marine Engineering | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | |
| **Course Code** | SCI 119 | |
| **Year/ Level** | First year- 2nd semester | |
| **Specialization** | Major | |
| **Teaching Hours** | Lectures | Tutorial |
| | 2 | 2 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply the theoretical knowledge and practical that will be required for dealing with systems of linear equations and their solutions. The ability to initiate and sustain in-depth research relevant to linear algebra. The skill to deal with matrices and determinants and to understand their properties. The capability of understanding vector spaces, linear independence of vectors, subspaces, bases, dimension of vector spaces and inner product spaces. The knowledge of linear transformations; and eigenvalues and eigenvectors. The concept of Laplace transforms, inverse Laplace transform, solving differential equations. The potential of using Laplace transforms and inverse Laplace transform in solving differential equations. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Determine the Laplace transform of functions from first principles. |
| A1.2 | Apply basic properties of the Laplace transform such as linearity and convolution. |
| A1.3 | Use the Laplace transforms to solve ordinary differential equations with given initial conditions. |
| A1.4 | Categorize of the basic concepts of linear algebra. |
| A1.5 | Recognize System of Linear equations using matrices. |
| A1.6 | Know and understand concept of vector space. |
| A1.7 | Recognize the Eigenvalues and Eigenvector. |
| A1.8 | Understand of the basic concepts of probability. |
| A5.1 | Practice the unit step functions to determine the Laplace transform of piecewise continuous functions. |
| A5.2 | Apply shifting, differentiation and integration properties of the Laplace transform. |
| A5.3 | Distinguish different cases of linear systems solutions. |
| A5.4 | Know fundamental concepts and properties of matrices. |
| A5.5 | Identify fundamental concepts of probability. |
| A9.1 | Use the text- books to solve some problems and collect some data. |
| B1.1 | Evaluate the Delta functions to model impulses and solve such models by applying the Laplace transform. |
| B1.2 | Suggest most moderate method to solve a system of linear equations. |
| B1.3 | Show different applications of Eigenvalues and Eigenvector. |
| B1.4 | Use mathematical thinking for students to be self-independent in problem solving. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>Chapter 1: Laplace transforms.<br>• Definition of the Laplace transform<br>• Properties of the Laplace transform<br>• Inverse Laplace transform<br>• Solving Initial Value Problems<br>• Convolution theory<br>• Impulses and the Dirac Delta Function<br>**Tutorials:**<br>• Practice of solving Laplace transform<br>• Practice of solving inverse Laplace transform | 1-5 |
| 2 | **Lectures:**<br>Chapter2: Linear Equations<br>• Introduction to Linear Equations<br>• Solving Linear Equations<br>• The Gauss-Jordan algorithm<br>• Systematic solution of Linear systems<br>• Homogeneous systems<br>**Tutorials:**<br>• Apply the different methods to solve linear equations | 6-7 |
| 3 | **Lectures:**<br>Chapter 3: Matrices<br>• Matrix arithmetic<br>• Linear transformations<br>• Recurrence relations<br>• Non-singular matrices<br>• Least square solution of equation<br>**Tutorials:**<br>• Evaluate matrix arithmetic and linear transformations.<br>• Solve problems on least square solution of equation**.** | 8 |
| 4 | **Lectures:**<br>Chapter 4: Vector Space and Subspaces<br>• Subspaces of $R^n$<br>• Linear Dependence<br>• Basis of a Subspace<br>• Rank and Nullity of a Matrix<br>**Tutorials:**<br>• Solve the problems on the basis of any vector space and the subspaces of $R^n$ . | 10-12 |

| | | |
|---|---|---|
| 5 | **Lectures:**<br>Chapter 5: -Eigenvalues and Eigenvectors<br>• Motivation<br>• Definitions and examples<br>**Tutorials:**<br>• Calculate the Eigenvalues and Eigenvectors. | 13 |
| 6 | **Lectures:**<br>Chapter 6: Probability Theory<br>• Sample Space<br>• Probability Axioms<br>• Distribution Function<br>**Tutorials:**<br>• Solve the role of probability in engineering.<br>• Use of text- books to solve some problems and collect some data. | 14-15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture(on line / in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial(on line / in class)** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | x | x | | | | | | | | | | | | | |
| | **A1.2** | x | x | | | | x | | | | | | | | | |
| | **A1.3** | x | x | x | | | x | | | | | | | | | |
| | **A1.4** | x | x | | | | x | | | | | | | | | |
| | **A1.5** | x | x | x | | | x | x | | | | | | | | |
| | **A5.1** | x | x | | | | x | x | | | | | | | | |
| | **A5.2** | x | x | | | | x | | | | | | | | | |
| | **A5.3** | x | x | | | | x | x | | | | | | | | |
| | **A5.4** | x | x | x | | | x | | | | | | | | | |
| | **A5.5** | x | x | | | | x | x | | | | | | | | |
| | **A5.5** | x | x | x | | | x | | | | | | | | | |
| | **A5.5** | x | x | x | | | x | x | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A5.5** | x | x | | | | x | | | | | | | | | |
| | **A9.1** | | | | | x | x | x | x | | | | | | | |
| **B-Level** | **B1.1** | x | x | x | | | x | x | | | | | | | | |
| | **B1.2** | x | x | x | | | x | | | | | | | | | |
| | **B1.3** | x | x | | | | x | x | | | | | | | | |
| | **B1.4** | x | x | | | | x | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |
| 3 | Lecture (online / in class ) |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4, A5.1, A5.2, A5.3, B1.1 , B1.2 |
| 2 | Formative (quizzes- sheets- reports) | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A1.8, A5.1, A5.2 , A5.3 , A5.4, A5.5, A9.1, B1.1, B1.2, B1.3, B1.4 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A1.8, A5.1, A5.2 , A5.3 , A5.4, A5.5, A9.1, B1.1, B1.2, B1.3, B1.4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- sheets- reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 3 | Formative (quizzes- sheets- reports) | 10 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References:

| **No.** | **Reference List** |
|---|---|
| **1** | Howard Anton and Chris Rorres, “Elementary Linear Algebra”, Application Version 11th, publisher John Wiley & Sons, 2013. |
| **2** | Erwin Kreyszig:"Advanced Engineering Mathematics ”John Wiley & Sons, N.Y |
| **3** | K.A., Booth D.J.: "Engineering Mathematics Stroud ”8ed., 2014 |
| **4** | K. A. Stroud and Dexter J. Booth, “Advanced Engineering Mathematics” publisher Palgrave Macmillan, 2011. |
| **5** | Erwin Kreyszig, Kreyszig Textbook: “Advanced Engineering Mathematics, 10th edition- slader. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>Chapter 1: Laplace transforms.<br>• Definition of the Laplace transform<br>• Properties of the Laplace transform<br>• Inverse Laplace transform<br>• Solving Initial Value Problems<br>• Convolution theory<br>• Impulses and the Dirac Delta Function<br>**Tutorials:**<br>• Practice of solving Laplace transform<br>• Practice of solving inverse Laplace transform | 1 | A1.1, A1.2, A1.3, A5.1,A5.2, B1.1 |
| 2 | **Lectures:**<br>Chapter2: Linear Equations<br>• Introduction to Linear Equations<br>• Solving Linear Equations<br>• The Gauss-Jordan algorithm<br>• Systematic solution of Linear systems<br>• Homogeneous systems | 1 | A1.4 ,A5.3, B1.2 |

| | | | |
|---|---|---|---|
| | **Tutorials:**<br>- Apply the different methods to solve linear equations | | |
| 3 | **Lectures:**<br>Chapter 3: Matrices<br>- Matrix arithmetic<br>- Linear transformations<br>- Recurrence relations<br>- Non-singular matrices<br>- Least square solution of equation<br>**Tutorials:**<br>- Evaluate matrix arithmetic and linear transformations.<br>- Solve problems on least square solution of equation**.** | 1 | A1.5, A5.4, A9.1 |
| 4 | **Lectures:**<br>Chapter 4: Vector Space and Subspaces<br>- Subspaces of $R^n$<br>- Linear Dependence<br>- Basis of a Subspace<br>- Rank and Nullity of a Matrix<br>**Tutorials:**<br>- Solve the problems on the basis of any vector space and the subspaces of $R^n$ . | 1 | A1.6, A9.1, B1.4 |
| 5 | **Lectures:**<br>Chapter 5: -Eigenvalues and Eigenvectors<br>- Motivation<br>- Definitions and examples<br>**Tutorials:**<br>Calculate the Eigenvalues and Eigenvectors. | | A1.7, A9.1 , B1.3 |
| 6 | **Lectures:**<br>Chapter 6: Probability Theory<br>- Sample Space<br>- Probability Axioms<br>- Distribution Function<br>**Tutorials:**<br>- Solve the role of probability in engineering.<br>Use of text- books to solve some problems and collect some data. | | A1.8, A5.5 , B1.4 |

| **Course: Math 4-B** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Determine the Laplace transform of functions from first principles.<br>A1.2 Apply basic properties of the Laplace transform such as linearity and convolution.<br>A1.3 Use the Laplace transforms to solve ordinary differential equations with given initial conditions.<br>A1.4 Categorize of the basic concepts of linear algebra.<br>A1.5 Recognize System of Linear equations using matrices.<br>A1.6 Know and understand concept of vector space.<br>A1.7 Recognize the Eigenvalues and Eigenvector.<br>A1.8 Understand of the basic concepts of probability. |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | A5.1 Practice the unit step functions to determine the Laplace transform of piecewise continuous functions.<br>A5.2 Apply shifting, differentiation and integration properties of the Laplace transform.<br>A5.3 Distinguish different cases of linear systems solutions.<br>A5.4 Know fundamental concepts and properties of matrices.<br>A5.5 Identify fundamental concepts |

| | |
|---|---|
| | of probability. |
| A9. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A9.1 Use the text- books to solve some problems and collect some data. |
| B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems. | B1.1 Evaluate the Delta functions to model impulses and solve such models by applying the Laplace transform.<br>B1.2 Suggest most moderate method to solve a system of linear equations<br>B1.3 Show different applications of Eigenvalues and Eigenvector.<br>B1.4 Use mathematical thinking for students to be self-independent in problem solving. |

**Course Coordinator: Dr. Ibrahim Hosney**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 103 | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Oral |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Apply the engineering principles of ship stability at large angles of heel (for the intact and damage conditions). Develop and analyze the necessary mathematics of some International published methods to determine ship stability at large angles of heel. Apply the engineering principles to acquire the knowledge of ship dynamic and damage stability, and ship watertight subdivision. Apply the international assessment standards for ship stability, and acquire the knowledge to fulfill these standards. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Develop expressions for ship CB-Coordinates and GZ Equations at Large Angles of Heel. Recognize some methods to develop Ship Cross-Curves of Stability. |
| A1-2 | Describe Ship Dynamic Stability and its Evaluation. |
| A1-3 | Recognize methods and equations to treat the subjects of ship damage stability and ship watertight subdivision. |
| B1-1 | Investigate Ship stability at large-angle and analysis using Microsoft Software. |
| B1-2 | Investigate ship floodable length and using Microsoft Software. |
| B4-1 | Apply the requirements of the international maritime organizations on the standards of ship dynamic stability and watertight subdivision. |
| B4-2 | Recognize the environmental hazards associated with ship damage stability, and methods of how to protect the ship against these hazards. |
| C2-1 | Prepare different ship dynamic stability aspects; (GZ values, cross curves of static stability, and other) at different angles of heel. |
| C2-2 | Estimate the safe length of ship compartments according to ship watertight subdivision computations and drawings. |
| C5-1 | Evaluate ship dynamic stability, and ship floodable length must meet with the different criteria and requirements of the International Maritime Organization, IMO, Standards and Regulations. |

| Course: Naval Architecture (1) | |
|---|---|
| **Program LOs** | **Course Los** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Develop expressions for ship CB-Coordinates and GZ Equations at Large Angles of Heel. Recognize some methods to develop Ship Cross-Curves of Stability. |
| | A1-2 Describe Ship Dynamic Stability and its Evaluation. |
| | A1-3 Recognize methods and equations to treat the subjects of ship watertight subdivision and ship damage stability. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Investigate Ship stability at large-angle and analysis using Microsoft Software. |
| | B1-2 Investigate ship watertight subdivision, apply Shirokauer method to determine the ship floodable length using Microsoft Software, with a sheet drawing. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Apply the requirements of the international maritime organizations on the standards of ship dynamic stability and watertight subdivision. |
| | B4-2 Recognize the environmental hazards associated with ship damage stability, and methods of how to protect the ship against these hazards. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Prepare different ship dynamic stability aspects; (GZ values, cross curves of static stability, and other) at different angles of heel. |
| | C2-2 Estimate the safe length of ship compartments according to ship watertight subdivision computations and drawings. |

| | |
|---|---|
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Evaluate of ship dynamic stability, and ship floodable length must meet with the different criteria and requirements of the International Maritime Organization, IMO, Standards and Regulations. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Ship Stability at Large Angles of Heel, Different Methods, New CB-Coordinates after Heel | 1-3 |
| 2 | Methods to determine & draw GZ-Curve Vs. Heel Angles, Cross-Curves of Static Stability | 4-6 |
| 3 | Ship Dynamic Stability, International Criteria of Assessment of Ship Static Arm of Stability; GZ-Curve | 7-8 |
| 4 | Ship Damage Stability using Lost Buoyancy and Added Weight Methods | 10-12 |
| 5 | Ship Watertight Subdivision, Ship Floodable Length Curve; Calculations and Sheet Drawings | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A1-2 | x | x | | x | | | x | | | | | | | | |
| | A1-3 | x | x | | x | | | x | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B1-2 | x | x | | x | | x | | | | | | | | | |
| | B4-1 | x | x | | x | | x | | | | | | | | | |
| | B4-2 | x | x | | x | | x | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C-Level** | **C2-1** | x | x | | x | | x | | | | | | | | | |
| | **C2-2** | x | x | | x | | | x | | | | | | | | |
| | **C5-1** | x | x | | x | | | x | | | | | | | | |

### 6. Teaching and Learning Methods of Disable Students:

| **No.** | **Teaching Method** |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

### 7. Student assessment:

#### 7.1 Student Assessment Methods:

| **No.** | **Assessment Method** | **LOs** |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A1-2, A1-3, B1-1, B4-1, C2-1 |
| 2 | Formative (quizzes – presentation) | A1-1, A1-2, A1-3, C1-3, C1-5 |
| 3 | Oral examination | A1-1, A1-2 |
| 4 | Practical examination | C2-1, C2-2, C5-1 |
| 5 | Final Term Examination (written) | A1-1, A1-2, A1-3, B4-1, B4-2, C2-1, C2-2, C5-1 |

#### 7.2 Assessment Schedule:

| **No.** | **Assessment Method** | **Weeks** |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – presentation) | Every 2nd week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

#### 7.3 Weighting of Assessments:

| **No.** | **Assessment Method** | **Weights** |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – presentation) | 20 |
| 3 | Oral / Written Exam | 10 |
| 4 | Final Term Examination (written) | 60 |

| | |
|---|---|
| Total | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Rawson & Tupper, " Basic Ship Theory,” Vol.1, Longman, London, England, 1999. |
| **2** | Group of Authors, “ Principles of Naval Architecture,“ SNAME Publications, USA, 2012. |
| **3** | Keywords for Internet Search<br>*Naval Architecture, Ship Intact Stability, Ship Dynamic Stability, Ship Damage Stability, Ship Watertight Subdivision, Ship Floodable Length.* |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presentation in Person |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Ship Stability at Large Angles of Heel, different methods, CB-Coordinates | 1 | A1-1, B1-1, C2-1 |
| 2 | Methods to determine & draw GZ-Curve Vs. Heel Angles, Cross-Curves of Stability | 1 | A1-2, C2-2 |
| 3 | Ship Dynamic Stability, International Criteria of Assessment of Ship Static Arm of Stability; GZ-Curve | 1 | A1-2, B1-2, C2-2 |
| 4 | Ship Damage Stability using Lost Buoyancy and Added Weight Methods | 1 | A1-3, B1-1, B4-1, C2-1, C5-1 |
| 5 | Ship Watertight Subdivision, Ship Floodable Length Curve; Calculations and Sheet Drawings Damage Stability using Lost Buoyancy and Added Weight Methods | 1 | A1-3, B1-1, B4-2, C2-2, C5-1 |

**Course Coordinator: Prof. Dr. Mo’men M. Gaafary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 104 | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use techniques, skills, procedures and modern engineering tools necessary to produce a ship in a shipyard, and accurately chose the required materials and instruments to build the hull and outfit it. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Identify the characteristics of the ship design components. |
| A4-2 | Recognize the characteristics of the required materials & material handling to build the hull. |
| A4-3 | Identify basic definitions and ship types. |
| A4-4 | Classify the classification societies and the shipyard's layout. |
| A7-1 | Show how to plan & manage the shipyards. |
| A7-2 | Outline the different technologies of steel cutting, forming & welding. |
| A7-3 | Recognize the different techniques used for welding detection. |
| A7-4 | Outline the modern techniques used to build ships. |
| B1-1 | Practice CAD and CAM in design , manufacturing and shipbuilding. |
| B1-2 | Distinguish different sequences for building ships. |
| B1-3 | Discuss & compare different organizing policies in a shipyard. |
| B1-4 | Distinguish the requirements for the safety of persons, instruments and work sites. |
| C3-1 | Visit different shipyard sites to practice and be familiar with the actual building sequence. |
| C4-1 | Prepare the site for work. |
| C4-2 | Install the different components of ship to its position. |

| | |
|---|---|
| C4-3 | Conduct the required repair for corrupted components of ship. |

| **Course: Manufacturing and Shipbuilding** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Identify the characteristics of the ship design components. |
| | A4-2 Recognize the characteristics of the required materials & material handling to build the hull. |
| | A4-3- Identify basic definitions and ship types. |
| | A4-4- Classify the classification societies and the shipyard's layout. |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1-Show how to plan & manage the shipyards. |
| | A7-2- Outline the different technologies of steel cutting, forming & welding. |
| | A7-3- Recognize the different techniques used for welding detection. |
| | A7-4- Outline the modern techniques used to build ships. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1- Practice CAD and CAM in design, manufacturing and shipbuilding. |
| | B1-2- Distinguish different sequences for building ships. |
| | B1-3- Discuss & compare different organizing policies in a shipyard. |
| | B1-4- Distinguish the requirements for the safety of persons, instruments and work sites. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1- Visit different shipyard sites to practice and be familiar with the actual building sequence. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1- prepare the site for work.<br>C4-2- install the different components of ship to its position.<br>C4-3- conduct the required repair for corrupted components of ship. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Overview & Definitions. | 1 |
| 2 | Manufacture of shipbuilding materials | 2-3 |
| 3 | Shipbuilding Processes | 3-4 |
| 4 | Plate and Section marking and cutting | 5-6 |
| 5 | Plate and Section forming | 7-8 |
| 6 | Mid-Term Exam | 9 |
| 7 | Welding operations | 10 - 11 |
| 8 | Outfitting processes | 12 |
| 9 | Material handling processes | 13 |
| 10 | Paint of ships | 14 |
| 11 | General revision & Oral exam. | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A4-1 | x | x | | x | x | | | | | | | | | | |
| | A4-2 | x | x | | x | x | | | | | | | | | | |
| | A4-3 | x | x | | x | x | x | | | | | | | | | |
| | A4-4 | x | x | | | x | | | | | | | | | | |
| | A7-1 | x | x | | | x | x | | | | | | | | | |
| | A7-2 | x | x | | x | x | x | | | | | | | | | |
| | A7-3 | x | x | | | x | x | | | | | | | | | |
| | A7-4 | x | x | | x | x | x | | | | | | | | | |
| B-Level | B1-1 | x | x | | x | x | | | | | | | | | | |
| | B1-2 | x | x | | x | x | x | | | | | | | | | |
| | B1-3 | x | x | | x | x | x | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1-4 | x | x | | x | x | x | | | | | | | | | |
| **C-Level** | C3-1 | x | x | | x | x | x | | | | | | | | | |
| | C4-1 | x | x | | x | x | | | | | | | | | | |
| | C4-2 | x | x | | x | x | x | | | | | | | | | |
| | C4-3 | x | x | | x | x | | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Assign a portion of the office hours for those students. |
| 2 | Give them specific tasks. |
| 3 | Repeat the explanation of some of the material and tutorials. |
| 4 | Assign a teaching assistance to follow up the performance of this group of students. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-4, B1-1, B1-2, B1-3, B1-4, C3-1 |
| 2 | Practical Examination | A4-2, A7-2, A7-3, A7-4 |
| 3 | Oral Examination | B1-1, B1-2, C3-1 |
| 4 | Formative (quizzes- online quizzes- presentation) | A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A7-4, B1-1, B1-2, B1-3, B1-4, C3-1, C4-1, C4-2, C4-3 |
| 5 | Final Term Examination (written) | A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A7-4, B1-1, B1-2, B1-3, B1-4, C3-1, C4-1, C4-2, C4-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes- presentation ) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights % |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes- presentation) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Welding Symbols on Drawing, E.N. Gregory and A.A. Armstrong, CRC Press, Woodhead Publishing Limited, Cambridge, England, 2005. |
| 2 | Welding Gude, Technical Handbook of Bohler welding Products, Edition 7, 2005. |
| 3 | A Quick Guide to Suitable Welding Consumables for Mild Steel and 490 M.Pa High Tensile Strength Steel, Kobelco, Welding Today, 2nd Special Edition, 2015. |
| 4 | The Welding Handbook for Maritime Welders, Wilhelmsen Ship Service, 11th Edition, Norway, 2014. |
| 5 | Submerged Arc Welding, R. M. Nugent et. al., Welding Handbook Committee Member, Dan Tn, 2009. |
| 6 | Submerged Arc Welding Equipment, Miller Electrode, 4th Edition, 2015. |
| 7 | Modern Arc Welding Technology, S. V. Nodkarni, Ador Welding Limited, New Delhi, 2010. |
| 8 | Stud Welding, AWS, Miami, Florida, 2011. |
| 9 | Resistance Welding Basis, entron Cootrols, LLC., April 2014. |
| 10 | Handbook for Resistance Spot Welding, Miller Electric, Mfg., 2012. |
| 11 | Air Carbon – Arc Guide, Arc-Air Cutting and Gouging System, Victor Technologies, 2013. |
| 12 | Precaution and Safe Practices for Arc Welding, Cutting and Gouging, ESAB Welding and Cutting Products, December 2009. |
| 13 | Welding Lens Shade and Personal Protective Equipment Selection, Safe Operating Proceedure, University of Nebraska, Lincoln, July 2009. |
| 14 | Aluminum Automotive Manual – Joining, Beam Welding, European Aluminum Association, 2015. |
| 15 | Improving Laser Beam Welding Efficiency, Mikhail Sokolov and Antti Solminen, Engineering Scientific Research, Published Online, August2014. |
| 16 | Laser Welding Guide, Unitek Miyachi Corporation, 2003. |
| 17 | Plasma Arc Cutting, Finbar Smith, SOLAS, 2014. |
| 18 | Design of Welded Joints, Taye Steel Europe Limited, 2013. |
| 19 | Plasma Arc Cutting Machine, Plasma 60i, Snap-on Incorporation, 2011. |
| 20 | Power max 65, Power max 85, Plasma Arc Cutting Systems, Operator Manual, Hypertherm Inc., USA, 2010. |
| 21 | Optimization and Improvement of the Flame Straightening process (Opti-straight) D. Schaferetal, Research Fund for Cool and Steel, European Union, July 2018. |

| | |
|---|---|
| 22 | Plate Flaming by Line Heating, Henrik Bisgaard Clausen, Ph.D. Thesis, Department of Naval Architecture and Offshore Engineering, Technical University of Denmark, April 2000. |
| 23 | Welding Imperfections and Preventive Measures, Kika-Shinagwa and Shinagwa Kw, Kobe Steel LTD, Tokyo, 2015. |
| 24 | Common Weld Defects-Causes and Cures, Qualimet, Welding and Metal Engineering, November, 2013. |
| 25 | Studies of Welding Joints, J. M. Kruba and W. Wojcie-chowski, Archives of Foundry Engineering, Vol. 10, March 2010. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Lectures:<br>Overview & Definitions. | 2 | A4-1, |
| 2 | Lectures:<br>Manufacture of shipbuilding materials<br>Labs/Tutorials:<br>Introduce a report about the standard of shipbuilding steel | 2 | A4-2, A4-3, A4-4 |
| 3 | Lectures:<br>Shipbuilding Processes<br>Labs/Tutorials:<br>Demonstrate the sequences of shipbuilding processes. | 2 | A7-1, A7-2, A7-4, B1-1, B1-2, B1-3 |
| 4 | Lectures:<br>Plate and Section marking and cutting<br>Labs/Tutorials:<br>Introduce some sketches to simulate the templates. | 2 | A7-2, B1-1, B1-2, B1-4, C3-1 |
| 5 | Lectures:<br>Plate and Section forming<br>Labs/Tutorials:<br>Recognize the different standard of plates and sections through a visit to a shipyard | 2 | A7-2, B1-1, B1-2, B1-4, C3-1 |

| | | | |
|---|---|---|---|
| 6 | Mid-Term Exam | 2 | A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-4, B1-1, B1-2, B1-3, B1-4, C3-1 |
| 7 | Lectures:<br>Welding operations<br>Labs/Tutorials:<br>Recognize the types of gas welding and electric welding through visiting the welding shop and a shipyard | 2 | A7-3, B1-1, B1-2, B1-4, C3-1 |
| 8 | Lectures:<br>Outfitting processes<br>Labs/Tutorials:<br>--------------------- | 2 | B1-1, B1-2, B1-4, C3-1 |
| 9 | Lectures:<br>Material handling processes<br>Labs/Tutorials:<br>Recognize the different equipment for the handling of materials for, inside, and from the shipyard through a visit to One of them | 2 | C4-1, C4-2, C4-3 |
| 10 | Lectures:<br>Paint of ships<br>Labs/Tutorials:<br>----------------- | 2 | B4-1, C4-1 |
| 11 | Lectures:<br>General revision & Oral exam. | 2 | A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A7-4, B1-1, B1-2, B1-3, B1-4, C3-1, C4-1, C4-2, C4-3 |

**Course Coordinator: Emeritus Prof. Dr. Mohamed A. Mansour**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 105 | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 7 | Apply the basics theory of structures to determine the reactions and moments to determine the strength of beams, frames and trusses. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Describe the stress-strain relationship for steel and recognize the shear and normal forces on structures. |
| A2.1 | Calculate the reactions of different structures by applying the conditions of static equilibrium and define statically determinate structures |
| A2.2 | Recognize the basic principles of the simple beam theory and frame analysis and Calculate the geometric properties of sections |
| B1.1 | Identify the maximum bending moment, maximum allowable load on a beam knowing the permissible stresses and the factor of safety. |
| B1-2 | Identify the maximum allowable load on a beam knowing the permissible stresses and the factor of safety. |
| B1.3 | Study simple trusses and identifying the critical members in it. |

| **Course:** Ship Structure Theory (1) | |
|---|---|
| **Program LOs** | **Course LOs** |
| A.1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Describe the stress-strain relationship for steel and recognize the shear and normal forces on structures. |
| A.2 Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Calculate the reactions of different structures by applying the conditions of static equilibrium and define statically determinate structures |
| | A2.2 Recognize the basic principles of the simple beam theory and frame analysis and Calculate the geometric properties of sections |
| B.1 Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations | B1.1 Identify the maximum bending moment, maximum allowable load on a beam knowing the permissible stresses and the factor of safety. |
| | B1-2- Identify the maximum allowable load on a beam knowing the permissible stresses and the factor of safety. |
| | B1.3 Study simple trusses and identifying the critical members in it. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | 1-Loads and reactions, Stability and determinacy | 1 |
| 2 | 2-Relation between shear and Bending | 2 |
| 3 | 3-Analysis of statically determinate beams | 3 |
| 4 | 4-Analysis of statically determinate frames | 4-5 |
| 5 | 6-Loads and reactions, Stability and determinacy | 6 |
| 6 | 7-Analysis of planar trusses (method of joints) | 7 |
| 7 | 8-Analysis of planar trusses (method of sections) | 8 |
| 8 | Mid term Exam | 9 |
| 9 | 9-Moment of inertia and Section modulus | 10 |
| 10 | 10-Section modulus of mid ship section | 11 |
| 11 | 11-Normal stresses : flexural formula, application to beams and hull girder | 12 |
| 12 | 12- Shear stresses: bolts, rivets and welding, shear formula (distribution over different sections) | 13 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1.1 | x | x | | | | x | | | | | | | | | |
| | A2.1 | x | x | | | | x | | | | | | | | | |
| | A2.2 | x | x | | | | x | | | | | | | | | |
| B-Level | B1.1 | x | x | | | | x | | | | | | | | | |
| | B1-2 | x | x | | | | x | | | | | | | | | |
| | B1.3 | x | x | | | | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A2-1, B1-1 |
| 2 | Formative (quizzes) | A1-1, A2-1, A2-2, B1-1, B1-2 |
| 3 | Final Term Examination (written) | A1-1, A2-1, A2-2, B1-1, B1-2, B1-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9th |
| 2 | Formative (quizzes) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes) | 01 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | El-Dakhakhny, "Theory of Structures", Dar El-Maaref, 2000. |
| **2** | Hibbeler, Russell C., and Tan Kiang. Structural analysis. Upper Saddle River: Pearson Prentice Hall, 2015. |
| **3** | E.C.Tupper, 'Introduction to Naval Architecture', 2002. |
| **4** | K.J.Rawson and E.C.Tupper 1968 and 1976, 'Basic Ship theory', Vol.1 |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | 1-Loads and reactions, Stability and determinacy | 7 | A1.1, A2.1 |
| 2 | 2-Relation between shear and Bending | 7 | A2,1 |
| 3 | 3-Analysis of statically determinate beams | 7 | A2.2, B1.1 |
| 4 | 4-Analysis of statically determinate frames | 7 | A2.2, B1.1 |
| 5 | 6-Loads and reactions, Stability and determinacy | 7 | A2.2 , B1.1, B1-2 |
| 6 | 7-Analysis of planar trusses (method of joints) | 7 | B1.3 |
| 7 | 8-Analysis of planar trusses (method of sections) | 7 | B1-3 |
| 8 | Mid term Exam | 7 | |
| 9 | 9-Moment of inertia and Section modulus | 7 | A2.2 |
| 10 | 10-Section modulus of mid ship section | 7 | A2.2 |
| 11 | 11-Normal stresses : flexural formula, application to beams and hull girder | 7 | B1.1, B1.2 |
| 12 | 12- Shear stresses: bolts, rivets and welding, shear formula (distribution over different sections) | 7 | B1.1, B1.2 |

**Course Coordinator: Assoc. Prof. Dr. Arwa Wafiq Hussein**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval architecture and Marine Engineering | | |
| **Department offering the Program** | Naval architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Production Engineering & Mechanical Design | | |
| **Course Code** | **PRD 111** | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | -- |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply the fundamentals of theory of machines: displacements, velocities, accelerations, and static and dynamic forces required for the proper design of mechanical linkages, cams, and geared systems. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Identify the fundamentals and outline of mechanisms. |
| A3.1 | Establish mathematical issues associated with obtaining an exact solution to design problems. |
| B1.1 | Analyze and understand the dynamic: (position, velocity, acceleration, force and torque) characteristics of mechanisms such as linkages and cams. |
| B1.2 | Design and analyze systems by applying the concepts of dynamics and vibrations. |
| B2.1 | Design and optimize mechanisms to perform a specified task. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1,2 | Simple Mechanisms | 1,2 |
| 3,4 | Velocity in mechanisms | 3,4 |
| 5,6 | Acceleration in Mechanism | 5,6 |
| 7 | Belt, Rope and Chain Drive | 7-8 |
| 8 | Midterm | 9 |
| 9,10 | Governors | 10 |
| 11,12 | Balancing | 11,12 |
| 13,14 | Gyroscopic Couple and Processional Motion | 13,14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | A1.1 | x | x | x | | | | | x | | | | | | | |
| | A3.1 | x | x | x | | x | x | x | x | | | x | | | | |
| **B-Level** | B1.1 | x | x | x | | x | x | x | x | | | x | | | x | |
| | B1.2 | x | x | x | x | x | x | x | x | | | | | x | x | |
| | B2.1 | x | x | x | x | x | x | x | x | | | x | x | x | x | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A3.1, B1.1 |
| 2 | Formative (quizzes – presentation - online) | A1.1, A3.1, B1.1, B1.2, B2.1 |
| 3 | Final Term Examination (written) | A1.1, A3.1, B1.1, B1.2, B2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes – presentation - online) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 01 |
| 2 | Formative (quizzes – presentation - online) | 15 |
| 3 | Final Term Examination (written) | 50 |
| Total | | 75 (100%) |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | J R.S. Khurmi, J.K. Gupta, Theory of Machines, 2008. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

### 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1,2 | • Simple Mechanisms | 1 | A1.1, A3.1 |
| 3,4 | • Velocity in mechanisms | 1 | A3.1, B1.1 |
| 5,6 | • Acceleration in Mechanism | 1 | A3.1, B1.1 |
| 7 | • Belt, Rope and Chain Drive | 1 | B1.1 |
| 8 | Midterm | | |
| 9,10 | • Governors | 1 | A3.1, B1.2, B2.1 |
| 11,12 | • Balancing | 1 | A3.1, B1.2, B2.1 |
| 13,14 | • Gyroscopic Couple and Processional Motion | 1 | A3.1, B1.2, B2.1 |

| **Course: Mechanical mechanics and machine theory** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A.1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Identify the fundamentals and outline of mechanisms. |

| | |
|---|---|
| A.3 Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Establish mathematical issues associated with obtaining an exact solution to design problems. |
| B.1 Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1.1 Analyze and understand the dynamic: (position, velocity, acceleration, force and torque) characteristics of mechanisms such as linkages and cams.<br>B1.2 Design and analyze systems by applying the concepts of dynamics and vibrations. |
| B2. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2.1 Design and optimize mechanisms to perform a specified task. |

**Course Coordinator: Dr.Eng. Mogeeb alrahman Abduelrahman**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. In Naval Architecture and Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Mechanical Power Engineering | | |
| **Course Code** | MPE105 | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aims |
|---|---|
| 1 | Acquire the students with the basics and the essential knowledge of the Thermodynamic Laws, Energy Transformations in Heat Engine, Thermodynamic Processes, Power cycles, simple power station, Air compressors. |
| 2 | Acquire the students with the principles of Thermal analysis and evaluation for the performance and the operating behavior of different thermal systems. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A1.1** | Define the concepts of physical meaning and phenomena are used in thermodynamics. |
| **A1.2** | Define the principles of energy; its use, its transfer, and its conversion from one form to another particularly heat and work. |
| **A1.3** | Identify the Thermodynamic system and processes, the first law of thermodynamics applied on closed and open system, the second law of thermodynamics and entropy |
| **A1.4** | Define the concepts of pure substances and Ideal gases and their properties |
| **A5.1** | Write the reports in accordance with the standard scientific guidelines. |
| **A5.2** | Describe the work coherently and successfully as a part of a team in assignments. |
| **A9.1** | Analyze the engineering problems Thermodynamically. |
| **A9.2** | Analyze the required reports, discuss results and defend his/her ideas. |
| **B1.1** | Apply basic scientific principles of thermodynamic to solve simple engineering problems on the closed and open system in steady state. |
| **B1.2** | Analyze thermally the processes of the air power cycles and air compressor. |
| **B1.3** | Investigate the operation and performance of: simple steam power plant and Refrigeration simple cycle. |
| **B2.1** | Identify the operation and performance of: Air Power Cycles, simple steam power plant, Refrigeration simple cycle, Air Compressor. |

| **Course:** Thermodynamics | |
|---|---|
| **Program Competencies** | **Course LOs** |
| **A1.** Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Define the concepts of physical meaning and phenomena are used in thermodynamics.<br>A1.2 Define the principles of energy; its use, its transfer, and its conversion from one form to another particularly heat and work.<br>A1.3 Identify the Thermodynamic system and processes, the first law of thermodynamics applied on closed and open system, the second law of thermodynamics and entropy<br>A1.4 Define the concepts of pure substances and Ideal gases and their properties |
| **A.5** Practice research techniques and methods of investigation as an inherent part of learning. | A5.1 Write the reports in accordance with the standard scientific guidelines.<br>A5.2 Describe the work coherently and successfully as a part of a team in assignments. |
| **A.9** Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9.1 Analyze the engineering problems Thermodynamically.<br>A9.2 Analyze the required reports, discuss results and defend his/her ideas. |
| **B.1** Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1.1 Apply basic scientific principles of thermodynamic to solve simple engineering problems on the closed and open system in steady state.<br>B1.2 Analyze thermally the processes of the air power cycles and air compressor.<br>B1.3 Investigate the operation and performance of: simple steam power plant and Refrigeration simple cycle. |
| **B.2** Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2.1 Identify the operation and performance of: Air Power Cycles, simple steam power plant, Refrigeration simple cycle, Air compressor |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lecture:**<br>• Thermodynamics Definition.<br>• Application Areas of Thermodynamics<br>• Importance of Dimensions and Units<br>• Revision on Definitions of: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power<br>**Tutorials/Lab:**<br>• Solve problems on the Thermodynamic system of mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power in different units.<br>• Conduct experiments on thermodynamic system parameters: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power. | 1 |
| 2 | **Lecture:**<br>• Thermodynamic Systems<br>• Thermodynamic Property<br>• Thermodynamics equilibrium.<br>• Thermodynamic Process<br>• Thermodynamic Cycles<br>• Energy<br>**Tutorials/Lab:**<br>• Solve problems on: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power and defining system state.<br>• Conduct experiments on thermodynamic system parameters: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power. | 2 |
| 3 | **Lecture:**<br>• Zeroth Law of Thermodynamics<br>• First Law of Thermodynamics<br>• General Form of the First Law of Thermodynamics (Energy Equation)<br>• Application of the First Law of Thermodynamics to Closed System (Non-Flow Energy Equation)<br>• Work of the Non-flow Process<br>• Work of the flow Process<br>• Specific heats<br>• Application of the First Law of Thermodynamics to Steady Flow Open System<br>• Simple Steam Power Plant.<br>**Tutorials/Lab:**<br>• Solve problems on First Law of Thermodynamics and its applications. | 3-4 |

| | | |
|---|---|---|
| | • Conduct experiments on flow ducts: Nozzle and Diffuser to identify the effect of inlet conditions on the exit conditions according to the shape of duct. | |
| 4 | **Lecture:**<br>• Ideal Gases<br>• Ideal Gas Characteristics<br>• Gas Laws<br>• Equation of state, Ideal gas Law<br>• Specific heats with ideal gases<br>• Processes of Ideal Gases<br>**Tutorials/Lab:**<br>• Solve problems on Ideal Gases, Gas Laws and Processes of Ideal Gases.<br>• Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the torque of the turbine. | 5-6 |
| 5 | **Lecture:**<br>• Second Law of Thermodynamics<br>• Corollaries of the Second Law of Thermodynamics<br>• Heat reservoir<br>• Heat engine<br>• Carnot Cycle<br>**Tutorials/Lab:**<br>• Solve problems on Second Law of Thermodynamics and Carnot Cycle.<br>• Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the torque of the turbine. | 7 |
| 6 | **Midterm Examination** | 8 |
| 7 | **Lecture:**<br>• The reversed cycles: Heat Pump and Refrigerator.<br>• Reversed Heat Engines<br>• Coefficient of Performance<br>• Reversed Gas Carnot Cycle<br>**Tutorials/Lab:**<br>• Solve problems on Heat Pump and Refrigerator, Reversed Gas Carnot Cycle.<br>• Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the torque of the turbine. | 9 |
| 7 | **Lecture:**<br>• Introduction to Gas Power Cycles.<br>• Air Standard Cycles<br>➢ The assumption normally made in establishing the ideal-gas cycles | 10-11-12 |

| | | |
|---|---|---|
| | ➢ Otto Cycle<br>➢ Actual Otto Cycle<br>➢ Diesel Cycle<br>➢ Actual Diesel Cycle<br>➢ Dual Cycle<br>➢ Gas Turbine Engine Cycles, Brayton (Joule) Cycle<br>**Tutorials/Lab:**<br>• Solve problems on Gas Power Cycles: Otto , Diesel , Dual and Brayton (Joule) Cycle.<br>• Conduct experiments on Benzene and Diesel engines. | |
| **9** | **Lecture:**<br>• Properties of Pure Substances.<br>• Phases of a Pure Substance<br>• Heating a pure substance at constant pressure<br>• Saturation Temperature and Saturation Pressure<br>• Property diagrams for phase-change processes<br>• Tables of Steam Properties.<br>• Vapor Charts<br>**Tutorials/Lab:**<br>• Solve problems on the Properties of Pure Substances, Tables of Steam Properties and Vapor Charts.<br>• Conduct experiments on Gas turbine unit Performance. | 13 |
| **10** | **Lecture:**<br>• Air Compressor<br>**Tutorials/Lab:**<br>• Solve problems on Air Compressor.<br>• Conduct experiments on Air Compressor unit Performance. | 14 |

## 5. Teaching and Learning Methods:

| LOs | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| **A-Level** | **A1.1** | x | x | | x | x | | x | x | | | | | | | x |
| | **A1.2** | x | x | | x | x | | x | x | | | | | | | |
| | **A1.3** | x | x | | x | x | | x | x | | | | | | | x |
| | **A1.4** | x | x | | x | x | | x | x | | | | | | | x |
| | **A5.1** | | x | | x | x | | | x | | | x | | | | |
| | **A5.2** | | x | | x | x | | | x | | | x | x | | | |
| | **A9.1** | x | x | | x | x | | x | x | | | | x | | | x |
| | **A9.2** | | x | | x | x | | x | x | | | x | x | | | |
| **B-Level** | B1.1 | x | x | | x | x | | x | x | | | | | | | x |
| | B1.2 | x | x | | x | x | | x | x | | | | | | | x |
| | B1.3 | x | x | | x | x | | x | x | | | | | | | x |
| | B2.1 | x | x | | x | x | | x | x | | | | | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| **1** | Additional Tutorials and videos |
| **2** | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A9.1, B1.1 |
| **2** | Practical Examination | A9.1, A9.2, A1.3 |
| **3** | Oral Examination | B1.1, B1.3, B2.1 |
| **4** | Formative (quizzes - presentation - assignments) | A1.2, A1.3, A5.1, A5.2, A9.2, B1.1, B1.2, B1.3, B2.1 |
| **5** | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4, A9.1, B1.1, B1.2, B1.3, B2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes - presentation - assignments) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights (%) |
|---|---|---|
| **1** | Mid Term Examination (written) | 8 |
| **2** | Practical/ Oral Examination | 20 |
| **3** | Formative (quizzes - presentation - assignments) | 12 |
| **4** | Final Term Examination (written) | 60 |
| **Total** | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Çengel, Yunus A., Boles, Michael A., Kanoğlu, “Thermodynamics: An Engineering Approach”9th Edition, McGraw-Hill Education, USA, 2019. |
| **2** | Onkar Singh, “Applied Thermodynamics” 3rd Edition, New Age International (P) Ltd, New Delhi, 2009. |
| **3** | Claus B., Richard E. Sonntag, “Fundamentals of Thermodynamics” 8th Edition, John Wiley & Sons, 2013. |
| **4** | Sarker, D. S., “Thermal Power Plant: Design and Operation, ” 1st Edition, Elsevier, Waltham, Massachusetts, USA, 2015. |
| **5** | Nag, P. K., “Power Plant Engineering, ” 3rd Edition, Tata McGraw-Hill Inc., New Delhi, India, 2008. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture/Online Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aims | LOs |
|---|---|---|---|
| 1 | **Lecture:**<br>• Thermodynamics Definition.<br>• Application Areas of Thermodynamics<br>• Importance of Dimensions and Units<br>• Revision on Definitions of: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power<br>**Tutorials/Lab:**<br>• Solve problems on the Thermodynamic system of mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power in different units.<br>• Conduct experiments on thermodynamic system parameters: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power. | 1, 2 | A1.1, A1.2, A5.1 |
| 2 | **Lecture:**<br>• Thermodynamic Systems<br>• Thermodynamic Property<br>• Thermodynamics equilibrium.<br>• Thermodynamic Process<br>• Thermodynamic Cycles<br>• Energy<br>**Tutorials/Lab:**<br>• Solve problems on: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy and power and defining system state.<br>• Conduct experiments on thermodynamic system parameters: mass, weight, force, density, specific weight, specific volume, pressure, temperature, energy | 1,2 | A1.1, A1.2, A9.1, B1.1 |

| | | | |
|---|---|---|---|
| | and power. | | |
| **3** | **Lecture:**<br>• Zeroth Law of Thermodynamics<br>• First Law of Thermodynamics<br>• General Form of the First Law of Thermodynamics (Energy Equation)<br>• Application of the First Law of Thermodynamics to Closed System (Non-Flow Energy Equation)<br>• Work of the Non-flow Process<br>• Work of the flow Process<br>• Specific heats<br>• Application of the First Law of Thermodynamics to Steady Flow Open System<br>• Simple Steam Power Plant.<br>**Tutorials/Lab:**<br>• Solve problems on First Law of Thermodynamics and its applications.<br>• Conduct experiments on flow ducts: Nozzle and Diffuser to identify the effect of inlet conditions on the exit conditions according to the shape of duct. | 1,2 | A1.1, A1.2, A1.3, A5.2, B1.1, B1.3 |
| **4** | **Lecture:**<br>• Ideal Gases<br>• Ideal Gas Characteristics<br>• Gas Laws<br>• Equation of state, Ideal gas Law<br>• Specific heats with ideal gases<br>• Processes of Ideal Gases<br>**Tutorials/Lab:**<br>• Solve problems on Ideal Gases, Gas Laws and Processes of Ideal Gases.<br>• Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the torque of the turbine. | 1,2 | A1.2, A1.3, A1.4, B1.1 |
| **5** | **Lecture:**<br>• Second Law of Thermodynamics<br>• Corollaries of the Second Law of Thermodynamics<br>• Heat reservoir<br>• Heat engine<br>• Carnot Cycle<br>**Tutorials/Lab:**<br>• Solve problems on Second Law of Thermodynamics and Carnot Cycle.<br>• Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the | 1,2 | A1.2, A1.3, A9.1, B1.1, B1.3, B2.1 |

| | | | |
|---|---|---|---|
| | torque of the turbine. | | |
| **6** | - **Midterm Examination** | 1,2 | A1.1, A1.2,<br>A1.3, A1.4,<br>A9.1, B1.1 |
| **7** | **Lecture:**<br>- The reversed cycles: Heat Pump and Refrigerator.<br>- Reversed Heat Engines<br>- Coefficient of Performance<br>- Reversed Gas Carnot Cycle<br>**Tutorials/Lab:**<br>- Solve problems on Heat Pump and Refrigerator, Reversed Gas Carnot Cycle.<br>- Conduct experiments on steam turbine power plant to investigate the effect of the boiler pressure on the torque of the turbine. | 1,2 | A1.2, A1.3,<br>A9.1, B1.1 |
| **8** | **Lecture:**<br>- Introduction to Gas Power Cycles.<br>- Air Standard Cycles<br>➢ The assumption normally made in establishing the ideal-gas cycles<br>➢ Otto Cycle<br>➢ Actual Otto Cycle<br>➢ Diesel Cycle<br>➢ Actual Diesel Cycle<br>➢ Dual Cycle<br>➢ Gas Turbine Engine Cycles, Brayton (Joule) Cycle<br>**Tutorials/Lab:**<br>- Solve problems on Gas Power Cycles: Otto, Diesel , Dual and Brayton (Joule) Cycle.<br>- Conduct experiments on Benzene and Diesel engines. | 1,2 | A1.2, A9.2,<br>B1.1, B1.2,<br>B1.3, B2.1 |
| **9** | **Lecture:**<br>- Properties of Pure Substances.<br>- Phases of a Pure Substance<br>- Heating a pure substance at constant pressure<br>- Saturation Temperature and Saturation Pressure<br>- Property diagrams for phase-change processes<br>- Tables of Steam Properties.<br>- Vapor Charts<br>**Tutorials/Lab:**<br>- Solve problems on the Properties of Pure Substances, Tables of Steam Properties and Vapor Charts.<br>- Conduct experiments on Gas turbine unit | 1,2 | A1.4, B1.1,<br>B1.3, B2.1 |

| | | | |
|---|---|---|---|
| | Performance. | | |
| **10** | **Lecture:**<br>• Air Compressor<br>**Tutorials/Lab:**<br>• Solve problems on Air Compressor.<br>• Conduct experiments on Air Compressor unit Performance. | 1,2 | A1.2, A1.3, B1.1, B1.2, B2.1 |

**Course Coordinator:** **Dr. Mohamed Sayed Soliman**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | HUF102 | | |
| **Year/ Level** | First year- 2nd semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | --- | --- |

## 2. Course Aims:

| **No.** | **Aim** |
|---|---|
| 3 | Master self-learning and life-long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner. Accordingly, to apply advanced knowledge of technical English sentence structure, presentation skills, and vocabulary related to the Engineering in general as well as petroleum and construction engineering in particular. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A8-1 | Identify the importance and usage of different types of technical report for engineers. |
| A8-2 | Recognize the differences between the different sections of technical reports. |
| A8-3 | Prepare accurate, clear, efficient, and comprehensive engineering technical report. |
| A8-4 | Presents accurate, clear, efficient, and comprehensive engineering technical report. |
| A8-5 | Explore different ideas, views, and knowledge from a range of sources to organize, collect, analyze, and evaluate information for writing a technical report. |
| A10-1 | Refer to various literatures regarding writing styles and rules. |
| A10-2 | Practice writing the list of references in a different format. |

| **Course: Technical Report Writing** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A8 - Communicate effectively, graphically, verbally and in writing, with a range of audiences using contemporary tools. | A8-1 Identify the importance and usage of different types of technical report for engineers. |
| | A8-2 Recognize the differences between the different sections of technical reports. |
| | A8-3 prepare accurate, clear, efficient, and comprehensive engineering technical report. |
| | A8-4 Presents accurate, clear, efficient, and comprehensive engineering technical report. |
| | A8-5 Explore different ideas, views, and knowledge from a range of sources to organize, collect, analyze, and evaluate information for writing a technical report. |
| A10 - Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Refer to various literatures regarding writing styles and rules. |
| | A10-2 Practice writing the list of references in a different format. |

## 4. Course Contents:

| *Week No.* | *Topic* | *Total Hours* | *Contact hrs* | | |
|---|---|---|---|---|---|
| | | | **Lec.** | **Tut.** | **Lab.** |
| *Week-1* | Introduction | 2 | 2 | -- | -- |
| *Week-2* | Formatting Guidelines (templates, pages, and text) | 2 | 2 | -- | -- |
| *Week-3-4* | Components of a report ( preliminary pages) | 4 | 4 | -- | -- |
| *Week-5-7* | Components of a report ( text of a report : introduction, main section, conclusion, recommendations) | 6 | 6 | -- | -- |
| *Week-9* | Mid-term Exam | 2 | 2 | -- | -- |
| *Week-8-11* | Referencing of sources and originality (author-date, and numerical referencing) | 6 | 6 | -- | -- |
| *Week-12* | Planning and writing | 2 | 2 | -- | -- |
| *Week-13-14* | Practice and discuss how to prepare and write a technical report. | 4 | 4 | -- | -- |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online-In class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A8-1 | x | x | | x | x | | | x | | | | x | | | |
| | A8-2 | x | x | | x | | | | | | | | | | | |
| | A8-3 | x | x | | x | | | | | | | | | | | |
| | A8-4 | x | x | | x | | | | | | | | | | | |
| | A8-5 | | x | | x | | | | | | | x | x | | | |
| | A10-1 | x | x | | x | | | | x | | | | | | | |
| | A10-2 | x | x | | x | x | | | x | | | x | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A8-1, A8-2, A8-3, A8-5, A10-1 |
| 2 | Formative (quizzes – presentation - proposal) | A8-1, A8-2, A8-3, A8-4, A8-5, A10-1, A10-2 |
| 3 | Final Term Examination (written) | A8-1, A8-2, A8-3, A8-4, A8-5, A10-1, A10-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9th |
| 2 | Formative (quizzes – presentation - proposal) | Three times through the semester |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation - proposal) | 10 |
| 3 | Final Term Examination (written) | 80 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Su-Hie Ting, and Syaharom Abdullah, *Report Writing Skills of Engineering Students*, Proceedings of The Second International Conference on the Roles of the Humanities and Social Sciences in Engineering, July 2012. |
| **2** | Ann Winckel, and Bonnie Hart, *Report Writing Style Guide For Engineering Students*, Flexible Learning Centre, University of Australia, 4th edition July 2002. |
| **3** | Nell Ann Pickett, *Technical English: Writing, Reading, and Speaking*, 8th edition, Pearson international edition, 2014. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Sound System Facility |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction | 3 | A8-1 |
| 2 | Formatting Guidelines (templates, pages, and text) | 3 | A8-2, A8-4, A10-1 |
| 3 | Components of a report ( preliminary pages) | 3 | A8-2, A8-4, A10-1 |
| 4 | Components of a report ( text of a report : introduction, main section, conclusion, recommendations) | 3 | A8-2, A8-4, A10-1 |
| 5 | Mid-term Exam | 3 | A8-1, A8-2, A8-3, A8-5, A10-1 |
| 6 | Referencing of sources and originality (author-date, and numerical referencing) | 3 | A10-1, A10-2 |
| 7 | Planning and writing | 3 | A8-1, A8-3, A8-4, A10-1, A10-2 |
| 8 | Practice and discuss how to prepare and write a technical report. | 3 | A8-1, A8-2, A8-3, A8-4, A10-1, A10-2 |

**Course Coordinator: Dr. Randa Ramadane**

**Program Corodinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

# Course Specifications: Math 5B

## 1.Basic Information

| | | |
|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | |
| **Course Code** | SCI 227 | |
| **Year/ Level** | Second year- 1st semester | |
| **Specialization** | Major | |
| **Teaching Hours** | Lectures | Tutorial |
| | 2 | 2 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply the theoretical knowledge and practical to deal with special functions and its applications and to initiate and sustain in-depth research relevant to special functions. Also, the course provides the student with the essential skills to evaluate double and triple Integrals and its applications. Also, topics include the evaluation methods of the Line Integral, Curl and Divergence of vector fields, the concept of Surface Integrals and its applications. Also, the student will be able to demonstrate the knowledge and understanding of the concept of Green, Stokes and Gauss theorems, and the potential of using them in some applications. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Identify the solution of ordinary differential equations using series. |
| A1.2 | Review the theories and concepts used in the Special functions. |
| A1.3 | Recognize the contribution and impacts on Special functions in different areas of science. |
| A1.4 | Describe the nature and operations of vector analysis. |
| A2.1 | Estimate the gradient of a scalar field and the divergence and curl of a vector field. |
| A2.2 | Apply the concepts and theories of the basic properties of using the Green theorem as an effective methodology of solving engineering problems. |
| A2.3 | Conduct the application of the divergence theorem, Stokes' theorem and Gauss theorem as an effective methodology of solving engineering problems. |
| A10.1 | Identify the problem and select appropriate mathematical methods for modeling and analyzing it. |
| A10.2 | Use different methods for solving the different types of problems and select the most appropriate solutions based on analytical thinking. |
| B2.1 | Apply knowledge of mathematics, science, and engineering practice integrally to solve engineering problems related to the course topics. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>**Chapter 1:** Solution in series<br>- case I<br>- case II<br>- case III<br>- case IV<br>**Tutorials:**<br>-Solve the cases problems. | 1-4 |
| 2 | **Lectures:**<br>**Chapter2:** Special functions<br>- The Gamma function<br>- The Beta function<br>- The Bessel functions<br>- The Legendre polynomials<br>**Tutorials:**<br>-Discuss problems and the possible solutions. | 5-6 |
| 3 | **Lectures:**<br>**Chapter 3:** Vector analysis<br>- Scalar and Vector Fields<br>- Vector addition<br>- Dot and Cross product of vectors<br>- application of vectors<br>**Tutorials:**<br>-Solve the problems. | 7-8 |
| 4 | Midterm | 9 |
| 5 | **Lectures:**<br>**Chapter 4:** Differential operators<br>- The gradient of a scalar field<br>- The divergence of a vector field<br>- The curl of a vector field<br>**Tutorials:**<br>-Solve the problems. | 10-12 |
| 6 | **Lectures:**<br>**Chapter 5:** - Calculus of functions of several variables<br>-The line integral<br>- The double integral<br>- The triple integral<br>**Tutorials:**<br>-Solve the problems. | 13 |
| 7 | **Lectures:**<br>**Chapter 6:** | 14-15 |

| | | |
|---|---|---|
| | **-** Fundamental theorems that connect differentiation and integration in multivariable calculus<br>-Green theory<br>- Stocks theory<br>-Gauss theory<br>**Tutorials:**<br>- Solve the problems | |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** (online\in class) | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | x | x | | | | x | x | | | | | | | | |
| | **A1.2** | x | | | | x | x | x | | | | | | | | |
| | **A1.3** | x | | | | | x | x | | | | | | | | |
| | **A1.4** | x | | | | x | x | x | x | | | | | | | |
| | **A2.1** | x | | | | x | x | x | | | | | | | | |
| | **A2.2** | x | x | | | x | x | x | x | | | | | | | |
| | **A2.3** | x | | | | x | x | x | | | | | | | | |
| | **A10.1** | x | | | | | x | | x | | | | | | | |
| | **A10.2** | | | | | | x | | x | | | | | | | |
| **B-Level** | **B2.1** | | x | | | x | x | | x | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A1.4,A10.1,A10.2 |
| 2 | Formative (quizzes- online quizzes- sheets) | A2.1, A2.2, A2.3,A10.1,A10.2, B2.1 |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A1.4,A10.1,A10.2, A2.1, A2.2, A2.3, B2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes- sheets) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 2 | Formative (quizzes- online quizzes- sheets) | 10 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, (2010). |
| **2** | R.KENT NAGLE & EDWARD B. SAFF, "Fundamental of Differential Equations.", Publisher: Pearson; 9 edition, (Jan 11, 2017). |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>**Chapter 1:** Solution in series<br>- case I<br>**-** case II<br>**-** case III<br>- case IV<br>**Tutorials:**<br>-Solve the cases problems | 1 | A1.1 |
| 2 | **Lectures:**<br>**Chapter2:** Special functions<br>**-** The Gamma function<br>- The Beta function<br>- The Bessel functions<br>- The Legendre polynomials<br>**Tutorials:**<br>-Discuss problems and the possible solutions. | 1 | A1.2, A1.3 |
| 3 | **Lectures:**<br>**Chapter 3:** Vector analysis<br>- Scalar and Vector Fields<br>- Vector addition<br>- Dot and Cross product of vectors<br>- application of vectors<br>**Tutorials:**<br>-Solve the problems. | 1 | A1.4 |
| 4 | Midterm. | 1 | A1.1, A1.2, A1.3, A1.4,A10.1,A10.2 |
| 5 | **Lectures:**<br>**Chapter 4:** Differential operators<br>- The gradient of a scalar field<br>- The divergence of a vector field<br>- The curl of a vector field<br>**Tutorials:**<br>-Solve the problems. | 1 | A2.1 |
| 6 | **Lectures:**<br>**Chapter 5:** - Calculus of functions of several variables<br>-The line integral<br>- The double integral<br>- The triple integral<br>**Tutorials:**<br>-Solve the problems. | 1 | A2.2, A2.3,A10.2 |

| | | | |
|---|---|---|---|
| 7 | **Lectures:**<br>**Chapter 6:**<br>**-** Fundamental theorems that connect differentiation and integration in multivariable calculus<br>-Green theory<br>- Stocks theory<br>-Gauss theory<br>**Tutorials:**<br>-Solve the problems | 1 | A2.2,<br>A2.3,A10.1,A10.2,B2.1 |

| **Course: Math 5** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1.1 Identify the solution of ordinary differential equations using series.<br>A1.2 Review the theories and concepts used in the Special functions.<br>A1.3 Recognize the contribution and impacts on Special functions in different areas of science.<br>A1.4 Describe the nature and operations of vector analysis. |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2.1 Estimate the gradient of a scalar field and the divergence and curl of a vector field.<br>A2.2 Apply the concepts and theories of the basic properties of using the Green theorem as an effective methodology of solving engineering problems.<br>A2.3Conduct the application of the divergence theorem, Stokes' theorem and Gauss theorem as an effective methodology of solving engineering problems. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10.1 Identify the problem and select appropriate mathematical methods for modeling and analyzing it.<br>A10.2 Use different methods for solving the different types of problems and select the most appropriate solutions based on analytical thinking. |
| B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design. | B2.1 **1** Apply knowledge of mathematics, science, and engineering practice integrally to solve engineering problems related to the course topics. |

**Course Coordinator: Dr. Mohamed Youssef Farghly**

**Dr. Ibrahim hosny**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 206 | | |
| **Year/ Level** | Second year- 1st semester – Law 2014 | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Oral |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Apply engineering mathematics, as necessary tools to investigate ship launching. Analyze and investigate the engineering methods of ship launching, on basis of ship type, shipyard facility, and width of waterway. Develop the necessary mathematics to acquire the fundamental knowledge of ship motion, ship steering and maneuverability. Apply modern engineering tools to ship steering as one of naval architecture practice to design ship rudder and rudder stock diameter. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize the methods of ship launching, and investigate in details the method of ship end launching, both theory and calculations. |
| A1-2 | Investigate the wave and wind as sources of ship exciting forces and moments. Recognize the fundamentals of ship motion in different sea and wind conditions. |
| A1-3 | Identify the ship steering and maneuverability expressions for ship operating at different waterways and sea conditions. For a specific ship type, recognize the ship rudder type, design and estimate the rudder stock diameter. |
| B1-1 | Analysis and solution of ship end launching formulation. Solve the end-launching problem with computations and drawings. |
| B1-2 | Analysis of theory of waves and wind, to estimate the dynamic exciting forces that cause ship motions, and ship steering. |
| B4-1 | Investigate the environmental hazards associated with the dynamics of ship motions and ship steering. |
| B4-2 | Adopt the requirements of the International Maritime Organizations standards to the dynamics of ship motions and ship steering. |
| C2-1 | Evaluate the behavior of ship among waves and ship steering in inland, coastal sea waterways and in open sea. |
| C2-2 | Estimate the rudder type, and develop a rudder design and rudder stock diameter. |
| C5-1 | Evaluate the ship launching hazards, and the hazards of ship dynamics according to International Maritime Organization, Standards and Regulations. |

| **Course:** Naval Architecture (2) | |
|---|---|
| **Program LOs** | **Course Los** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Identify the methods of ship launching, and investigate in details the method of ship end launching, both theory and calculations. |
| | A1-2 Formulate the wave and wind as sources of ship exciting forces and moments. Recognize the fundamentals of ship motion in different sea and wind conditions. |
| | A1-3 Investigate the ship steering and maneuverability in different waterways and sea conditions. Recognize for a specific ship form, the ship rudder type, and estimate the rudder stock diameter. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Analysis and solution of ship end launching formulation. Solve the end-launching problem with computations and drawings. |
| | B1-2 Analyze the wave theory and wind, to estimate the dynamic exciting forces that cause ship motions, and ship steering. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Investigate the environmental hazards associated with the dynamics of ship motions and ship steering. |
| | B4-2 Adopt the requirements of the International Maritime Organizations standards to the dynamics of ship motions and ship steering. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate the behavior of ship among waves and ship steering in inland, coastal sea waterways and in open sea. |
| | C2-2 Estimate the rudder type, and develop a rudder design and rudder stock diameter. |

| | |
|---|---|
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Evaluate the ship launching hazards, and the hazards of ship dynamics according to International Maritime Organization, Standards and Regulations. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Ship Launching Theory | 1-3 |
| 2 | Ship End Launching Hazards,<br>Launching Sheet Computations & Drawings | 4-6 |
| 3 | Introduction to Ship Motion, Sea Waves & Wind Effects | 7-8 |
| 4 | Fundamentals of Ship Steering & Maneuverability | 10-12 |
| 5 | Rudder Types, Design, and Rudder Stock Design | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A1-2 | x | x | | x | | | x | | | | | | | | |
| | A1-3 | x | x | | x | | | x | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B1-2 | x | x | | x | | x | | | | | | | | | |
| | B4-1 | x | x | | x | | x | | | | | | | | | |
| | B4-2 | x | x | | x | | x | | | | | | | | | |
| C-Le | C2-1 | x | x | | x | | x | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **C2-2** | x | x | | x | | | x | | | | | | | | |
| | **C5-1** | x | x | | x | | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A1-2, A1-3, B1-1, B4-1, C2-1 |
| 2 | Formative (quizzes – presentation – reports) | A1-1, A1-2, A1-3, C1-3, C1-5 |
| 3 | Oral examination | A1-1, A1-2 |
| 4 | Practical examination | C2-1, C2-2, C5-1 |
| 5 | Final Term Examination (written) | A1-1, A1-2, A1-3, B4-1, B4-2, C2-1, C2-2, C5-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – presentation – reports) | Every 2nd week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – presentation – reports) | 20 |
| 3 | Oral / Written Exam | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Rawson & Tupper, " Basic Ship Theory," Vol. 1 and Vol. 2, Longman, London, England, 1999. |
| **2** | Group of Authors, "Principles of Naval Architecture", SNAME Publications, Vol. 1 and Vol. 3, USA, 2012. |
| **3** | ***Keywords for Internet Search***<br>*Ship Launching, Ship Dynamics and Motions, Ship Steering, Ship Maneuverability, Ship Controllability, Ship Rudder Design, Rudder Stock Design.* |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presentation in Person |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Ship Launching Theory | 1 | A1-1, B1-1, C2-1 |
| 2 | Ship End Launching Hazards, Launching Sheet Computations & Drawings | 1 | A1-2, C2-2 |
| 3 | Introduction to Ship Motion, Sea Waves & Wind Effects | 1 | A1-2, B1-2, C2-2 |
| 4 | Fundamentals of Ship Steering & Maneuverability | 1 | A1-3, B1-1, B4-1, C2-1, C5-1 |
| 5 | Rudder Types, Design, and Rudder Stock Design | 1 | A1-3, B1-1, B4-2, C2-2, C5-1 |

**Course Coordinator: Prof. Dr. Mo'men M. Gaafary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 207 | | |
| **Year/ Level** | Second year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply knowledge of marine engineering concepts and basic knowledge and skills to recognize the different marine systems on shipboard and provide students with the ability to be familiar with the main principles of marine engineering and how to design, select and arrange the optimum marine power plant, piping systems and components for ship hull and machinery. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B2-1 | Choose the suitable marine power plants for different ship types |
| B2-2 | Analyze the engineering problems related to marine engineering and naval architecture |
| B2-3 | Demonstrate the advanced mechanisms and tools in marine engineering systems. |
| B3-1 | Select and determine the suitable requirements for safety and environmental protection |
| B3-2 | Investigate the recent and new technologies in ship propulsion systems. |
| B4-1 | Discuss the required data to solve the problems of marine engineering systems. |
| B4-2 | Select the standards to get the design data required for marine systems design |
| C1-1 | Utilize the given data to deal with the engineering problems related to Marine engineering. |
| C1-2 | Design different elements of marine systems |
| C2-1 | Illustrate different marine systems |
| C2-2 | Read technical specifications & drawings of different marine elements & systems |
| C6-1 | Improve and add new ideas to marine engineering disciplines |
| C6-2 | Prepare technical reports and free hand sketches |

**Course: Marine Engineering (1)**

| Course LOs | Program LOs |
|---|---|
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Choose the suitable marine power plants for different ship types |
| | B2-2 Analyze the engineering problems related to marine engineering and naval architecture |
| | B2-3 Demonstrate the advanced mechanisms and tools in marine engineering systems. |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Select and determine the suitable requirements for safety and environmental protection |
| | B3-2 Investigate the recent and new technologies in ship propulsion systems. |
| \|B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Discuss the required data to solve the problems of marine engineering systems. |
| | B4-2 Select the standards to get the design data required for marine systems design |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Utilize the given data to deal with the engineering problems related to Marine engineering. |
| | C1-2 Design different elements of marine systems |
| C 2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Illustrate different marine systems |
| | C2-2 Read technical specifications & drawings of different marine elements & systems |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Improve and add new ideas to marine engineering disciplines |
| | C6-2 Prepare technical reports and sketches |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Selection and classification of marine power plants | 1-2 |
| 2 | Marine diesel engine, steam turbine, gas turbine power plants (components and systems) | 3-4 |
| 3 | Marine combined cycle power plants (components and systems) | 5 |
| 4 | Principles of engine room layout of different ships | 6-7 |
| 5 | Arrangement of ship tanks & Marine piping systems on shipboard | 8-10 |
| 6 | Design and required Calculations for marine power plants | 11-12 |
| 7 | Cooling piping systems, Lubricating and fuel oil piping systems, Air starting and exhaust piping systems, Bilge and ballast piping systems | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| B - Level | B2-1 | X | X | | | | | | X | | | | | | | |
| | B2-2 | X | X | | | X | | | | | | | | | | |
| | B2-3 | X | X | | | | | | | | | | | | | |
| | B3-1 | X | X | | | | | | | | | | | | | |
| | B3-2 | X | X | | | | | | | | | | | | | |
| | B4-1 | X | X | | | | X | | | | | | | | | |
| | B4-2 | X | X | | | | X | | | | | | | | | |
| C - Level | C1-1 | X | X | | | | | X | | | | | | | | |
| | C1-2 | X | X | | | | | X | | | | | | | | |
| | C2-1 | X | X | | X | X | | | | | | | | | | |
| | C2-2 | X | X | | X | X | | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **C6-1** | **X** | **X** | | **X** | **X** | **X** | | **X** | | | | | | | |
| | **C6-2** | **X** | **X** | | **X** | **X** | **X** | | **X** | | | | | **X** | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | B2-1, B2-2, B2-3, B3-1, B3-2, C1-1 |
| 2 | Formative (quizzes – reports – drawings) | B4-1, C2-1, C6-2 |
| 3 | Oral assessment | B2-1, B4-1, C2-1, C6-2 |
| 4 | Practical assessment | C2-1, C2-2 |
| 5 | Final Term Examination (written) | B2-1, B2-2, B2-3, B3-1, B3-2, B4-1, B4-2, C1-1, C1-2, C6-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – reports – drawings) | Every week |
| 3 | Oral assessment | 15 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 11 |
| 2 | Oral assessment | 10 |
| 3 | Formative (quizzes – reports – drawings) | 21 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Taylor, D.A., Introduction to marine engineering, Elsevier, 1996 |
| **2** | DNV.GL Rules for classifications, Part 4 Systems and components, Chapter 6 Piping systems, January 2017 |
| **3** | Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992 |
| **4** | R. Taggart, "Ship Design and Construction", SNAME, USA 1980 |
| **5** | S. Turnock, Future fuels- a nuclear solution?, Future fuel for shipping conference, London, 2014 |
| **6** | Professor Adel Tawfik Lecture Notes. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facility |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Selection and classification of marine power plants | 1 | B2-1, B2-2 |
| 2 | Marine diesel engine, steam turbine, gas turbine power plants (components and systems) | 1 | B2-2, B3-1, B3-2 |
| 3 | Marine combined cycle power plants (components and systems) | 1 | B2-1, B4-1, B4-2 |
| 4 | Principles of engine room layout of different ships | 1 | B2-3, B3-1, B3-2, C1-1 |
| 5 | Arrangement of ship tanks & Marine piping systems on shipboard | 1 | C1-1, C1-2, C2-2C6-2 |
| 6 | Design and required Calculations for marine power plants | 1 | C1-1, C1-2, C6-2 |

**Course Coordinator: Dr Ameen Bassam**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| Program Title | B. Sc. in Naval Architecture &Marine Engineering | | |
| Department offering the Program | Naval Architecture &Marine Engineering | | |
| Department Responsible for the Course | Naval Architecture &Marine Engineering | | |
| Course Code | NME 208 | | |
| Year/ Level | Second year- 1st semester | | |
| Specialization | Major | | |
| Teaching Hours | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 7 | Apply the essential knowledge to understand the fundamental concepts of structural mechanics with applications to ship structures, and to evaluate the elastic deformation of structures and the shearing force and bending moment along it. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize the relation between the forms of structural response |
| A1-2 | Investigate the theorems and equations studied and state their main assumptions. |
| A1-3 | Describe the free body diagram shearing force diagram and bending moment diagram for statically indeterminate beams and frames |
| A1-4 | Identify the effective length of columns, Euler load and collapse load |
| A4-1 | Differentiate between a force method and displacement method |
| A4-2 | Differentiate between direct method and iterative methods to solve statically indeterminate structures |
| B1-1 | Investigate the correlation between mathematical expressions of bending moment, shearing force, slope and deflection. |
| B1-2 | Review the fundamentals of beam and frame analysis |
| B1-3 | Investigate the various degrees of freedom and the compatibility conditions |
| B1-4 | Determine the expected elastic deformation of a structure. |
| C1-1 | Analyze statically indeterminate beams and frames |
| C1-2 | Choose whether it is convenient to adopt a force method or a displacement method |
| C1-3 | Compare the consequences of adopting different types of supports (consequences of full fixation, or presence of intermediate support) |
| C1-4 | Design a pillar subjected to compressive loads (buckling) |

| Course: Theory of Ship Structures (2) | |
|---|---|
| Program LOs | Course LOs |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1-Recognize the relation between the forms of structural response |
| | A1-2- Investigate the theorems and equations studied and state their main assumptions. |
| | A1-3- Describe the free body diagram: shearing force diagram and bending moment diagram for statically indeterminate beams and frames |
| | A1-4- Identify the effective length of columns, Euler load and collapse load |
| A4-Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1- Differentiate between a force method and displacement method |
| | A4-2- Differentiate between direct method and iterative methods to solve statically indeterminate structures |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Investigate the correlation between mathematical expressions of bending moment, shearing force, slope and deflection. |
| | B1-2- Review the fundamentals of beam and frame analysis |
| | B1-3-Investigate the various degrees of freedom and the compatibility conditions |
| | B1-4- Determine the expected elastic deformation of a structure. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1- Analyze statically indeterminate beams and frames |
| | C1-2- Choose whether it is convenient to adopt a force method or a displacement method |
| | C1-3- Compare the consequences of adopting different types of supports (consequences of full fixation, or presence of intermediate support) |
| | C1-4- Design a pillar subjected to compressive loads (buckling) |

4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Lectures:<br>Introduction and revision: main concepts and objective of the course<br>Computer Lab.:<br>• The role and utility of structural analysis commercial software | 1 |
| 2 | Lectures:<br>Double integration method<br>Computer Lab.:<br>• Terminology adopted in structural analysis and design software | 2-3 |
| 3 | Lectures:<br>Mohr's theorems: Moment area method<br>Computer Lab.:<br>• Exercise 1: modeling one span beams with different loading and supports. | 4-5 |
| 4 | Lectures:<br>Introducing energy methods: strain energy, Castigliano's theorem<br>Computer Lab.:<br>• Exercise 2 : Different modeling techniques of frames with inclined members | 6-7 |
| 5 | Lectures:<br>Statically indeterminate structures: three moment equation<br>Computer Lab.:<br>• Exercise 3: Statically indeterminate structures | 8 & 10 |
| 6 | Mid-Term | 9 |
| 7 | Lectures:<br>Slope deflection method: Simple applications to transverse strength of ships.<br>Computer Lab.:<br>• Exercise 4: Modelling continuous beams with different section modulus | 11-13 |
| 8 | Lectures:<br>Column buckling; design of pillars.<br>Computer Lab.:<br>• Exercise 5 : Modeling a column for buckling analysis | 14 |
| 9 | Lectures:<br>----------------------<br>Labs/Tutorials:<br>• Tutorial and application Examination. . | 15 |

5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | | x | x | x | | | | | | | | |
| | A1-2 | x | x | | | x | x | x | | | | | | | | |
| | A1-3 | x | x | | | x | x | x | | | | | | | | |
| | A1-4 | x | x | | | x | x | x | | | | | | | | |
| | A4-1 | x | x | | | x | x | x | | | | | | | | |
| | A4-2 | x | x | | | x | x | x | | | | | | | | |
| B-Level | B1-1 | x | x | | | x | x | x | | | | | | | | |
| | B1-2 | x | x | | | x | x | x | | | | | | | | |
| | B1-3 | x | x | | | x | x | x | | | | | | | | |
| | B1-4 | x | x | | | x | x | x | | | | | | | | |
| C-Level | C1.1 | x | x | | | x | x | x | | | | | | | | |
| | C1.2 | x | x | | | x | x | x | | | | | | | | |
| | C1-3 | x | x | | | x | x | x | | | | | | | | |
| | C1-4 | x | x | | | x | x | x | | | | | | | | |

6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Assign a portion of the office hours for those students. |
| 2 | Give them specific tasks. |
| 3 | Repeat the explanation of some of the material and tutorials. |
| 4 | Assign a teaching assistance to follow up the performance of this group of students. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1-1, A1-2, A1-3, B1-1, B1-2, C1-1 |
| 2 | Practical Examination | B1-1, B1-2, C1-1 |
| 3 | Oral Examination | C1-3, C1-4 |
| 4 | Formative (quizzes- online quizzes-presentation) | B1-3, B1-4, C1-1, C1-2, C1-3 |
| 5 | Final Term Examination (written) | A1-4, A4-1, A4-2, B1-3, B1-4, C1-1, C1-2, C1-3, C1-4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes- online quizzes-presentation) | At the end of each chapter |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights % |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 12 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes- online quizzes-presentation) | 8 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | W. El-Dakhakhni, "Theory of Structures, Part 2 ", Dar El-Maaref, 14th edition, (2010). |
| 2 | R.C. Hibbeler, "Structural Analysis", Pearson, 10th edition, (2018). |
| 3 | Computers and Structures, software SAP2000, v20 |

9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Lectures:<br>Introduction and revision: main concepts and objective of the course<br>Computer Lab.:<br>• The role and utility of structural analysis commercial software | 7 | A1-1, B1-3, C1-1, C1-3 |
| 2 | Lectures:<br>Double integration method<br>Computer Lab.:<br>• Terminology adopted in structural analysis and design software | 7 | A1-1, A1-2, B1-1, B1-3, B1-4 |
| 3 | Lectures:<br>Mohr's theorems: Moment area method<br>Computer Lab.:<br>• Exercise 1: modeling one span beams with different loading and supports. | 7 | A1-1, A1-2, B1-1, B1-3, B1-4 |
| 4 | Lectures:<br>Introducing energy methods: strain energy, Castigliano's theorem<br>Computer Lab.:<br>• Exercise 2 : Different modeling techniques of frames with inclined members | 7 | A1-1, A1-2, B1-1, B1-2, B1-3, B1-3, B1-4 |
| 5 | Lectures:<br>Statically indeterminate structures: three moment equation<br>Computer Lab.:<br>• Exercise 3: Statically indeterminate structures | 7 | A1-2, A1-3, A4-1, A4-2, B1-2, B1-3, C1-2 |
| 6 | Mid-Term | 7 | A1-1, A1-2, A1-3, A4-1, B1- |

| | | | |
|---|---|---|---|
| | | | 1, B1-2, B1-3, B1-4, C1-1 |
| 7 | Lectures:<br>Slope deflection method: Simple applications to transverse strength of ships.<br>Computer Lab.:<br>• Exercise 4: Modelling continuous beams with different section modulus | 7 | A1-2, A1-3, A4-1, A4-2, B1-2, B1-3, C1-2 |
| 8 | Lectures:<br>Column buckling; design of pillars.<br>Computer Lab.:<br>• Exercise 5 : Modeling a column for buckling analysis | 7 | A1-2, A1-4, C1-4 |
| 9 | Lectures:<br>-----------------------<br>Labs/Tutorials:<br>• Tutorial and application Examination.<br>. | 7 | A1-2, A1-4, C1-4 |

Course Coordinator: Emeritus Prof. Dr. Mohamed A. Mansour

Prof. Dr. Heba S. El-kilany

Program Coordinator: Dr Ameen Bassam

Head of Department: Assoc. Prof. Dr. Mostafa M. Mostafa

## 1. Basic Information

<table>
<tr><td><b>Program Title</b></td><td colspan="3">B. Sc. in Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Department offering the Program</b></td><td colspan="3">Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Department Responsible for the Course</b></td><td colspan="3">Naval Architecture & Marine Engineering</td></tr>
<tr><td><b>Course Code</b></td><td colspan="3">NME 209</td></tr>
<tr><td><b>Year/ Level</b></td><td colspan="3">Second year- 1st semester</td></tr>
<tr><td><b>Specialization</b></td><td colspan="3">Major</td></tr>
<tr><td rowspan="2"><b>Teaching Hours</b></td><td>Lectures</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>2</td><td>1</td><td>1</td></tr>
</table>

## 2. Course aims:

| No. | Aims |
|---|---|
| 7 | Apply analytical and experimental processes with proficiency aided by modern engineering tools that enable the students to analyze and design any engineering system in which the liquid is the medium of work. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Define or describe different theoretical terminologies and concepts used in fluid statics and dynamics |
| A1-2 | Apply pertinent equations of fluid mechanics and solve different engineering problems based on fluid statics and dynamics. |
| A1-3 | Identify basics of similarity and dimensional analysis and evaluate the physical and mathematical significance of dimensionless numbers. |
| A2-1 | Observe and conduct experiments in fluid static and dynamics. |
| A2-2 | Identify the concept of fluid flows to be able to classify them. |
| A2-3 | Evaluate friction and local losses in laminar and turbulent flows. |
| B1-1 | Employ principle of manometry to measure gauge and differential pressure. |
| B1-2 | Analyze the dynamics of rotating cylinders (Rotational flow). |
| B1-3 | Analyze fluid flow in closed conduits and open channels |
| C2-1 | Evaluate stability of any floating body by determining its metacentric height. |
| C2-2 | Examine power losses in propeller shaft bearings (Oiled and Collar bearings). |
| C2-3 | Compute buoyancy force of ships in both inland, coastal waterways and open sea. |
| C2-4 | Calculate the magnitude and location of hydrostatic forces on the submerged part of ship's hull. |

| **Course:** Fluid Mechanics and Marine applications | |
|---|---|
| **Program LOs** | **Course Los** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Define or describe different theoretical terminologies and concepts used in fluid statics and dynamics |
| | A1-2 Apply pertinent equations of fluid mechanics and solve different engineering problems based on fluid statics and dynamics. |
| | A1-3 Identify basics of similarity and dimensional analysis and evaluate the physical and mathematical significance of dimensionless numbers. |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Observe and conduct experiments in fluid static and dynamics. |
| | A2-2 Identify the concept of fluid flows to be able to classify them. |
| | A2-3 Evaluate friction and local losses in laminar and turbulent flows. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Employ principle of manometry to measure gauge and differential pressure. |
| | B1-2 Analyze the dynamics of rotating cylinders (Rotational flow). |
| | B1-3 Analyze fluid flow in closed conduits and open channels |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate stability of any floating body by determining its metacentric height. |
| | C2-2 Examine power losses in propeller shaft bearings (Oiled and Collar bearings). |
| | C2-3 Compute buoyancy force of ships in both inland, coastal waterways and open sea. |
| | C2-4 Calculate the magnitude and location of hydrostatic forces on the submerged part of ship's hull. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• Units, fluid definition, fluid properties, fluid types and general dimensions for the most common quantities.<br>**Labs:**<br>• Determine the specific weight and the viscosity of liquids at room temperature. | 1 |
| 2 | **Lectures:**<br>• Pressure at a Point in a static fluid, variation of pressure in a static fluid and pressure measurement devices.<br>**Labs:**<br>• Dealing with pressure measurement devices. | 2 |
| 3 | **Lectures:**<br>• Hydrostatic forces acting on plane and curved submerged surfaces and their points of application.<br>**Labs:**<br>• Description of the Hydraulic Bench. | 3 |
| 4 | **Lectures:**<br>• Stability of floating bodies, metacenter, Free surface effect, inclining experiment of ships.<br>**Labs:**<br>• Performing inclining experiment of ships. | 4 |
| 5 | **Lectures:**<br>• Fluid Dynamics: types of fluid flow, Basic Equations of Fluid Flow ( Continuity equation – Bernoulli's equation and its applications )<br>**Labs:**<br>• Verifying Bernoulli's Theorem. | 5 |
| 6 | **Lectures:**<br>• Fluid flow measurement devices and Time of Emptying of tanks.<br>**Labs:**<br>• Demonstrate the variation of the pressure along a converging-diverging pipe section. | 6 |
| 7 | **Lectures:**<br>• Rotational flow ( Forced and free vortices).<br>**Labs:**<br>• Determining the coefficients of discharge, velocity and contraction from a sharp-edged circular orifice. | 7 |
| 8 | **Lectures:**<br>• Momentum equation and impact of jets - Momentum theory of marine propellers.<br>**Labs:**<br>• Investigating the validity of theoretical expressions for the | 8 |

| | | |
|---|---|---|
| | calculation of the force exerted by a jet on objects of various shapes. | |
| 9 | **Lectures:**<br>• Laminar Flow of incompressible fluids through pipes.<br>**Labs:**<br>• Conduct Reynolds's experiments to investigate the types of flow. | 10 |
| 10 | **Lectures:**<br>• Turbulent flow of incompressible fluids in pipes.<br>**Labs:**<br>• Conduct Reynolds's experiments to investigate the types of flow. | 11 |
| 11 | **Lectures:**<br>• Major and Minor losses of fluid flows.<br>**Labs:**<br>• Determining the energy loss for pipelines in which a steady-state flow exists. | 12 |
| 12 | **Lectures:**<br>• Pipe lines problems, cavitation phenomenon.<br>**Labs:**<br>• Determining Cd coefficient for a venturi meter. | 13 |
| 13 | **Lectures:**<br>• Laws of similarity and Dimensional Analyses.<br>**Labs:**<br>• Investigating the importance of the similarity and dimension analysis in conducting model tests. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| **A-Level** | A1-1 | x | x | | x | | | x | | | | | | | | x |
| | A1-2 | x | x | | x | | | x | | | | | | | | x |
| | A1-3 | x | x | | x | | | x | | | | | | | | x |
| | A2-1 | x | x | | x | | | | | | | | | | | x |
| | A2-2 | x | x | | x | | | x | | | | | | | | x |
| | A2-3 | x | x | | x | | | x | | | | | | | | x |
| **B-Level** | B1-1 | x | x | | x | | | x | | | | | | | | x |
| | B1-2 | x | x | | x | | | x | | | | | | | | x |
| | B1-3 | x | x | | x | | | x | | | | | | | | x |
| **C-Level** | C2-1 | x | x | | x | | | x | | | | | | | | x |
| | C2-2 | x | x | | x | | | x | | | | | | | | x |
| | C2-3 | x | x | | x | | | x | | | | | | | | x |
| | C2-4 | x | x | | x | | | x | | | | | | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A1-2, A2-2, B1-1, B1-2, B1-3, C2-1, C2-2, C2-3, C2-4 |
| 2 | Practical Examination | A2-1 |
| 3 | Oral Examination | A2-2, C2-1 |
| 4 | Formative (quizzes – presentation) | A1-1, A1-2, A1-3, A2-2, A2-3, B1-1, B1-2, B1-3, C2-1, C2-2, C2-3, C2-4 |
| 5 | Final Term Examination (written) | A1-1, A1-2, A1-3, A2-2, A2-3, B1-1, B1-2, B1-3, C2-1, C2-2, C2-3, C2-4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes – presentation) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes – presentation) | 10 |
| 4 | Final Term Examination (written) | 60 |

| | |
|---|---|
| Total | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Yunus Cengel & John Cimbala, "Fluid Mechanics: Fundamentals and Applications', McGraw-Hill Education, 4th Edition, 2017. |
| 2 | Philip M. Gerhart, Andrew L. Gerhart & John I. Hochstein, "Fundamentals of Fluid Mechanics", Wiley, 8th Edition, 2016. |
| 3 | Frank White, "Fluid Mechanics", McGraw-Hill Education, 8th Edition, 2015. |
| 4 | Merle Potter & David Wiggert, "Schaum's Outline of Fluid Mechanics", Schaum's Outline Series, McGraw-Hill Education, 1 edition, 2007. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Units, fluid definition, fluid properties, fluid types and general dimensions for the most common quantities.<br>**Labs:**<br>• Determine the specific weight and the viscosity of liquids at room temperature. | 7 | A1-1, A1-2, A1-3, A2-1, C2-2 |
| 2 | **Lectures:**<br>• Pressure at a Point in a static fluid, variation of pressure in a static fluid and pressure measurement devices.<br>**Labs:**<br>• Dealing with pressure measurement devices. | 7 | A1-1, A1-2, A2-1, B1-1, C2-4 |
| 3 | **Lectures:**<br>• Hydrostatic forces acting on plane and curved submerged surfaces and their points of application. | 7 | A1-1, A1-2, A2-1, B1-1, C2-3, C2-4 |

| | | | |
|---|---|---|---|
| | **Labs:**<br>- Description of the Hydraulic Bench. | | |
| 4 | **Lectures:**<br>- Stability of floating bodies, metacenter, Free surface effect, inclining experiment of ships.<br>**Labs:**<br>- Performing inclining experiment of ships. | 7 | A1-1, A1-2, A2-1, C2-1, C2-3 |
| 5 | **Lectures:**<br>- Fluid Dynamics: types of fluid flow, Basic Equations of Fluid Flow ( Continuity equation – Bernoulli's equation and its applications )<br>**Labs:**<br>- Verifying Bernoulli's Theorem. | 7 | A1-1, A1-2, A2-1, A2-2, B3-1 |
| 6 | **Lectures:**<br>- Fluid flow measurement devices and Time of Emptying of tanks.<br>**Labs:**<br>- Demonstrate the variation of the pressure along a converging-diverging pipe section. | 7 | A1-1, A1-2, A2-1, B1-1, B1-3 |
| 7 | **Lectures:**<br>- Rotational flow ( Forced and free vortices).<br>**Labs:**<br>- Determining the coefficients of discharge, velocity and contraction from a sharp-edged circular orifice. | 7 | A1-2, A2-1, B1-2 |
| 8 | **Lectures:**<br>- Momentum equation and impact of jets - Momentum theory of marine propellers.<br>**Labs:**<br>- Investigating the validity of theoretical expressions for the calculation of the force exerted by a jet on objects of various shapes. | 7 | A1-1, A1-2, A2-1 |
| 9 | **Lectures:**<br>- Laminar Flow of incompressible fluids through pipes.<br>**Labs:**<br>- Conduct Reynolds's experiments to investigate the types of flow. | 7 | A1-1, A1-2, A2-1, A2-2, A2-3, B1-3 |
| 10 | **Lectures:**<br>- Turbulent flow of incompressible fluids in pipes.<br>**Labs:**<br>- Conduct Reynolds's experiments to investigate the types of flow. | 7 | A1-1, A1-2, A2-1, A2-2, A2-3, B1-3 |
| 11 | **Lectures:**<br>- Major and Minor losses of fluid flows. | 7 | A1-1, A1-2, A2-3, C2-2 |

| | | | |
|---|---|---|---|
| | **Labs:**<br>• Determining the energy loss for pipelines in which a steady-state flow exists. | | |
| 12 | **Lectures:**<br>• Pipe lines problems, cavitation phenomenon.<br>**Labs:**<br>• Determining Cd coefficient for a venturi meter. | 7 | A1-1, A1-2, A2-1, A2-3, B1-1 |
| 13 | **Lectures:**<br>• Laws of similarity and Dimensional Analyses.<br>**Labs:**<br>• Investigating the importance of the similarity and dimension analysis in conducting model tests. | 7 | A1-1, A1-2, A1-3 |

**Course Coordinator: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 210 | | |
| **Year/ Level** | Second year– 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | -- | 2 | --- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply modern engineering tools as AutoCAD to facilitate and enhance the ability of understanding different structural components and its application in ship construction as well as mechanical parts. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A9-1 | Current engineering technologies as related to disciplines. |
| A10-1 | Prepare engineering drawings, computer graphics and specialized technical reports. |
| B2-1 | Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| B2-2 | Effectively manage tasks, time, and resources. |
| C1-1 | Use and manage the exploitation of modern CAD and CAD/CAM facilities |
| C1-2 | Practice the neatness and aesthetics in design and approach. |

**Course: Summer Training (1)**

| **Program LOs** | **Course LOs** |
|---|---|
| A9- Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Current engineering technologies as related to disciplines. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Prepare engineering drawings, computer graphics and specialized technical reports. |

| | |
|---|---|
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| | B2-2 Manage tasks, time, and resources effectively. |
| C1- Design ships, small units, and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Use and manage the exploitation of modern CAD and CAD/CAM facilities |
| | C1-2 Practice the neatness and aesthetics in design and approach. |

### 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | The definition of AutoCAD program and training on the existing orders in the program and enable the student (drawing curved lines and cutting). | 1 |
| 2 | Drawing engineering processes with the dimensions of the drawing and training on how to print different drawings and choose the appropriate scale for printing. | 2 |
| 3 | Drawing the structural connections of ships - drawing lines and sections of the ship - drawing a mid-ship section of a general cargo ship with details. | 3 |
| 4 | Drawing the internal divisions of a ship - assembling of mechanical drawing. | 4 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | A9-1 | x | x | | x | | | | | x | | x | | x | | |
| | A10-1 | x | x | | x | | | | | x | | x | | x | | |
| **B-Level** | B2-1 | x | x | | | | x | | | x | | | | x | | |
| | B2-2 | x | x | | x | | x | | | x | x | | | x | | |
| **C-Level** | C1-1 | x | x | | | | x | | | x | | | | x | | |
| | C1-2 | x | x | | x | | x | | x | x | | | | x | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Formative (quizzes – drawings) | A9-1, A10-1, B2-1, B2-2 |
| 2 | Final Term Examination (written) | A9-1, A10-1, B2-1, B2-2, C1-1, C1-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Formative (quizzes – drawings) | Every week |
| 2 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Formative (quizzes – drawings) | 10 |
| 2 | Final Term Examination (written) | 40 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | R. Taggart (1980), Ship Design and Construction, SNAME |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

### 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | The definition of AutoCAD program and training on the existing orders in the program and enable the student (drawing curved lines and cutting). | 1 | A9-1, A10-1, B2-1, B2-2 |
| 2 | Drawing engineering processes with the dimensions of the drawing and training on how to print different drawings and choose the appropriate scale for printing. | 1 | A9-1, A10-1, B2-1, B2-2 |
| 3 | Drawing the structural connections of ships - drawing lines and sections of the ship - drawing a mid-ship section of a general cargo ship with details. | 1 | B2-1, B2-2 |
| 4 | Drawing the internal divisions of a ship - assembling of mechanical drawing. | 1 | C1-1, C1-2 |

**Course Coordinator: Variable**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

# Course Specifications: HUU204 Management and Marketing

## 1. Basic Information

| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
|---|---|---|---|
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture and Marine Engineering | | |
| **Course Code** | HUU204 | | |
| **Year/ Level** | Second Year – 1st semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | **2** | **--** | **--** |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 2 | Use the concepts, principles, problems, and applications of marketing. It will emphasize all functional areas and institutions of marketing including target marketing and positioning of products and organizations, consumer, and organizational markets, product management, pricing, channels of distribution, marketing ethics, promotions, services, and international marketing. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A7.1 | Analyze the importance of social responsibility and ethics on marketing. |
| A7.2 | Identify environmental factors that affect both global and domestic marketing decisions. |
| A9.1 | Explain the concepts of the marketing mix in the development of marketing strategy and tactics. |
| A9.2 | Analyze the importance of social responsibility and ethics on marketing. |
| A10.1 | Apply essential marketing concepts to research and write a strategic marketing plan. |

## 4. Course Contents:

| **No.** | **Topics** | **Week** |
|---|---|---|
| 1 | **Lectures:**<br>• An Overview of Marketing. | **1** |
| 2 | **Lectures:**<br>• Strategic Planning for Competitive Advantage. | **2** |

| | | |
|---|---|---|
| 3 | **Lectures:**<br>- Social Responsibility, Ethics, and the Marketing Environment. | **3-4** |
| 4 | **Lectures:**<br>- Developing a Global Vision. | **5** |
| 5 | **Lectures:**<br>- Consumer Decision Making. | **6** |
| 6 | **Lectures:**<br>- Business Marketing. | **7** |
| 7 | **Lectures:**<br>Segmenting and Targeting Markets. | **8** |
| 8 | **Midterm** | **9** |
| 9 | **Lectures:**<br>- Product Concepts. | **10** |
| 10 | **Lectures:**<br>- Services and Non-profit Organization Marketing. | **11** |
| 11 | **Lectures:**<br>- Marketing Channels and Supply Chain Management. | **12** |
| 12 | **Lectures:**<br>- Advertising and Public Relations. | **13** |
| 13 | **Lectures:**<br>- Sales Promotion and Personal Selling.<br>- Pricing Concepts. | **14** |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A7.1 | x | | | x | x | | | | | | | x | | | |
| | A7.2 | x | | | x | x | | x | | | | | x | | | |
| | A9.1 | x | | | x | | | x | x | | | | x | | | |
| | A9.2 | x | | | x | x | | x | x | | | | x | | | |
| | A10.1 | x | | | x | | | | | x | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A7.1, A7.2, A9.1, A9.2 |
| 2 | Formative (quizzes- online quizzes- presentation - reports) | A7.1, A7.2, A9.1, A9.2, A10.1 |
| 4 | Final Term Examination (written) | A7.1, A7.2, A9.1, A9.2, A10.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Project | 15 |
| 3 | Formative (quizzes- online quizzes- presentation - reports) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 5 |
| 2 | Project | 10 |
| 3 | Formative (quizzes- online quizzes- presentation - reports) | 5 |
| 4 | Final Term Examination (written) | 80 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Course notes |
| **2** | Essential books (text books)<br>- Lamb, Hair and McDaniel, MKTG, South-Western Publishing .U.S.A. 2009. |
| **3** | Recommended books.<br>- Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe,2008. |
| **4** | Periodicals, Web sites, etc<br>http://marketing.about.com<br>http://www.slideshare.net<br>http://www.knowthis.com<br>http://www.studymarketing.org<br>Course Prof:Dr: - Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe,2008. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>- An Overview of Marketing. | **2** | A7.1, A7.2, A9.1, A9.2 |
| 2 | **Lectures:**<br>- Strategic Planning for Competitive Advantage. | **2** | A7.1, A7.2, A9.1, A9.2 |
| 3 | **Lectures:**<br>- Social Responsibility, Ethics, and the Marketing Environment. | **2** | A7.1, A7.2, A9.1, A9.2, A10.1 |
| 4 | **Lectures:**<br>- Developing a Global Vision. | **2** | A7.1, A9.2, A10.1 |
| 5 | **Lectures:**<br>- Consumer Decision Making. | **2** | A7.1, A7.2,A10.1 |
| 6 | **Lectures:**<br>Business Marketing. | **2** | A7.1, A9.1, A9.2, A10.1 |
| 7 | **Lectures:**<br>- Segmenting and Targeting Markets. | **2** | A7.2, A9.1, A9.2, A10.1 |
| 8 | Midterm | **2** | A7.1, A7.2, A9.1, A9.2 |
| 9 | **Lectures:**<br>- Product Concepts | 2 | A7.1, A10.1 |

| | | | |
|---|---|---|---|
| 10 | **Lectures:**<br>• Services and Non-profit Organization Marketing. | **2** | A7.1, A7.2, A9.1, A9.2 |
| 11 | **Lectures:**<br>• Marketing Channels and Supply Chain Management. | **2** | A7.1, A9.1, A9.2, A10.1 |
| 12 | **Lectures:**<br>• Advertising and Public Relations. | **2** | A7.1, A7.2, A9.1 |
| 13 | **Lectures:**<br>• Sales Promotion and Personal Selling.<br>Pricing Concepts. | **2** | A7.1, A7.2, A9.1, A9.2, A10.1 |

| **Course: HUU204 Management and Marketing** | |
|---|---|
| **Program LOs** | **Course Los** |
| **A7.** Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. | **A7.1** Analyze the importance of social responsibility and ethics on marketing.<br>**A7.2** Identify environmental factors that affect both global and domestic marketing decisions. |
| **A9.** Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | **A9.1** Explain the concepts of the marketing mix in the development of marketing strategy and tactics.<br>**A9.2** Analyze the importance of social responsibility and ethics on marketing. |
| **A10.** Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | **A10.1** Apply essential marketing concepts to research and write a strategic marketing plan. |

**Course Coordinator: Dr. Mona Hammouda**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Physics and Mathematical Engineering | | |
| **Course Code** | SCI 228 | | |
| **Year/ Level** | Second Year -2$^{nd}$Semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Lab. |
| | 2 | 2 | - |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use the numerical methods aided by technology to solve algebraic, transcendental, and differential equations, and to calculate derivatives and integrals. The course will also develop an understanding of the elements of error analysis for numerical methods and certain proofs. The course will further develop problem solving skills, and also will introduce students to descriptive statistics, observational studies, experiments, elementary probability, random variables, and sampling distributions. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1.1 | Show roots using bisection, linear interpolation, Secant and/or Newton's methods |
| A1.2 | Select a function using an appropriate numerical method |
| A1.3 | Define a differential equation using an appropriate numerical method. |
| A2.1 | Apply a derivative at a value using an appropriate numerical method |
| A2.2 | Solve a linear system of equations using an appropriate numerical method |
| A2.3 | Estimate an error analysis for a given numerical method. |
| A6.1 | Differentiate between an algebraic or transcendental equation using an appropriate numerical method |
| A6.2 | Demonstrate understanding and ability to use Least squares and Lagrangian polynomials. |
| A6.3 | Recognize the steps necessary to solve practical problems |
| B3.1 | Differentiate between an algebraic or transcendental equation using an appropriate numerical method |
| B3.2 | Demonstrate understanding and ability to use Least squares and Lagrangian polynomials |

| | |
|---|---|
| B3.3 | Analyzes the steps necessary to solve practical problems |
| B3.4 | Solve problems involving linear algebraic equations and appreciate the application of these equations in many fields of engineering. |
| B3.5 | Introduce random circumstances, interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities |
| B3.6 | Introduce random variables, displays of discrete random variables, summarizing a random variable: expected value (mean) and standard deviation, binomial random variables, continuous random variables, normal random variables, approximating a binomial random variable using a normal random variable |

| **Course : Numerical analysis and Probability** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Show roots using bisection, linear interpolation, Secant and/or Newton's methods<br>A1-2Select a function using an appropriate numerical method<br>A1-3 Define a differential equation using an appropriate numerical method |

| | |
|---|---|
| A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Apply a derivative at a value using an appropriate numerical method<br>A2-2 Solve a linear system of equations using an appropriate numerical method<br>A2-3 Estimate an error analysis for a given numerical method |
| A6-Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements | A6-1 Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>A6-2 Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>A6-3 Recognize the steps necessary to solve practical problems |

| | |
|---|---|
| B3- Select conventional mechanical equipment according to the required performance | B3-1 Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>B3-2 Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>B3-3 Analyses the steps necessary to solve practical problems<br>B3-4 Solve problems involving linear algebraic equations and appreciate the application of these equations in many fields of engineering.<br>B5-5 Introduce random circumstances, interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities<br>B5-6 Introduce random variables, displays of discrete random variables, summarizing a random variable: expected value (mean) and standard deviation, binomial random variables, continuous random variables, normal random variables, approximating a binomial random variable using a normal random variable |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures: Chapter 1**<br>- Show roots using bisection, linear interpolation, Secant and/or Newton's methods<br>- Select a function using an appropriate numerical method<br>- Define a differential equation using an appropriate numerical method<br>**Tutorials:**<br>• Find roots using bisection, linear interpolation, Secant and/or Newton's methods .<br>• solve a differential equation using an appropriate numerical method | 1-4 |
| 2 | **Lectures: Chapter 2**<br>- Apply a derivative at a value using an appropriate numerical method<br>-Solve a linear system of equations using an appropriate numerical method<br>-Estimate an error analysis for a given numerical method<br>-Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>- Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>-Recognize the steps necessary to solve practical problems<br>**Tutorials:**<br>- Solve numerical techniques to the solution of practical problems | 5-8 |
| 3 | **Lectures: Chapter 3**<br>- Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>- Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>**Tutorials:**<br>Apply numerical techniques to the solution of practical problems | 10-11 |
| 4 | **Lectures: Chapter 4**<br>- Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities<br>-Discrete random variables,expected value (mean) –,standard deviation,- binomial random variables,continuous random variables<br>-Normal random variables, approximating a binomial random variable using a normal random variable<br>**Tutorials:**<br>Solve the problems. | 12-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (online/in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1.1** | x | x | | | | x | x | | | | | | | | |
| | **A1.2** | x | x | | | x | | | | | | | | | | |
| | **A1.3** | x | x | | | x | x | x | | | | | | | | |
| | **A2.1** | x | x | | | | x | | | | | | | | | |
| | **A2.2** | x | x | | | x | | | x | | | | | | | |
| | **A2.3** | x | x | | | | x | | | | | | | | | |
| | **A6.1** | x | x | | | | | x | | | | | | | | |
| | **A6.2** | x | x | | | | | x | | | | | | | | |
| | **A6.3** | x | x | | | | | x | | | | | | | | |
| **B-Level** | **B3.1** | x | x | | | | | | | | | | | | | |
| | **B3.2** | x | x | | | | | | x | | | | | | | |
| | **B3.3** | x | x | | | x | | | | | | | | | | |
| | **B3.4** | x | x | | | x | | | | | | | | | | |
| | **B3.5** | x | x | | | x | | | | | | | | | | |
| | **B3.6** | x | x | | | | | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A1.1, A1.2, A1.3, A2.1 A2.2, A2.3, A2.3, , A6.1 A6.2, A6.3, |
| 2 | Formative (quizzes- online quizzes- sheets) | A2.2, A2.5, |
| 3 | Final Term Examination (written) | A1.1, A1.2, A1.3, A2.1 A2.2, A2.3, A2.3, , A6.1 A6.2, A6.3, A6.3,B3.1,B3.2, B3.3, B3.4,B3.5, B3.6 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Formative (quizzes- online quizzes- sheets) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 20 |
| 2 | Formative (quizzes- online quizzes- sheets) | 10 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | • . Steven C. Chapra, *Numerical Methods for Engineers*, 8th Ed., McGraw Hill, 2015 |
| **2** | • . John H. Mathews and Kurtis D. Fink, Numerical Methods using Matlab, 9th Ed., Pearson , Prentice Hall, 2014 |
| | • - Mendenhall, William, Robert J. Beaver, and Barbara M. Beaver. *Introduction to probability and statistics*. Cengage Learning, 2012 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Chapter 1**<br>**Lectures: Chapter 1**<br>- Show roots using bisection, linear interpolation, Secant and/or Newton's methods<br>- Select a function using an appropriate numerical method<br>- Define a differential equation using an appropriate numerical method | 2 | A1.1, A1.2, A1.3, |
| 2 | **Chapter 2**<br>- Apply a derivative at a value using an appropriate numerical method<br>-Solve a linear system of equations using an appropriate numerical method<br>-Estimate an error analysis for a given numerical method<br>-Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>- Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>-Recognize the steps necessary to solve practical problems | 2 | A2.1, A2.2, A2.3, A6.1, A6.2, A6.3, |

| | | | |
|---|---|---|---|
| 3 | Midterm | 2 | A1.1, A1.2, A1.3, A2.1 A2.2, A2.3, A2.3, , A6.1 A6.2, A6.3, |
| 4 | **Chapter 3**<br>-Differentiate between an algebraic or transcendental equation using an appropriate numerical method<br>- Demonstrate understanding and ability to use Least squares and Lagrangian polynomials<br>-Analyses the steps necessary to solve practical problems | 2 | B3.1,B3.2, B3.3 |
| 5 | **Chapter 4**<br>Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities<br>-Discrete random variables,expected value (mean) –,standard deviation,- binomial random variables,<br>-Continuous random variables<br>-\|Normal random variables, approximating a binomial random variable using a normal random variable | 2 | B3.4,B3.5, B3.6 |

**Course Coordinator: Dr. Youssef Mohamed Baghdadi**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B.Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 211 | | |
| **Year/ Level** | Second year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | 1 |

## 2. Course aims:

| **No.** | **Aim** |
|---|---|
| 2 | Apply ship construction process with proficiency in order to acquire the ability to perform the structural design of the different parts of the hull amidships based on the Rules of the Classification Society and aided by modern engineering tools. |
| 7 | Use techniques, skills, and modern engineering tools necessary to evaluate the longitudinal strength calculations |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Apply the principles of naval architecture that are essential to perform the longitudinal strength calculations (hydrostatics and longitudinal stability) |
| A1-2 | Recall the basic principles of the simple beam theory, frame analysis, and the geometric properties of sections. |
| A3-1 | Combine various theories and idealizations of structural analysis with the corresponding structural parts |
| A3-2 | Correlate between the formulae given by the Rules of classification societies and the principles and classical methods of structural mechanics. |
| C1-1 | Categorize the levels of ship structural response and arrange the importance of each level according to the ship type and size. |
| C1-2 | Carry out the longitudinal hull girder analysis. |
| C1-3 | Use the classification society Rules to carry-out the structural design of the midship section of two ships of different types(e.g., cargo ship and tanker) and the design of a transverse bulkhead. |
| C3-1 | Assess the critical areas from the structural point of view for different structural configurations and loading conditions. |
| C3-2 | Justify the presence of various structural members as well as the adoption of a specific system of framing. |

| **Course: Ship Construction (1)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1-Apply the principles of naval architecture that are essential to perform the longitudinal strength calculations (hydrostatics and longitudinal stability) |
| | A1-2 Recall the basic principles of the simple beam theory, frame analysis, and the geometric properties of sections. |
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3-1 Combine various theories and idealizations of structural analysis with the corresponding structural parts |
| | A3-2 Correlate between the formulae given by the Rules of classification societies and the principles and classical methods of structural mechanics. |
| C1 - Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Categorize the levels of ship structural response and arrange the importance of each level according to the ship type and size. |
| | C1-2 Carry out the longitudinal hull girder analysis. |
| | C1-3 Use the classification society Rules to carry-out the structural design of the midship section of two ships of different types(e.g., cargo ship and tanker) and the design of a transverse bulkhead. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Assess the critical areas from the structural point of view for different structural configurations and loading conditions. |
| | C3-2 Justify the presence of various structural members as well as the adoption of a specific system of framing. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Loads on ship's hull and levels of ship structural response | 1+2 |
| 2 | Different ship configurations and features | 3 |
| 3 | Materials used in ship building | 4 |
| 4 | Longitudinal Strength Calculation<br>Computer lab : use of a commercial software to carry out the procedure) | 5+6 |
| 5 | Structural modules and components (bottom, deck and side panels ) | 7+8 |
| 6 | Design by Rules of the classification society<br>Computer lab. : use of rulefinder (classification society software) | 10 |
| 7 | Midship section Lab . AutoCad drawing | 11+12 |
| 8 | Bulkhead and pillar Lab . AutoCad drawing | 13+14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture(online & in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | X | X | | | | X | X | | | | | | | | |
| | A1-2 | X | X | | | | X | X | | | | | | | | |
| | A3-1 | X | X | | | | X | X | | | | | | | | |
| | A3-2 | X | X | | | | X | X | | | | | | | | |
| C-Level | C1-1 | X | X | | | | X | | | | | | | | | |
| | C1-2 | X | X | | | | X | X | | | | | | | | |
| | C1-3 | X | X | | | | X | | | X | | | | | | |
| | C3-1 | X | X | | | | | | | | | | | X | | |
| | C3-2 | X | X | | | | | | | | X | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1, A3-2, C1-1, C1-2, |
| 2 | Formative (quizzes – Drawings) | A1-1, A1-2 |
| 3 | Practical Exam. (computer lab) | C1-2, C1-3 |
| 4 | Final Term Examination (written) | C1-1, C1-2, C1-3, C3-1, C3-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – Drawings) | 2, 3, 4 |
| 3 | Practical Exam. (computer lab) | 15 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – Drawings) | 10 |
| 3 | Practical Exam. (computer lab) | 20 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | David Eyres, Ship Construction, 7th edition, Butterworth-Heinemann 2012 |
| **2** | E.C.Tupper , 'Introduction to Naval Architecture', Elsever Science, 5th edition , 2013 |
| **3** | Rawson, K. J. and Tupper, E. C., , Basic Ship Theory, vol. 1 - Butterworth-Heinemann., 5th edition, 2001 |
| **4** | Thomas Lamb , Ship Design and Construction, SNAME, 2003 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Loads on ship's hull and levels of ship structural response | 2, 7 | C1-1 |
| 2 | Different ship configurations and features | 2 | C1-1, C3-1, C3-2 |
| 3 | Materials used in ship building | 2 | A1-2, C1-3 |
| 4 | Longitudinal Strength Calculation | 7 | A1-1, A1-2, A3-1, C1-2 |
| 5 | Structural modules and components (bottom, deck and side panels ) | 2 | C3-1, C3-2 |
| 6 | Design by Rules of the classification society | 2 | A3-1, A3-2 |
| 7 | Midship section | 2 | C1-1, C3-1, C3-2 |
| 8 | Bulkhead and pillar | 2 | C1-1, C3-1, C3-2 |

**Course Coordinator: Prof. Heba S. El-Kilani**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 212 | | |
| **Year/ Level** | Second year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 6 | Act professionally to design a ship that not only meets the regulations and requirements, but also suits the marine environment and is economically and environmentally feasible. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Perform ship capacity calculation by applying the basics of numerical integration. |
| A1-2 | Select main dimensions and hull form parameters for a ship in the preliminary design stage by using suitable empirical formulae. |
| B2-1 | Carry out capacity calculation using Microsoft Excel or Maxsurf software. |
| B2-2 | Draw ship lines manually or using AutoCAD or export it from Maxsurf software. |
| B4-1 | Apply the requirements of the international maritime organizations to design a safe and economically feasible ship. |
| B4-2 | Appreciate the dangers associated with the ship environment and understand how to protect the ship from the hazards. |
| C1-1 | Recognize the principles and methodology in the field of ship design. |
| C1-2 | Select the main dimensions and hull form parameters for a ship that meets the owner's requirements and complies with the requirements of international maritime organizations. |
| C1-3 | Preform freeboard and tonnage calculations according to the international conventions regulating these matters. |
| C1-4 | Design ship lines by different methods (series 60 – creative – similarity). |
| C1-5 | Design a ship that not only complies with the requirements of international maritime organizations, but also suits the marine environment and is economically and environmentally feasible. |

| **Course: Ship Design (1)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Perform ship capacity calculation by applying the basics of numerical integration. |
| | A1-2 Select main dimensions and hull form parameters for a ship in the preliminary design stage by using suitable empirical formulae. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Carry out capacity calculation using Microsoft Excel or Maxsurf software. |
| | B2-2 Draw ship lines manually or using AutoCAD or export it from Maxsurf software. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Apply the requirements of the international maritime organizations to design a safe and economically feasible ship. |
| | B4-2 Appreciate the dangers associated with the ship environment and understand how to protect the ship from the hazards. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Recognize the principles and methodology in the field of ship design. |
| | C1-2 Select the main dimensions and hull form parameters for a ship that meets the owner's requirements and complies with the requirements of international maritime organizations. |
| | C1-3 Preform freeboard and tonnage calculations according to the international conventions regulating these matters. |
| | C1-4 Design ship lines by different methods (series 60 – creative – similarity). |
| | C1-5 Design a ship that not only complies with the requirements of international maritime organizations, but also suits the marine environment and is economically and environmentally feasible. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to ship design | 1-2 |
| 2 | Determination of ship principal dimensions and hull form parameters. | 3-5 |
| 3 | Design of ship lines | 6-8 |
| 4 | Freeboard and load line assignment | 01-10 |
| 5 | Capacity calculations | 12-13 |
| 6 | Tonnage calculations | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A1-2 | x | x | | x | | | x | | | | | | | | |
| B-Level | B2-1 | x | x | | x | | x | x | | | | | | | | |
| | B2-2 | x | x | | x | | x | | | | | | | x | | |
| | B4-1 | x | x | | x | | x | | | | | | | | | |
| | B4-2 | x | x | | x | | x | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | x | | | | | | | | | |
| | C1-2 | x | x | | x | | | x | | | | | | | | |
| | C1-3 | x | x | | x | | | x | | | | | | | | |
| | C1-4 | x | x | | x | | x | | | | | | | x | | |
| | C1-5 | x | x | | x | | x | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-2, B4-1, C1-1, C1-2, C1-4, C1-5 |
| 2 | Formative (quizzes – presentation) | A1-1, A1-2, C1-2, C1-3, C1-5 |
| 3 | Final Term Examination (written) | A1-1, A1-2, B4-1, B4-2, C1-1, C1-2, C1-3, C1-5 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Suresh Chandra Misra, “Design Principles of Ships and Marine Structures”, CRC Press, 1st Edition, 2015. |
| **2** | Apostolos Papanikolaou, “Ship Design: Methodologies of Preliminary Design”, Springer; 2014. |
| **3** | Yasuhisa Okumoto, Yu Takeda, Masaki Mano & Tetsuo Okada, “Design of Ship Hull Structures: A Practical Guide for Engineers”, Springer; 2009. |
| **4** | C. B. Barrass: “Ship Design and Performance for Masters and Mates”, First Edition, Butterworth-Heinemann, London, 2004. |
| **5** | David G.M. Watson: “Practical Ship Design”, Volume 1, First edition, Elsevier Amsterdam, 1998. |
| **6** | H. Schneekluth & V. Bertram: "Ship Design for Efficiency and Economy", Butterworth-Heinemann , 1998. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to ship design | 6 | B4-1, C1-1, C1-5 |
| 2 | Determination of ship principal dimensions and hull form parameters. | 6 | A1-2, C1-2 |
| 3 | Design of ship lines | 6 | B2-2, C1-4 |
| 4 | Freeboard and load line assignment | 6 | B4-1, B4-2, C1-2, C1-3, C1-5 |
| 5 | Capacity calculations | 6 | A1-1, B2-1, B4-2 |
| 6 | Tonnage calculations | 6 | A1-1, B4-1, C1-2, C1-3, C1-5 |

**Course Coordinator: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 213 | | |
| **Year/ Level** | Second year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Apply a wide engineering knowledge of the fundamentals of engineering science, computer applications, mathematics in the field of ship hydrodynamic in practically, the ideal flow characteristics, equations of motion and types of flow, flow function definition, flow around floating bodies, simpler and complex types of ideal flow, pressure distribution on geometrical bodies. It also apply analytical and experimental processes to study the viscous flow and its governing equations, boundary layer theory. In addition, apply theoretical and experimental techniques to study hydrodynamic airfoils and calculation lift and drag forces. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Define the ideal flow characteristics and derive the equation of flow motion. |
| A1-2 | Identify the pressure distribution around bodies from the principal and NASA sections. |
| A3-1 | Investigate the boundary layer characteristics for bodies |
| A3-2 | Estimate lift and drag forces of airfoils. |
| A10-1 | Determine the lift and drag of airfoil. |
| B2-1 | Investigate the different type of flow by superposition method. |
| C1-1 | Assess lift and drag for NASA airfoil sections. |
| C1-2 | Evaluate drag force for flat plate by using boundary theory, applicable to ship |
| C2-1 | Assess velocity and pressure about floating bodies using the computer. |

| Course: Ship Hydrodynamics (1) | |
|---|---|
| **Program LOs** | **Course Los** |

| | |
|---|---|
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Define the ideal flow characteristics and derive the equation of flow motion. |
| | A1-2 Identify the pressure distribution around bodies from the principal and NASA sections. |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development | A 3-1 Investigate the boundary layer characteristics for bodies |
| | A3-2 Estimate lift and drag forces of airfoils. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Determine the lift and drag of airfoil. |
| B2. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1. Investigate the different type of flow by superposition method. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1. Assess lift and drag for NASA airfoil sections. |
| | C1-2. Evaluate drag force for flat plate by using boundary theory, applicable to ship |
| C2. Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering Knowledge. | C2-1 Assess velocity and pressure about floating bodies using the computer. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | The characteristic of ideal flow | 1-2 |
| 2 | equations of motion for types of flow | 3 |
| 3 | flow function definition, flow around floating bodies | 4 |
| 4 | Some two dimensional type of flow | 5 |
| 5 | Superposition of simple ideal flows | 6 |
| 6 | Flow around floating bodies and pressure distribution on the surface | 7 |
| 7 | Complex types of ideal flow | 8 |
| 8 | Midterm Exam | 9 |
| 8 | Viscous flow and boundary layer equations. | 10-11 |
| 9 | The theory of airfoils and calculation of the pressure using NASA airfoil sections. | 12-13 |
| 10 | Calculation of lift and drag forces | 14 |
| 11 | Laboratory Examination | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A2-1 | x | x | | x | | | x | | | | | | | | |
| | A3-1 | x | x | | x | | x | x | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A3-2 | x | x | | x | | x | | | | | | | | | |
| | A10-2 | x | x | | x | | x | | | | | | | | | |
| B-Level | B2-1 | x | x | | x | | X | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | X | | | | | | | | | |
| | C1-2 | x | x | | x | | | x | | | | | | | | |
| | C2-1 | x | x | | x | | | x | | | | | | | | |

### 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

### 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-2, A3-1, C1-1, C1-2, C2-1 |
| 2 | Formative (quizzes – work sheets - presentations) | A1-1, A1-2, C1-2, C2-1 |
| 3 | Practical examination | C2-1 |
| 4 | Oral examination | A1-1, C1-2 |
| 5 | Final Term Examination (written) | A1-1, A3-2, B2-1, C1-1, C1-2, |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 9 |
| 2 | Formative (quizzes – work sheets - presentations) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – work sheets - presentations) | 30 |
| 3 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Rawson, K.J., "Basic Ship Theory", Mc Graw – Hill, Vol 2, 2001. |
| **2** | Schilichting, H., "Boundary layers theory", Mc Graw-Hill, 1979. |
| **3** | Abbott, H., Von Doenhoff, A.E., "Theory of win section", Dover, 1959 |
| **4** | Schetz, J.A., "Foundation of Boundary layers theory for momentum, heat, mass transfer, Prentice- Hall, Englewood, 1984 |
| **5** | White, F.M., "Fluid mechanics ", 1979. |
| **6** | Blevins, R.P., "Applied fluid dynamics handbook", Van Nostrand reinhold Co., 1984. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | On line teaching and communications |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | The characteristic of ideal flow | 1 | A1-1, A2-1,C1-1, C1-2,C2-1 |
| 2 | equations of motion for types of flow | 1 | A1-1, A2-1,B2-1,C1-1, C1-2 |
| 3 | flow function definition, flow around floating bodies | 1 | A1-1,C1-1, C1-2,C2-1 |
| 4 | Some two dimensional type of flow | 1 | A1-1, A2-1,B2-1,C1-1 |
| 5 | Superposition of simple ideal flows | 1 | A1-1, A2-1,B2-1, |
| 6 | flow around floating bodies and pressure distribution on the surface | 1 | A1-1, A2-1,B2-1 |
| 7 | complex types of ideal flow | 1 | C1-1, C1-2,C2-1 |
| 8 | Viscous flow and boundary layer equations. | 1 | A1-1, A2-1,B2-1,C1-1 |
| 9 | The theory of airfoils and calculation of the pressure using NASA airfoil sections, | 1 | A1-1, A2-1,B2-1C2-1 |
| 10 | Calculation of lift and drag forces | 1 | A1-1, A2-1,B2-1,C1-1 |

**Course Coordinator: Prof. Dr. Mohamed A. Mosaad**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

# Department of Production Engineering and Mechanical Design

# Course Specifications

| Course Name | Code |
|---|---|
| **Machine Design and Marine Systems** | **PRD 222** |

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval architecture and Marine engineering | | |
| **Department Responsible for the Course** | Production Engineering & Mechanical Design | | |
| **Course Code** | PRD222 | | |
| **Year/ Level** | Second year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply the basis of mechanical design, machine element design, and design of principal machine elements, such as shafts, keys, gears, etc. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3.1 | Outline introduction to engineering materials in mechanical design. |
| A4.1 | List Design considerations |
| A4.2 | State Design procedure |
| B3.1 | Demonstrate to overcome simple engineering problems |
| B3.2 | predict components behaviour with respect to other components. |
| C2.1 | Record the status of elements that have failed (or prone to fail) as history that can be used in modern design. |
| C2.2 | Record the status of newly designed element to monitor its behavior to avoid any errors in the forthcoming design |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• Machine design and design considerations<br>**Tutorials:**<br>• Demonstrate the difference between different stresses | 1 |
| 2,3 | **Lectures:**<br>• Engineering materials in machine element design<br>**Labs/Tutorials:**<br>• Demonstrate the difference between material behavior and safety factor consideration | 2,3 |

| | | |
|---|---|---|
| 4 | **Lectures:**<br>- Theories of failure<br>**Labs/Tutorials:**<br>- Solve examples considering various failure theories | 4 |
| 5,6 | **Lectures:**<br>- Design of cotter and knuckle joints<br>**Labs/Tutorials:**<br>- Solve examples regarding mentioned joints and similar ones. | 5,6 |
| 7 | **Lectures:**<br>- Design of shafts and axels.<br>**Labs/Tutorials:**<br>- Solve examples to determine shaft diameter under various loading conditions | 7 |
| 8 | Midterm | 8 |
| 9,10 | **Lectures:**<br>- Design of screwed joints.<br>**Labs/Tutorials:**<br>- Indicate procedure of designing screw joints under various working conditions | 9,10 |
| 11,12 | **Lectures:**<br>- Design of welded joints<br>**Labs/Tutorials:**<br>- Solve problems to estimate welding rod size to withstand loading conditions. | 11,12 |
| 13 | **Lectures:**<br>- Shaft – hub-connections<br>**Labs/Tutorials:**<br>- Designing shaft hub connections and related designs. | 13 |
| 14,15 | **Lectures:**<br>- Marine applications.<br>**Labs/Tutorials:**<br>- Discuss the mentioned topics and its relation with the marine engineering | 14,15 |

## 4. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (in-class - | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3.1 | x | x | x | | | x | x | | | | | | | | |
| | A4.1 | x | x | | | x | | | x | x | | | | x | | |
| | A4.2 | x | x | | | x | x | x | | x | | | | | | |
| B-Level | B3.1 | | x | | | | x | | | x | | x | | | | |
| | B3.2 | | | | | | x | | | x | | | | x | x | |
| C-Level | C2.1 | | x | | | x | | | x | | x | | | | | |
| | C2.2 | | x | | x | | | | | x | | | | x | x | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written, online) | A3.1, A4.1, A4.2 |
| 2 | Formative (quizzes – presentation - sheets) | A3.1, A4.1, A4.2, B3.1, B3.2, C2.1, C2.2 |
| 3 | Final Term Examination (written) | A3.1, A4.1, A4.2, B3.1, B3.2, C2.1, C2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written, online) | 9 |
| 2 | Formative (quizzes – presentation - sheets) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written, online) | 15 |
| 2 | Practical/ Oral Examination | -- |
| 3 | Formative (quizzes – presentation - sheets) | 15 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Khurmi, R. S. and Gupta, J. K. (2006) A text Book of Machine Design, Eurasia Publishing House , India |
| **2** | Kandil, A. (2009) Design of Machine Elements , Lecture Notes, Port Said University |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>- Machine design and design considerations<br>**Tutorials:**<br>- Demonstrate the difference between different stresses | 1 | A3.1, |
| 2,3 | **Lectures:**<br>- Engineering materials in machine element design<br>**Labs/Tutorials:**<br>- Demonstrate the difference between material behavior and safety factor consideration | 1 | A3.1,<br>A4.1 |
| 4 | **Lectures:**<br>- Theories of failure<br>**Labs/Tutorials:**<br>- Solve examples considering various failure theories | 1 | A4.1,<br>A3.1,<br>A4.2 |
| 5,6 | **Lectures:**<br>- Design of cotter and knuckle joints<br>**Labs/Tutorials:**<br>- Solve examples regarding mentioned joints and similar ones. | 1 | A4.2,<br>A3.1 |
| 7 | **Lectures:**<br>- Design of shafts and axels.<br>**Labs/Tutorials:**<br>- Solve examples to determine shaft diameter under various loading conditions | 1 | A4.2,<br>A4.1, |
| 8 | Midterm | 1 | |
| 9,<br>10 | **Lectures:**<br>- Design of screwed joints.<br>**Labs/Tutorials:**<br>- Indicate procedure of designing screw joints under various working conditions | 1 | B3.1,<br>B3.2 |
| 11,<br>12 | **Lectures:**<br>- Design of welded joints<br>**Labs/Tutorials:**<br>- Solve problems to estimate welding rod size to withstand loading conditions.<br>- | 1 | A4.1,<br>A4.2,<br>B3.1 |
| 13 | **Lectures:**<br>- Shaft – hub-connections<br>**Labs/Tutorials:**<br>- Designing shaft hub connections and related designs. | 1 | B3.2,<br>B3.1,<br>C2.1 |
| 14,<br>15 | **Lectures:** | 1 | B3.1, |

| | | | |
|---|---|---|---|
| | - Marine applications.<br>**Labs/Tutorials:**<br>- Discuss the mentioned topics and its relation with the marine engineering | | B3.2 |

| **Course: Machine Design and Marine Systems** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Outline introduction to engineering materials in mechanical design. |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4.1. List Design considerations<br>A4.2 stating design procedure. |
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams . | A7.1 Work in production team and critical analysis in relation to production engineering. |
| B.3 Select conventional mechanical equipment according to the required performance. | B3.1 Demonstrate to overcome simple engineering problems. |
| C2. Determine the appropriate manufacturing method considering the principles of engineering science and design requirements to solve production engineering problems. | C2.1 Record the status of elements that have failed (or prone to fail) as history that can be used in modern design.<br>C2.2 Record the status of newly designed element to monitor its behavior to avoid any errors in the forthcoming design |

**Course coordinator: Prof.Dr Gamal Abd El Nasser**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| Program Title | B. Sc. in Naval Architecture & Marine Engineering | | |
| Department offering the Program | Naval Architecture and Marine Engineering | | |
| Department Responsible for the Course | Naval Architecture and Marine Engineering | | |
| Course Code | HUF 203 | | |
| Year/ Level | Second Year – 2nd Semester | | |
| Specialization | Minor | | |
| Teaching Hours | Lectures | Tutorial | Practical/Lab. |
| | 2 | - | - |

## 2. Course aims:

| No. | aim |
|---|---|
| 4 | Behave professionally and adhere to engineering ethics and standards based on the recognition of Suez Canal Marine Environment characteristics, Projects, Institutions and Authorities, and the knowledge of Marine Engineering Applications and Port Planning in order to develop the profession and the community and promote sustainability principles. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3.1 | Recognize the ethics and impacts of engineering solutions on society and the marine environment characteristics. |
| A3.2 | Identify Suez Canal Marine Projects, Institutions and Authorities. |
| A3.3 | Classify and identify the types of Ports and its master plans. |
| A3.4 | Describe the different designs of port structures such as breakwaters and berths and the forces affected on them. |
| A7.1 | Discuss Marine Engineering Applications and its Environment Pollution. |
| A7.2 | Discuss the environmental effects of the bad planning of port master plan systems. |
| A10.1 | Apply new knowledge and practice self about the engineering problems related to marine environment. |
| A10.2 | Apply code of ministry of water resources and irrigation and international navigation code for designing Ports structures. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Lectures:<br>• Suez Canal Marine Environment characteristics. | 1 |
| 2 | Lectures:<br>• Suez Canal Marine Projects, Institutions and Authorities. | 2 |
| 3 | Lectures:<br>• Marine Suez Canal Marine Projects, Institutions and Authorities. Engineering Applications and its Environment Pollution. | 3-5 |
| 4 | Lectures: | 6-8 |

| | | |
|---|---|---|
| | • Types of: Ports, Master plans, and ship. | |
| 5 | Midterm | 9 |
| 6 | Lectures:<br>• Breakwater and berths types.<br>• Forces affected on Breakwater and berths. | 10-11 |
| 7 | Lectures:<br>• Determining the no. of berths required for Harbor. | 12 |
| 8 | Lectures:<br>• Determining the no. of berths required for Harbor.<br>• Dredging and Land area of the Port. | 13-14 |

5. Teaching and Learning Methods:

| LO’s | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online/offline) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3.1 | x | x | | | x | | | | | | x | | | | |
| | A3.2 | x | x | x | | x | | | | | | x | | | | |
| | A3.3 | x | x | x | | x | | | | | | | | | | |
| | A3.4 | x | | | | x | | | | | | | | | | |
| | A7.1 | x | | | | x | | | | | | x | | | | |
| | A7.2 | x | | | | x | | | | | | x | | | | |
| | A10.1 | x | | | | | | | | | | | | | | |
| | A10.2 | x | | | | | | | | | | | | | | |

6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional video tutorials |
| 2 | Online lectures |

7. Student assessment:

7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A3.1, A3.2, A3.3, A7.1, A7.2, A10.1 |
| 2 | Practical/ Oral Examination | ____ |
| 3 | Formative (self-learning assignments) | A3.1, A3.2, A3.3, A3.4, A7.1, A7.2, A10.1, A10.2 |
| 4 | Final Term Examination (written) | A3.1, A3.2, A3.3, A3.4, A7.1, A7.2, A10.1, A10.2 |

7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Practical/ Oral Examination | ----- |
| 3 | Formative (self-learning assignments) | 7 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10% |
| 2 | Practical/ Oral Examination | - |
| 3 | Formative (self-learning assignments) | 10% |
| 4 | Final Term Examination (written) | 80% |
| Total | | 100% |

8. List of References

| No. | Reference List |
|---|---|
| 1 | European Maritime Safety Agency "Annual Overview Of Marine Casualties And Incidents 2014" ( to be updated every year). |
| 2 | Bowersox, D J, Closs, D J and Cooper, M B (2007) Supply Chain Logistics Management, 2nd edn, McGraw Hill. |
| 3 | K.J. Rawson & E.C. TUPPER " Basic Ship Theory " , fifth edition , Butterworth – Heinemann, 2005 |
| 4 | http://www.suezcanal.gov.eg |
| 5 | Adrian Jarvis; Port and harbour engineering, 2016. |
| 6 | Per Bruun, Port engineering, 1993. |
| 7 | Gregory Tsinker; Handbook of Port and Harbor Engineering : Geotechnical and Structural Aspects.2014. |

9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Lectures:<br>Suez Canal Marine Environment characteristics. | 4 | A3.1, A10.1 |
| 2 | Lectures:<br>Suez Canal Marine Projects, Institutions and Authorities. | 4 | A3.1, A3.2 |
| 3 | Lectures:<br>Marine Suez Canal Marine Projects, Institutions and Authorities. Engineering Applications and its Environment Pollution. | 4 | A3.1, A3.2, A7.1, A10.1 |
| 4 | Lectures:<br>Types of: Ports, Master plans, and ship. | 4 | A3.3, A7.2, A10.2 |
| 5 | Lectures:<br>• Breakwater and berths types.<br>Forces affected on Breakwater and berths. | 4 | A3.4, A10.2 |
| 6 | Lectures:<br>Determining the no. of berths required for Harbor. | 4 | A3.4, A10.2 |
| 7 | Lectures:<br>• Determining the no. of berths required for Harbor.<br>• Dredging and Land area of the Port. | 4 | A3.4, A10.2 |

| Course: "Engineering applications in the marine environment HUF203" | |
|---|---|
| Program LOs | Course LOs |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Recognize the ethics and impacts of engineering solutions on society and the marine environment characteristics.<br>A3.2 Identify Suez Canal Marine Projects, Institutions and Authorities.<br>A3.3 Classify and identify the types of Ports and its master plans.<br>A3.4 Describe the different designs of port structures such as breakwaters and berths and the forces affected on them. |
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. | A7.1 Discuss Marine Engineering Applications and its Environment Pollution.<br>A7.2 Discuss the environmental effects of the bad planning of port master plan systems. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10.1 Apply new knowledge and practice self about the engineering problems related to marine environment.<br>A10.2 Apply code of ministry of water resources and irrigation and international navigation code for designing Ports structures. |

Course Coordinator: Assoc. Prof. /Elsayed Mohamed Galal

Program Coordinator: Dr Ameen Bassam

Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture and Marine Engineering | | |
| **Course Code** | **HUF204** | | |
| **Year/ Level** | Second year- 2nd semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | **Lectures** | **Tutorial** | **Practical/Lab.** |
| | 2 | 0 | 0 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply the essential knowledge to recognize the basics and principles of Environmental Sciences such as different types of pollutions. Also, the course outlines climate change and its impact on the environment, and Environmental impact assessment for various institutions. Next it explains the concept of Occupational safety and health and how to implement it in workplace and use of scientific information to prevent injuries and illnesses in workplace. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| **A4-1** | Recognize the regulations and standards codes for occupational safety related to environmental issues. |
| **A4-2** | Discuss Occupational and Human health safety related to the different types of pollution, and methods of prevention. |
| **A4-3** | Define of the phenomenon of global warming, greenhouses, and predict future inviromenmtal hazards and their impact on the inveronment. |
| **A6-1** | Practice applying the quality assurance procedures in all environmental and occupational safety |
| **A6-2** | Apply appropriate steps to design safe systems at work and manage their risk in effective ways. |
| **A6-3** | Plan and implement techniques in professional manner to manage the risks of the most types of pollutions such as: air pollution, water pollution, chemical pollution, electromagnetic pollution. |
| **A10-1** | Identify multiple environmental factors, and their environmental impacts related to economic dimensions. |
| **A10-2** | Explore the methodes to treat environmental problems by following professional standereds, and the effects of these solutions on society. |

## 4. Course Contents:

| Topic No. | Topic | Weeks |
|---|---|---|
| **1** | Introduction to environmental science and occupational safety | **1** |
| **2** | Elements of environmental systems | **2** |
| **3** | Air pollutions, Chemical Pollution, Water Pollution, Pollution caused by acid rain and acid fog, Oil Pollution, Biological weapons, and mechanical methods to remove oil spills. | **3-8** |
| **4** | Midterm Exam | **9** |
| **5** | Occupational and Human health and safety. | **10-11** |
| **6** | The impact of climate change on the population | **12-13** |
| **7** | Assessing the environmental impact and occupational safety of industrial applications including all standard codes. | **14-15** |

## 5. Teaching and Learning Methods:

| Courses LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Face-to-Face Lecture | Online Lecture | Flipped Classroom | Presentation and Movies | Discussion | Tutorial | Problem solving | Brain storming | Projects | Site visits | Self learning and Research | Cooperative | Discovering | Modeling | Playing |
| A-Level | A4-1 | x | x | x | x | x | | | | | | x | | | | |
| | A4-2 | x | x | x | x | x | | | | | | x | | | | |
| | A4-3 | x | x | x | x | x | | | | | | X | | | | |
| | A6-1 | x | x | x | X | x | | | | | | x | | | | |
| | A6-2 | x | x | x | x | x | | | | | | x | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A6-3** | x | x | x | x | x | | | | X | | x | | | | |
| | **A10-1** | x | x | x | x | x | | | | X | | x | | | | |
| | **A10-2** | x | x | x | x | x | | | | | | x | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A4-1, A4-2, A6-1, A6-2 |
| 2 | Tutorial, report, discussions, and presentation assessment | A4-1, A4-2, A4-3, A6-1, A6-2, A10-1, A10-2 |
| 3 | Final Term Examination (written) | A4-1, A4-2, A4-3, A6-1, A6-2, A10-1, A10-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 9 |
| 2 | Tutorial, report, discussions, and presentation assessment | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Tutorial, report, discussions, and presentation assessment | 10 |
| 3 | Final Term Examination (written) | 80 |
| Total | | 100% |

## 8. List of References

| | |
|---|---|
| ***Essential Books (Text Books):*** | **1( تلوو ا يىؤقوصروو و —ىؤو سوان بي و بيءةو بي رو ل بيل و يل و 1991**<br>**2( بيلو و ا شروول بيق ل بيوون-د.ضقووم دون وو بيءةو بي رو ل بيل و يل 1991**<br>**3( بي ل لبيهبىٔ يبوٴة —بي زعبأل ل-د.طلتب بهةبالع ج —دلسول بيللو بي دة ة 1991**<br>**1( لنس ن ت ل يبوٴة —ن بويسةن أن ؤ ط—بيءة بي ر لبيل يل - 1999**<br>**1( بيقون ن و يسو 1991-بأورب و ن ضرو وأن برلو يبوٴقو الىٔ دو بيفذل جهز ا ن يبوٴة بيق ه ة- 1999**<br>**6( يةل أ دس بجبعتقةبيوأرة يبوٴة و -جو ز و نيبوٴقو — طو للدب ة يبوٴة بيق ه قبك ب 1996**<br>**7( بي ل ابي ه طةس — د.عنبيرق د ب —بيءة بي ر ل بيل يل 2001**<br>**يسال ب ي د بيره ة — هلىب ن رنبي ن ى (8)**<br>**9( أهنف فهليسال ب ي د بيره ة بألب لبيرظر يه )قالت بكدلرة (تان بدط بدذ بيق .** |
| ***Recommended Text Books:*** | Eldon D. Enger, Bradley F. Smith, “Environmental Science, A study of Interrelationships”, PUBLISHER: McGraw-Hill, ISBN#: 97800-07-338327-9, 2018, 13th ed. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course

| Topic No. | Topic | Aim | Course LOs Covered (By No.) |
|---|---|---|---|
| 1 | Introduction to environmental science and occupational safety | 1 | A4-1, A6-1, A6-2, A6-3 |
| 2 | Elements of environmental systems | 1 | A6-1, A6-2, A6-3 |

| | | | |
|---|---|---|---|
| 3 | Air pollutions, Chemical Pollution, Water Pollution, Pollution caused by acid rain and acid fog, Oil Pollution, Biological weapons, and mechanical methods to remove oil spills. | 1 | A4-2, A6-1, A6-2, A6-3 |
| 4 | Midterm Exam | 1 | A4-1, A4-2, A6-1, A6-2 |
| 5 | Occupational and Human health and safety. | 1 | A6-1, A6-2, A6-3, A10-1, A10-2 |
| 6 | The impact of climate change on the population | 1 | A4-3, A6-1, A6-2, A6-3 |

| **Course: Environmental sciences and Professional safety** | |
|---|---|
| **Programme LOs**<br>**The graduates of the program should be able to** | **Course LOs** |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles. | A4-1 Recognize the regulations and standards codes for occupational safety related to environmental issues. |
| | A4-2 Discuss Occupational and Human health safety related to the different types of pollution, and methods of prevention. |
| | A4-3 Define of the phenomenon of global warming, greenhouses, and predict future inviromenmtal hazards and their impact on the inveronment. |
| A6- Plan, supervise and monitor impleme | A6-1 practice applying the quality assurance procedures in all environmental and occupational safety |
| | A6-2 Apply appropriate steps to design safe systems at work and manage their risk in effective ways. |
| | A6-3 Plan and implement techniques in professional manner to manage the risks of the most types of pollutions such as: air pollution, water pollution, chemical pollution, electromagnetic pollution. |

| | |
|---|---|
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Identify multiple environmental factors, and their environmental impacts related to economic dimensions. |
| | A10-2 Explore the methodes to treat environmental problems by following professional standereds, and the effects of these solutions on society. |

Course Coordinator: Assoc. Prof. Dr. Saad Bahey Eldeen

Program Coordinator: Dr Ameen Bassam

Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 314 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 2 | Use techniques, skills, and modern engineering tools necessary for ship construction practice. Furthermore, it guides them on how to use the classification societies rules book, in order to be able to design and draw all structural elements required in the fore and aft sections of the ship. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Introducing the importance of a ship's section along with its stiffeners in shipbuilding. |
| A3-2 | Clarifying the main requirements from the structural design point of view. |
| B2-1 | Applying the job of the classification society's rules. |
| B2-2 | Preparing detailed calculations and drawings. |
| C1-1 | Designing and drawing different structural members. |
| C1-2 | Drawing detailed sections according to the CS rules. |
| C3-1 | Recognizing the role of applying CS rules. |
| C3-2 | Distinguishing the importance of the necessary structural component. |
| C3-3 | Use of Classification Society’s rules to specify what he needs related to the course. |

| Course: Ship Construction (2) | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3-1 Relate the importance of a ship's section along with its stiffeners in shipbuilding. |
| | A3-2 Investigate the main requirements from the structural design point of view. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Identify the job of the classification society's rules. |
| | B2-2 Assess detailed calculations and drawings. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design and draw different structural members. |
| | C1-2 Draw detailed sections according to the CS rules. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Appraise the role of applying CS rules. |
| | C3-2 Evaluate the importance of the necessary structural component. |
| | C3-3 Use of Classification Society's rules to specify what he needs related to the course. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introducing the role of the CS rules. | 1-2 |
| 2 | Designing the ship's fore section. | 3-5 |
| 3 | Calculating and drawing the ship's fore section with stiffeners. | 6-8 |
| 4 | Designing the ship's aft section. | 01-10 |
| 5 | Calculating and drawing the ship's aft section with stiffeners. | 12-13 |
| 6 | Detailed design and drawing of the ship's rudder. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3-1 | x | x | | x | | | x | | | | | | | | |
| | A3-2 | x | x | | x | | | x | | | | | | | | |
| B-Level | B2-1 | x | x | | x | | x | x | | | | | | | | |
| | B2-2 | x | x | | x | | x | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | x | | | | | | | | | |
| | C1-2 | x | x | | x | | | x | | | | | | | | |
| | C3-1 | x | x | | x | | | x | | | | | | | | |
| | C3-2 | x | x | | x | | x | | | | | | | | | |
| | C3-3 | x | x | | x | | x | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-2, B2-1, C1-1, C1-2, C3-1, C3-2 |
| 2 | Formative (quizzes – drafts - presentation) | A1-1, A1-2, C1-1 |
| 3 | Oral examination | C1-2, C3-3 |
| 4 | Final Term Examination (written) | A1-1, A1-2, B2-1, B2-2, C1-1, C1-2, C3-2, C3-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – drafts - presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – drafts - presentation) | 21 |
| 3 | Oral Exam | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Ship Design and Construction 1st Edition, Robert Taggart (Editor), ISBN-13: 978-0960304806. |
| **2** | Ship Construction, Fifth Edition 5th Edition, D J Eyres (Author), ISBN-13: 978-0750648875. |
| **3** | DNV GL Rules for Classification and Construction Ship Technology, 2016. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introducing the role of the CS rules. | 2 | C1-1, C1-2, C3-2 |
| 2 | Designing the ship's fore section. | 2 | A1-2, C3-1 |
| 3 | Calculating and drawing the ship's fore section with stiffeners. | 2 | B2-2, C3-1 |
| 4 | Designing the ship's aft section. | 2 | B2-1, B2-2, C1-2, C3-2, C3-3 |
| 5 | Calculating and drawing the ship's aft section with stiffeners. | 2 | A1-1, B2-1, B2-2 |
| 6 | Detailed design and drawing of the ship's rudder. | 2 | A1-1, B2-1, C1-2, C1-3, C3-1 |

**Course Coordinator: Dr. Randa Ramadane**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 315 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aims |
|---|---|
| 6 | Act professionally to design a ship that not only meets the regulations and requirements, but also suits the marine environment and is economically and environmentally feasible. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Choose the suitable method to calculate ship weight in the preliminary design stages. |
| A3-2 | Apply the gained knowledge to expect the weight and cost of scrap during ship building operations. |
| A3-3 | Apply the gained knowledge to know the steps of the tender process for any project. |
| B2-1 | Select ship dimensions that achieve the optimum characteristics of the ships, using one of the available optimization software. |
| B2-2 | Draw general arrangement plans (GA) for a conventional or special ship type manually or using AutoCAD. |
| B4-1 | Apply safety requirements that must be met within each space in ship general arrangement plans (GA). |
| B4-2 | Apply various safety requirements in the corridors and stairs to move easily and safely between the different spaces of the ship |
| B4-3 | Provide means to escape from everywhere on the ship in case of emergency |
| C1-1 | Design a vessel to perform a special function and not only complies with the requirements of international maritime organizations, but also suits the marine environment and is economically and environmentally feasible. |
| C1-2 | Design general arrangement plans (GA) for a specified ship type. |
| C1-3 | Calculate ship weight and determining the ship's center of gravity. |
| C1-4 | Perform a tender process for ship design project. |

| **Course: Ship Design (2)** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3-1 Choose the suitable method to calculate ship weight in the preliminary design stages. |
| | A3-2 Apply the gained knowledge to expect the weight and cost of scrap during ship building operations. |
| | A3-3 Apply the gained knowledge to know the steps of the tender process for any project. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Select ship dimensions that achieve the optimum characteristics of the ships, using one of the available optimization software. |
| | B2-2 Draw general arrangement plans (GA) for a conventional or special ship type manually or using AutoCAD. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Apply safety requirements that must be met within each space in ship general arrangement plans (GA). |
| | B4-2 Apply various safety requirements in the corridors and stairs to move easily and safely between the different spaces of the ship |
| | B4-3 Provide means to escape from everywhere on the ship in case of emergency |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design a vessel to perform a special function and not only complies with the requirements of international maritime organizations, but also suits the marine environment and is economically and environmentally feasible. |
| | C1-2 Design general arrangement plans (GA) for a specified ship type. |
| | C1-3 Calculate ship weight and determining the ship's center of gravity. |
| | C1-4 Perform a tender process for ship design project. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Ship weight calculation and determining the ship's center of gravity. | 1-3 |
| 2 | Design of ship general arrangement for different ship types (Definitions – Cargo Spaces – Passengers and Crew Spaces – Machinery Spaces – Tanks Spaces - Interrelated Access and Corridors) | 4-7 |
| 3 | Ship dimensions optimization for optimum ship characteristics (Ship Stability – Ship Vibration – Ship Resistance – Ship Motion ... etc.) | 9-11 |
| 4 | Design methods for special ship types (Marine Tugs – Fishing Trawlers – Ro-Ro and Containers Ships) | 12-14 |
| 5 | Ship tendering design process | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3-1 | x | x | | x | | | x | | | | | | | | |
| | A3-2 | x | x | | x | | | x | | | | | | | | |
| | A3-3 | x | x | | x | | | | | | | | | | | |
| B-Level | B2-1 | x | x | | x | | x | | | | | | | | | |
| | B2-2 | x | x | | x | | x | | | | | | | x | | |
| | B4-1 | x | x | | x | | | | | | | | | | | |
| | B4-2 | x | x | | x | | | | | | | | | | | |
| | B4-3 | x | x | | x | | | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | x | | | | | | | | | |
| | C1-2 | x | x | | x | | x | | | | | | | x | | |
| | C1-3 | x | x | | x | | | x | | | | | | | | |
| | C1-4 | x | x | | x | | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1, A3-2, B2-2, B4-1, B4-2, B4-3, C1-1, C1-2, C1-3 |
| 2 | Formative (quizzes – presentation) | A3-1, A3-2, C1-3 |
| 3 | Final Term Examination (written) | A3-1, A3-2, A3-3, B2-1, B2-2, B4-1, B4-2, B4-3, C1-1, C1-2, C1-3, C1-4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 11 |
| 2 | Formative (quizzes – presentation) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Suresh Chandra Misra, “Design Principles of Ships and Marine Structures”, CRC Press, 1st Edition, 2015. |
| **2** | Apostolos Papanikolaou, “Ship Design: Methodologies of Preliminary Design”, Springer; 2014. |

| | |
|---|---|
| **3** | Yasuhisa Okumoto, Yu Takeda, Masaki Mano & Tetsuo Okada, "Design of Ship Hull Structures: A Practical Guide for Engineers", Springer; 2009. |
| **4** | C. B. Barrass: "Ship Design and Performance for Masters and Mates", First Edition, Butterworth-Heinemann, London, 2004. |
| **5** | David G.M. Watson: "Practical Ship Design", Volume 1, First edition, Elsevier Amsterdam, 1998. |
| **6** | H. Schneekluth & V. Bertram: "Ship Design for Efficiency and Economy", Butterworth-Heinemann, 1998. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Ship weight calculation and determining the ship's center of gravity. | 6 | A3-1, A3-2, C1-3 |
| 2 | Design of ship general arrangement for different ship types (Definitions – Cargo Spaces – Passengers and Crew Spaces – Machinery Spaces – Tanks Spaces - Interrelated Access and Corridors) | 6 | B2-2, B4-1, B4-2, B4-3, C1-2 |
| 3 | Ship dimensions optimization for optimum ship characteristics (Ship Stability – Ship Vibration – Ship Resistance – Ship Motion ... etc.) | 6 | B2-1, C1-1 |
| 4 | Design methods for special ship types (Marine Tugs – Fishing Trawlers – Ro-Ro and Containers Ships) | 6 | C1-1, C1-2 |
| 5 | Ship tendering design process | 6 | A3-1, C1-4 |

**Course Coordinator: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 316 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | - |

## 2. Course aims:

| No. | aim |
|---|---|
| 7 | Apply the principles of cost accounting to understand cost estimation of ship building and repairing, elements of cost, overhead expense and depreciation methods. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3.1 | Recognizes methods of cost analysis used in ship technologies. |
| A3.2 | Understands the causes of ship depreciation and calculating it. |
| B4.1 | Calculate the cost of cutting, welding and assembly of shell pates and stiffeners. |
| B4.2 | Calculating the hull weight using shell expansion drawing. |
| C3.1 | Estimate preliminary cost for ship construction |

| Course: Cost Accounting of ship building | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3 Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3.1 Recognizes methods of cost analysis used in ship technologies. |
| | A3.2 Understands the causes of ship depreciation and calculating it. |
| B4 Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4.1 Calculate the cost of cutting, welding and assembly of shell pates and stiffeners. |
| | B4.2 Calculating the hull weight using shell expansion drawing. |
| C3 Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3.1 Estimate preliminary cost for ship construction |

**4. Course Contents:**

| No. | Topic | Week |
|---|---|---|
| 1 | Definitions of cost elements and objectives of cost estimation | 1 |
| 2 | Methods of cost analysis | 2 |
| 3 | Cutting cost | 3 |
| 4 | Welding Cost | 4-5 |
| 5 | Depreciation Methods | 6-7 |
| 6 | Written Mid-Term Exam | 8th |
| 7 | Steel Weight cost | 9 |
| 8 | Total ship Cost | 10-11 |
| 9 | Examples of building and maintenance costs | 12-13 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3.1 | x | x | | | x | x | | | | | | | | | |
| | A3.2 | x | x | | | x | x | | | | | | | | | |
| B-Level | B4.1 | x | x | | | x | x | | | | | | | | | |
| | B4.2 | x | x | | | x | x | | | | | | | | | |
| C-Level | C3.1 | x | x | | | x | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | A3.2 , B4.1, B4.2 |
| 3 | Quizzes and assignments | A3.1 , A3.2 , B4.1, B4.2 ,C3.1 |
| 4 | Final Term Examination | A3.1 , A3.2 , B4.1, B4.2 ,C3.1 |

**A3.1**

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8th |
| 2 | Quizzes and assignments | Every week |
| 4 | Final Term Examination | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | 15 |
| 3 | Quizzes and assignments | 15 |
| 4 | Final Term Examination | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | American Welding Society, "Welding Handbook", Ninth Edition, 2015. ISBN: 978-0-87171-856-3 |
| **2** | Lorenzoni , A.B. ," Applied Cost Engineering",1996, ISBN-10: 0824772644 |
| **3** | Branch, A.E.. "Economics of Shipping Practice and Management", 1995, ISBN-10 : 0412713802 |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | White Board |
| 2 | Data Show System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Definitions of cost elements and objectives of cost estimation | 7 | A3.1 |
| 2 | Methods of cost analysis | 7 | A3.1, A3.2 |
| 3 | Cutting cost | 7 | A3.2, B4.1 |
| 4 | Welding Cost | 7 | B4.1 |
| 5 | Depreciation Methods | 7 | A3.2 |
| 6 | Written Mid-Term Exam | 7 | |
| 7 | Steel Weight cost | 7 | B4.1, B4.2 |
| 8 | Total ship Cost | 7 | B4.1, B4.2 |
| 9 | Examples of building and maintenance costs | 7 | C3.1 |

**Course Coordinator: Assoc. Prof. Dr. Arwa Wafiq Hussein**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 317 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 2 | Use techniques, skills, and the essential knowledge about the resistance to ship movement in sea and the main features of wave systems of ships to define and calculate the main component of ship resistance in open sea as well as in shallow water. It teaches also the necessary skills concerning the analysis of experimental ship model tests. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Describe different types of waves created by a moving ship |
| A1-2 | Recognize the methods to bring favorable interference of ship wave systems |
| A1-3 | Investigate the increase of resistance in restricted water ways |
| A2-1 | Identify the laws of similarity in the ship model experimental test |
| A7-1 | Recognize the different method used to measure ship resistance |
| B1-1 | Distinguish the methods to reduce the air resistance |
| B1-2 | Investigate the methods to bring favorable interference of ship wave systems |
| B3-1 | Predicate the alteration in ship resistance due to the roughness |
| B3-2 | Predicate the alteration in ship resistance due to the water way restriction |
| C1-1 | Use the measured resistance of ship model to calculate the resistance of full scale ships |
| C1-2 | Calculate the different components of ship resistance |
| C2-1 | Analyze the different components of ship resistance |
| C2-2 | Perform a model test to measure the total resistance |
| C6-1 | Apply the gained knowledge in the courses of naval architecture and ship design |

| **Course:** Ship Resistance | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Describe different types of waves created by a moving ship |
| | A1-2 Recognize the methods to bring favorable interference of ship wave systems |
| | A1-3 Investigate the increase of resistance in restricted water ways |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Identify the laws of similarity in the ship model experimental test |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Recognize the different method used to measure ship resistance |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Distinguish the methods to reduce the air resistance |
| | B1-2 Investigate the methods to bring favorable interference of ship wave systems |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Predicate the alteration in ship resistance due to the roughness |
| | B3-2 Predicate the alteration in ship resistance due to the water way restriction |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and out fitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Use the measured resistance of ship model to calculate the resistance of full scale ships |
| | C1-2 Calculate the different components of ship resistance |
| C2- Evaluate the behavior and performance of ships | C2-1 Analyze the different components of ship resistance |

| | |
|---|---|
| in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-2 Perform a model test to measure the total resistance |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Apply the gained knowledge in the courses of naval architecture and ship design |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Resistance theory and flow around ship | 1 |
| 2 | Components of ship resistance | 2-3 |
| 3 | Laws of similarity and ship model experiment | 4-5 |
| 4 | Methods to extrapolate model test to full scale ship | 6-7 |
| 5 | Frictional resistance | 8-9 |
| 6 | Eddy making resistance and Air resistance | 10 |
| 7 | Wave making resistance | 11 |
| 8 | Ship resistance  on the basis of published data | 12-13 |
| 9 | Resistance of ship in shallow and restricted water | 14-15 |

## 5. Teaching and Learning Methods:

| | Teaching and Learning Method |
|---|---|

| LO’s | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A-Level | A1-1 | X | X | | X | X | X | X | | | | | | | | |
| | A1-2 | X | X | | X | X | X | X | | | | | | | | |
| | A1-3 | X | X | | X | X | X | X | | | | | | | | |
| | A2-1 | X | X | | X | X | | X | | | | | | | | |
| | A7-1 | X | X | | X | X | | X | | | | | | | | |
| B-Level | B1-1 | X | X | | X | X | | X | | | | | | | | |
| | B1-2 | X | X | | X | X | | X | | | | | | | | |
| | B3-1 | X | X | | X | X | X | X | | | | | | | | |
| | B3-2 | X | X | | X | X | X | X | | | | | | | | |
| C-Level | C1-1 | X | X | | X | X | X | X | | X | | | | | | |
| | C1-2 | X | X | | X | X | X | X | | X | | | | | | X |
| | C2-1 | X | X | | X | X | X | X | | X | | | | | | X |
| | C2-2 | X | X | | X | X | | X | | | | | | | | |
| | C6-1 | X | X | | X | X | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A2-1, A7-1, B1-1, C1-2, C2-1, C2-2 |
| 2 | Oral Examination | B3-1, B3-2, C6-1 |
| 3 | Formative (quizzes – presentation - reports) | A1-2, B1-2, C1-1 |
| 4 | Final Term Examination (written) | A1-1, A1-2, A1-3, A2-1, B1-2, B3-1, B3-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Oral Examination | 15 |
| 3 | Formative (quizzes – presentation - reports) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Oral Examination | 20 |
| 3 | Formative (quizzes – presentation - reports) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | J.P. Comstock “Principals of Naval Architecture” SNAME Publications, 1989, Vol.III |
| **2** | K.J. Rawson & E.C. Tupper “Basic Ship Theory” Longman Publications, 1980, Vol.I |
| **3** | E.C. Tupper “Introduction to Naval Architecture” 3rd Edition, Butterworth, London 1996 |

| | |
|---|---|
| 4 | Periodicals, Web sites, etc |
| 5 | Anthony F. Molland “The Maritime Engineering Reference Book, UK2008 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Resistance theory and flow around ship | 2 | A1-1 |
| 2 | Components of ship resistance | 2 | C1-2, C2-1 |
| 3 | Laws of similarity and ship model experiment | 2 | A2-1 |
| 4 | Methods to extrapolate model test to full scale ship | 2 | C1-1, C2-2 |
| 5 | Frictional resistance | 2 | B3-1 |
| 6 | Eddy making resistance and Air resistance | 2 | B1-1, B3-2 |
| 7 | Wave making resistance | 2 | A1-2, B1-2 |
| 8 | Ship resistance on the basis of published data | 2 | A7-1 |
| 9 | Resistance of ship in shallow and restricted water | 2 | A1-3, C6-1 |

**Course Coordinator: Prof. Dr. Eng. Laila Bassiony Kamar**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 318 | | |
| **Year/ Level** | Third year– 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | -- | -- | 2 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 2 | Use techniques and modern engineering tools applied in design, production, construction, and operation within shipyards to save time and improve the performance of marine unites, to collect all need information in the field of naval architecture and marine engineering. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Apply safe systems at work and observe the appropriate steps to manage risk. |
| A4-2 | Apply quality assurance procedures and follow codes and standards. |
| A7-1 | Understand and apply safe systems of work. |
| A7-2 | Collaborate effectively within multidisciplinary team. |
| A10-1 | Exchange knowledge and skills with engineering community and industry |
| B4-1 | Work as a chief engineer in the shipbuilding, maintenance, and ship operation. |
| C3-1 | Effectively manage tasks, time and resources. |
| C4-1 | Prepare and present technical reports. |

**Course: Summer Training (2)**

| **Program LOs** | **Course LOs** |
|---|---|
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Apply safe systems at work and observe the appropriate steps to manage risk. |

| | |
|---|---|
| | A4-2 Apply quality assurance procedures and follow codes and standards. |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Understand and apply safe systems of work. |
| | A7-2 Collaborate effectively within multidisciplinary team. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Exchange knowledge and skills with engineering community and industry |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic, and financial aspects to design, build, operate, inspect, and maintain mechanical equipment and systems. | B4-1 Work as a chief engineer in the shipbuilding, maintenance, and ship operation. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair, and conversion projects. | C3-1 Manage tasks, time and resources effectively. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Prepare and present technical reports. |

**4. Course Contents:**

| No. | Topics | Week |
|---|---|---|
| 1 | Training the students practically in one of the authorities or shipyards or specialized companies in the field of shipbuilding to link between education and practical field of work, this may be done based on a program in cooperation between the department and the management of the training company and under the supervision of the two sides. | 8 weeks |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | A4-1 | | | | | | | | | | x | x | x | | | x |
| | A4-2 | | | | | | | | | | x | x | x | | | x |
| | A7-1 | | | | | | | | | | x | x | x | | | x |
| | A7-2 | | | | | | | | | | x | x | x | | | x |
| | A10-1 | | | | | | | | | | x | x | x | | | x |
| **L ev** | B4-1 | | | | | | | | | | x | x | x | | | x |
| **C-Level** | C3-1 | | | | | | | | | | x | x | x | | | x |
| | C4-1 | | | | | | | | | | x | x | x | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Oral Examination | A4-1, A4-2, A7-1, A7-2, A10-1, B4-1, C3-1, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Visits | Every week |
| 2 | Final Term Oral Examination | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Final Term Oral Examination | 50 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Watson, David GM. Practical ship design. Vol. 1. Elsevier, 2002. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Variable according to the authorized shipyard or company for training |

### 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Training the students practically in one of the authorities or shipyards or specialized companies in the field of shipbuilding to link between education and practical field of work, this may be done based on a program in cooperation between the department and the management of the training company and under the supervision of the two sides. | 2 | A4-1, A4-2, A7-1, A7-2, A10-1, B4-1, C3-1, C4-1 |

**Course Coordinator: Variable**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | HUU305 | | |
| **Year/ Level** | Third level / 1st term | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | --- | --- |

## 2. Course Aims:

| No. | Aim |
|---|---|
| 5 | Work in and lead a heterogeneous team by applying leadership qualities to make the student competent to function effectively and manage and influence the employees to be ready to face the real life challenges. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A6-1 | Identify leader and manager skills and values. |
| A6-2 | Distinguish between different leadership theories (limitations and characteristics) |
| A6-3 | Describe five key elements of leadership. |
| A6-4 | Define the ten managerial roles based on their three categories. |
| A7-1 | Discuss the advantages and disadvantages of working in teams |
| A7-2 | Improve skills related to working in groups and teamwork through class activities and project. |
| A7-3 | Discuss the role of strategic leadership in the strategic management process. |
| A8-1 | Analyze leadership case studies. |
| A8-2 | Prepare reports in accordance with the standard scientific guidelines for given topics. |
| A8-3 | Present reports discussing the results and defending his/her ideas. |
| A9-1 | Recommend methods to improve leadership skills in given case studies. |
| A9-2 | Evaluate information through individual and group project work |
| A9-3 | Practice decision making based on leadership theories in class activities and project. |

| **Course: Leadership Skills** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A6- Plan, supervise and monitor implementation of engineering projects. | A6-1 Identify leader and manager skills and values. |
| | A6-2 Distinguish between different leadership theories (limitations and characteristics) |
| | A6-3 Describe five key elements of leadership. |
| | A6-4 Define the ten managerial roles based on their three categories. |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. | A7-1 Discuss the advantages and disadvantages of working in teams |
| | A7-2 Improve skills related to working in groups and teamwork through class activities and project. |
| | A7-3 Discuss the role of strategic leadership in the strategic management process. |
| A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Analyze leadership case studies. |
| | A8-2 Prepare reports in accordance with the standard scientific guidelines for given topics. |
| | A8-3 Present reports discussing the results and defending his/her ideas. |
| A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Recommend methods to improve leadership skills in given case studies. |
| | A9-2 Evaluate information through individual and group project work |
| | A9-3 Practice decision making based on leadership theories in class activities and group project. |

## 4. Course Contents:

| *Week No.* | *Topic* | *Total Hours* | *Contact hrs* | | |
|---|---|---|---|---|---|
| | | | **Lec.** | **Tut.** | **Lab.** |
| *Week-1* | Introduction (leadership definition) | 2 | 2 | -- | -- |
| *Week-2* | Leader vs Manager | 2 | 2 | -- | -- |
| *Week 3-4* | Power the key to leadership | 4 | 4 | -- | -- |
| *Week 5* | Empowerment gains and threats | 2 | 2 | -- | -- |
| *Week 6-9* | Leadership theories and models | 8 | 8 | -- | -- |
| *Week-10* | Domains of leadership strengths | 2 | 2 | -- | -- |
| *Week 11-13* | The five practices and ten commitments of exemplary leadership | 6 | 6 | -- | -- |
| *Week 14-15* | Group projects presentation | 4 | 4 | -- | -- |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (online-In class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A6-1** | X | | | X | X | | | X | | | | | | | |
| | **A6-2** | X | | | X | X | | | X | | | | | | | |
| | **A6-3** | X | | | X | X | | | X | | | | | | | |
| | **A6-4** | X | | | X | X | | | X | X | | | X | | | |
| | **A7-1** | X | | | X | X | | | X | | | | | | | |
| | **A7-2** | X | | | X | X | | | X | | | | | | | |
| | **A7-3** | X | | | X | X | | | X | | | | | | | |
| | **A8-1** | X | | | X | X | | | X | X | | | X | | | |
| | **A8-2** | X | | | X | X | | | X | X | | | X | | | |
| | **A8-3** | X | | | X | X | | | X | X | | | X | | | |
| | **A9-1** | X | | | X | X | | | X | X | | | X | | | |
| | **A9-2** | X | | | X | X | | | X | X | | | X | | | |
| | **A9-3** | X | | | X | X | | | X | X | | | X | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and documentation. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | In class activity and assignments | A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3 |
| 2 | Group project presentation and discussion | A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3 |
| 3 | Final Term Examination (written) | A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | In class activity and assignments | Throughout the semester |
| 2 | Group project presentation and discussion | Weeks 14-15 |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | In class activity and assignments | 25 |
| 2 | Group project presentation and discussion | 25 |
| 3 | Final Term Examination (written) | 50 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | James Kouzes, and Barry Posner, “The Leadership Challenge”, Wiley, 6th edition, 2017, ISBN:0470651725. |
| **2** | Gareth Jones, and Jennifer George, "Contemporary Management", McGraw Hill, 11th edition 2017. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Sound System Facility |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction (leadership definition) | 5 | A6-1 |
| 2 | Leader vs Manager | 5 | A6-1, A7-1, A7-2 |
| 3 | Power the key to leadership | 5 | A6-3, A7-2, A7-3, A9-1, |
| 4 | Empowerment gains and threats | 5 | A6-3, A7-3, A8-1 |
| 5 | Leadership theories and models | 5 | A6-2, A8-1, A9-3 |
| 6 | Domains of leadership strengths | 5 | A7-2, A8-1, A9-1, A9-3 |
| 7 | The five practices and ten commitments of exemplary leadership | 5 | A6-3, A6-4, A9-3 |
| 8 | Group projects presentation | 5 | A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3 |

**Course Coordinator: Dr. Mohamed Farouk Abdel-Kader**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Dr. Rawya Rizk**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 319 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | ---- | 2 |

## 2. Course aims:

| No. | aims |
|---|---|
| 1 | Apply the fundamentals of computer applications; and build the ability to master one of the programming languages to perform most of the engineering calculations related to the field of ship engineering. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A9-1 | Recognize the method of translating an algorithm into a Fortran segment. |
| A9-2 | Use subprograms within any related Fortran main program. |
| B2-1 | Plan the steps for creating any computer program using flowcharts. |
| B2-2 | Carry out mathematical calculations related to any simple engineering problem using computer-aided tools and software. |
| C1-1 | Develop a Fortran computer programs calculate ship design calculations. |
| C1-2 | Develop a Fortran computer program calculates the efficiency and optimum characteristics of a B-type marine propellers. |
| C1-3 | Develop a Fortran computer program calculates some of the ships' structural features. |
| C2-1 | Assess the expected benefits of handling any problem related to the field of ship engineering by computers software. |
| C2-2 | Evaluate the ships' hydrostatic and hydrodynamic characteristics using specially developed Fortran computer programs. |
| C2-3 | Evaluate the performance of marine propellers using specially developed Fortran computer programs. |

| **Course:** Computer Applications in Ship Engineering | |
|---|---|
| **Program LOs** | **Course LOs** |
| A9- Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Recognize the method of translating an algorithm into a Fortran segment. |
| | A9-2 Use subprograms within any related Fortran main program. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Plan the steps for creating any computer program using flowcharts. |
| | B2-2 Carry out mathematical calculations related to any simple engineering problem using computer-aided tools and software. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Develop a Fortran computer programs calculate ship design calculations. |
| | C1-2 Develop a Fortran computer program calculates the efficiency and optimum characteristics of a B-type marine propellers. |
| | C1-3 Develop a Fortran computer program calculates some of the ships' structural features. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Assess the expected benefits of handling any problem related to the field of ship engineering by computers software. |
| | C2-2 Evaluate the ships' hydrostatic and hydrodynamic characteristics using specially developed Fortran computer programs. |
| | C2-3 Evaluate the performance of marine propellers using specially developed Fortran computer programs. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lectures:**<br>• Computer and programming languages overview - Fortran program organization.<br>**Labs:**<br>• Dealing with Fortran - coding form and software capabilities. | 1 |
| 2 | **Lectures:**<br>• Arithmetic statements & operations<br>**Labs:**<br>• Dealing with different types of Fortran arithmetic statements & operations | 2 |
| 3 | **Lectures:**<br>• Fortran statements<br>**Labs:**<br>• Dealing with different types of Fortran statements & write a simple Fortran programs. | 3-5 |
| 4 | **Lectures:**<br>• Flow charts - Some applications<br>**Labs:**<br>• Use Fortran instruction to solve some marine problems. | 6 |
| 5 | **Lectures:**<br>• Arrays and subscripted variables.<br>**Labs:**<br>• Use Fortran instruction to handle one dimension or multi dimension variables. | 7 |
| 6 | **Lectures:**<br>• Hydrostatical data sheet.<br>**Labs:**<br>• Make a Fortran program to calculate the ship hydrostatic characteristics. | 9-11 |
| 7 | **Lectures:**<br>• Design of marine propellers.<br>**Labs:**<br>• Make a Fortran program to select the optimum characteristics of a B-type marine propeller. | 12 |
| 8 | **Lectures:**<br>• Function and subroutines subprograms.<br>**Labs:**<br>• Use Fortran subprograms in calculating the hydrostatic characteristics of any marine unit. | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (Online / in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation / lab | Practical Experiments |
| A-Level | A9-1 | x | x | | x | | | x | | | | | | | | |
| | A9-2 | x | x | | x | | | x | | | | | | | x | |
| B-Level | B2-1 | x | x | | x | | | | | | | | | | | |
| | B2-2 | x | x | | x | | | | | | | | | | x | |
| C-Level | C1-1 | x | x | | x | | | | | | | | | | x | |
| | C1-2 | x | x | | x | | | | | | | | | | x | |
| | C1-3 | x | x | | x | | | x | | | | | | | x | |
| | C2-1 | x | x | | x | | | | | | | | | | | |
| | C2-2 | x | x | | x | | | | | | | | | | x | |
| | C2-3 | x | x | | x | | | | | | | | | | x | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A9-1, B2-1, B2-2, C2-1 |
| 2 | Practical Examination | C1-2, C1-3, C2-2, C2-3 |
| 3 | Oral Examination | A9-2, B2-2, C1-1 |
| 4 | Formative (quizzes – presentation) | A9-2, B2-1, B2-2, C1-1, C1-2, C1-3, C2-2, C2-3 |
| 5 | Final Term Examination (written) | A9-1, A9-2, B2-1, B2-2, C1-1, C1-2, C1-3, C2-1, C2-2, C2-3 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Practical/ Oral Examination | 15 |
| 3 | Formative (quizzes – presentation) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Practical/ Oral Examination | 20 |
| 3 | Formative (quizzes – presentation) | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Mark Jones Lorenzo, “The History of the FORTRAN Programming Language”, Independently published, 2019. |
| 2 | Ian Chivers & Jane Sleightholme “Introduction to Programming with Fortran”, Springer; 4th edition, 2018. |
| 3 | Stephen J. Chapman, “FORTRAN for Scientists & Engineers”, McGraw-Hill Education; 4th edition, 2017. |

| | |
|---|---|
| 4 | Sam Key, “Fortran Programming success in a day”, Lulu.com, 2nd edition, 2015. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Lectures:**<br>• Computer and programming languages overview - Fortran program organization.<br>**Labs:**<br>• Dealing with Fortran - coding form and software capabilities. | 1 | A9-1, B2-1, C2-1 |
| 2 | **Lectures:**<br>• Arithmetic statements & operations<br>**Labs:**<br>• Dealing with different types of Fortran arithmetic statements & operations | 1 | A9-1, B2-2 |
| 3 | **Lectures:**<br>• Fortran statements<br>**Labs:**<br>• Dealing with different types of Fortran statements & write a simple Fortran programs. | 1 | A9-1, B2-2 |
| 4 | **Lectures:**<br>• Flow charts - Some applications<br>**Labs:**<br>• Use Fortran instruction to solve some marine problems. | 1 | A9-1, B2-1, B2-2 |
| 5 | **Lectures:**<br>• Arrays and subscripted variables.<br>**Labs:**<br>• Use Fortran instruction to handle one dimension or multi dimension variables. | 1 | A9-1, B2-1, C2-1 |
| 6 | **Lectures:**<br>• Hydrostatical data sheet. | 1 | A9-2, B2-1, C1-1, C2-1, C2-2 |

| | | | |
|---|---|---|---|
| | **Labs:**<br>- Make a Fortran program to calculate the ship hydrostatic characteristics. | | |
| 7 | **Lectures:**<br>- Design of marine propellers.<br>**Labs:**<br>- Make a Fortran program to select the optimum characteristics of a B-type marine propeller. | 1 | A9-2, B2-1, C1-1, C1-2, C2-1, C2-3 |
| 8 | **Lectures:**<br>- Function and subroutines subprograms.<br>**Labs:**<br>- Use Fortran subprograms in calculating the hydrostatic characteristics of any marine unit. | 1 | A9-1, A9-2, C1-1, C2-1 |

**Course Coordinator: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 320 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 7 | Apply thermodynamics fundamentals and combustion processes to acquire the essential knowledge to understand the marine internal combustion engines, the engine operating cycle, its classification, the gas exchange processes, the supercharging and turbo-charging, the components of diesel engine, the engine performance, the fuels and fuel injection and the starting and reversing of the diesel engines. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A5-1 | Identify the most important parts of marine diesel engines |
| B1-1 | Compare different combustion cycles of internal combustion engines |
| B1-2 | Analyze the performance of marine diesel engine in terms of in-cylinder pressure and volume. |
| B2-1 | Carry out heat balance analysis of marine diesel engines in terms of torque, power, and different engine efficiencies. |
| B2-2 | Distinguish different fixed and moving parts of marine diesel engines |
| B3-1 | Select the most conventional method of air charging into marine diesel engines |
| B3-2 | Select the suitable fuel type and fuel injection system for marine diesel engines |
| C1-1 | Design marine diesel engine supporting piping systems |
| C1-2 | Employ the classification society regulations to arrange the marine diesel engine systems. |
| C4-1 | Recognize the most common failure reasons of marine diesel engines |
| C4-2 | Troubleshoot marine diesel engine failures and engine mechanical knocks |

**Course:** Marine diesel engines

| Course LOs | Program LOs |
|---|---|
| A5- Practice research techniques and methods of investigation as an inherent part of learning. | A5-1 Identify the most important parts of marine diesel engines |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Compare different combustion cycles of internal combustion engines |
| | B1-2 Analyze the performance of marine diesel engine in terms of in-cylinder pressure and volume. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Carry out heat balance analysis of marine diesel engines in terms of torque, power, and different engine efficiencies. |
| | B2-2 Distinguish different fixed and moving parts of marine diesel engines |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Select the most conventional method of air charging into marine diesel engines |
| | B3-2 Select the suitable fuel type and fuel injection system for marine diesel engines |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design marine diesel engine supporting piping systems |
| | C1-2 Employ the classification society regulations to arrange the marine diesel engine systems. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Recognize the most common failure reasons of marine diesel engines |
| | C4-2 Troubleshoot marine diesel engine failures and engine mechanical knocks |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to internal combustion engines | 1 |
| 2 | Engine Operating Cycles (Otto and Diesel engines) | 2 |

| | | |
|---|---|---|
| 3 | Four stroke and two stroke diesel engines | 3-4 |
| 4 | Diesel Engine components (Fixed and Moving parts) | 5-7 |
| 5 | Engine Performance, efficiency and heat balance calculations | 9 |
| 6 | Fuel injection and air charging systems | 10-11 |
| 7 | Starting and reversing systems | 12 |
| 8 | Supporting piping systems | 13-15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A- Level** | **A5-1** | X | X | | | | | | X | | | | | | | |
| **B- Level** | **B1-1** | X | X | | | | | | | | | | | | | |
| | **B1-2** | X | X | | | | | | | | | | | | | |
| | **B2-1** | X | X | | | | X | | | | | | | | | |
| | **B2-2** | X | X | | | | | | | | | | | | | |
| | **B3-1** | X | X | | | | | | | | | | | | | |
| | **B3-2** | X | X | | | | | | | | | | | | | |
| **C - Level** | **C1-1** | X | X | | | | | | | | | | | | | |
| | **C1-2** | X | X | | | | | | | | | | | | | |
| | **C4-1** | X | X | | | X | | X | X | | | | | | | |
| | **C4-2** | X | X | | | X | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A5-1, B1-1, B2-1, B2-2, B2-3, B3-1, B3-2, C1-1 |
| 2 | Formative (sheets - quizzes) | B2-2, C1-1, C4-2 |
| 3 | Oral assessment | A5-1, B2-2, C1-1, C4-2 |
| 4 | Practical assessment | C1-1 |
| 5 | Final Term Examination (written) | A5-1, B1-1, B2-1, B2-2, B3-1, B3-2, C1-1, C1-2, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (sheets - quizzes) | Every week |
| 3 | Oral assessment | 15 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Oral assessment | 10 |
| 3 | Formative (sheets - quizzes) | 21 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Woodyard, D. Pounder's marine diesel engines and gas turbines. Butterworth-Heinemann, 2009. |
| **2** | Mollenhauer, Klaus, and Helmut Tschöke, eds. Handbook of diesel engines. Vol. 1. Berlin: Springer, 2010. |
| **3** | Christon Knak, "Diesel Motor Ship's Engines and Machinery", The Institute of Marine Engineers, London, 1997. |
| **4** | Professor Adel Tawfik Lecture Notes. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facility |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to internal combustion engines | 7 | B1-1 |
| 2 | Engine Operating Cycles (Otto and Diesel engines) | 7 | B1-1, B1-2 |
| 3 | Four stroke and two stroke diesel engines | 7 | A5-1, B1-1 |
| 4 | Diesel Engine components (Fixed and Moving parts) | 7 | A5-1, B2-2, B3-1 |
| 5 | Engine Performance, efficiency and heat balance calculations | 7 | B1-2, C1-2, B3-1 |
| 6 | Fuel injection and air charging systems | 7 | B3-1, B3-2 |
| 7 | Starting and reversing systems | 7 | A5-1, C4-1 |
| 8 | Supporting piping systems | 7 | A5-1, C1-1, C4-1, C4-2 |

**Course Coordinator: Dr Ameen Bassam**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 231 | | |
| **Year/ Level** | Third Year - 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply a wide spectrum of engineering knowledge of the fundamentals of engineering science, computer applications, mathematics, and hydrodynamics; and build the ability to apply this knowledge in naval architecture and marine propulsion practice. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Understand the geometry and theories of propellers and Recognizing the principles of powering and efficiencies |
| A3-2 | Identify the components of marine propulsion systems and Understanding the interaction between hull and propeller |
| A3-3 | Specify the properties of an optimum & safe propeller |
| A3-4 | Study the conventional & non-conventional propeller types and Learning how to design and draw a propeller |
| B1-1 | Develop the ability of calculating propulsive factors |
| B1-2 | Develop the ability of determining the powering requirements and efficiencies of a ship's propeller |
| B1-3 | Develop the ability of deciding the suitable propulsion configuration and Developing the ability of Using propeller design charts. |
| B4-1 | Develop the ability of designing propellers in view of specific inputs |
| B4-2 | Develop the ability of investigating propulsion system issues through model testing results |
| C1-1 | Handle propeller design tasks , Choosing the optimum propeller for a specific design and Using the propeller design charts in designing and off designing conditions . |
| C1-2 | Make a search report for specific types of propellers |
| C4-1 | Make design drawing of propeller |
| C4-2 | Study the propulsion device configuration and layout |

| | |
|---|---|
| C6-1 | Study types of engines and studying interaction between hull and propeller and |
| C6-2 | Make search report for specific types of propellers |

**Course: Powering and Propulsion of Sips**

| **Program LOs** | **Course LOs** |
|---|---|
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.<br>. | A3-1 Understand the geometry and theories of propellers and Recognizing the principles of powering and efficiencies |
| | A3-2 Identify the components of marine propulsion systems and Understanding the interaction between hull and propeller |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.s . | B1-1 Develop the ability of calculating propulsive factors |
| | B1-2 Develop the ability of determining the powering requirements and efficiencies of a ship's propeller. |
| | B1-3 Develop the ability of deciding the suitable propulsion configuration and Developing the ability of Using propeller design charts. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Develop the ability of designing propellers in view of specific inputs and |
| | B4-2 Develop the ability of investigating propulsion system issues through model testing results |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Handle propeller design tasks , Choosing the optimum propeller for a specific design and Using the propeller design charts in designing and off designing conditions .. |
| | C1-2 Use the propeller design charts in design and off designing conditions |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Make design drawing of propeller |

| | |
|---|---|
| | C4-2 Study types of propulsion device configuration and layout |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Study interaction between hull and propeller and |
| | C6-2 Make search report for specific types of propellers |

## 4. Course Contents:

### 1- Course Topics.

| Topic No. | Topic | Weeks |
|---|---|---|
| 1st | Powering of ships (propelling machineries , marine ratings, power definitions , propulsion efficiencies ) | 1-2 |
| 2nd | Interaction between hull and propeller | 3 |
| 3rd | Types of propellers (Includes search report for specific types of propellers) | 4 |
| 4th | The screw propeller (Arrangements , Geometry , slip), Design features of marine screw propellers | 5 |
| 5th | Drawing of screw propeller | 6,7 |
| ------------- | Mid-Term Exam | 8 |
| 6th | Theoretical bases of propeller action | 9 |
| 7th | Model tests and laws of comparison for propellers | 10 |
| 8th | Design of propellers using standard series | 11 |
| 9th | Optimum propeller design points and off design points | 12 |
| 10th | Cavitation of propellers | 13 |
| 11th | Various design considerations of propellers and computer application on propeller design | 14 |

## . Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Presentation and Movies | Discussion | Tutorial | Problem solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Discovering | Modelling | Playing |
| **A-Level** | **A3-1** | x | | | x | x | | | | | | | | |
| | **A3-2** | x | | | x | x | | | | | | | | |
| | **A3-3** | x | | x | x | x | | | | | | | | |
| | **A3-4** | x | | | x | x | | | | | x | | | |
| **B-Level** | **B1-1** | x | | | x | x | | | | | | | | |
| | **B1-2** | x | | x | x | x | | | | | x | | | |
| | **B1-3** | x | | | x | x | | | | | | | | |
| | **B4-1** | x | | | x | x | x | x | | | x | | | |
| | **B4-2** | x | | | x | x | x | x | | | | | | |
| **C-Level** | **C1-1** | x | | | x | x | x | | | | | | | |
| | **C1-2** | x | x | | x | x | x | x | | | x | | | |
| | **C4-1** | x | | x | x | x | | x | | | | | | |
| | **C4-2** | x | | | x | x | x | | | | | | | |
| | **C6-1** | x | | | x | x | x | x | | | | | | |
| | **C6-2** | x | | | x | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1, A3-2, A3-3, B1-1, C1-2, C1-3 , C4-1, C4-2 |
| 2 | Formative (quizzes – presentation - discussions) | A3-1, A3-2, A3-3, A3-4, B1-1,B1-2, B1-3, B4-1, B4-2, C1-1, C1-2, C4-1, C4-2, C6-1, C6-2 |
| 3 | Laboratory & Visual Lab. | C1-1, C1-2, C6-2 |
| 4 | Final Term Examination (written) | A3-1, A3-2, A3-3, A3-4, B1-1,B1-2, B1-3, B4-1, B4-2, C1-1, C1-2, C4-1, C4-2, C6-1, C6-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - discussions) | Every week |
| 3 | Laboratory & Visual Lab. | 11th Week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 11 |
| 2 | Formative (quizzes – presentation - discussions) | 31 |
| 3 | Laboratory / Oral | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Prof.Dr. Galal Younis " Lecture Notes on Powering and Propulsion ", Department NAME, Faculty of Engineering, Port said, 2020<br>www.facebook.com/groups/1819292491715304/ |
| **2** | J.P.Comstock: "Principals of Naval Architecture",SNAME Publications,1967 & 1986 |
| **3** | K.J.Rawson, E.C.Tupper: "Basic Ship Theory" , Longman,London & New York 1984. |
| **4** | G.Younis:"The Choice of Optimum Propeller Design Points",Ph.D. Dissertation , Faculty Of Mechanical Engineering and Naval Architecture , Zagreb , Croatia , 1982 . |
| **5** | IR.A.J.W.LAP : Fundamentals of Ship Resistance and Propulsion , Pub.No. 129A of N.S.M.B , Reprinted from ISP ,Shipbuilding and Marine Engineering Monthly , Rotterdam |
| **6** | IR.W.P.A.VAN LAMMEREN , PROF. IRL.TROOST, IR.J.G.KONING:” Resistance , Propulsion and Steering of Ships, The Technical Publishing Co. H.Stam-Haarlem- Holland 1948 . |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Powering of ships (propelling machineries , marine ratings, power definitions , propulsion efficiencies ) | 1 | A3-1, A3-2, A3-3, B1-1,B1-2, B1-3, B1-4 |
| 2 | Interaction between hull and propeller | 1 | B1-1,B1-2, B1-3, B1-4 |
| 3 | Types of propellers (Includes search report for specific types of propellers) | 1 | A3-1, A3-2, A3-3, B1-1,B1-2, B1-3, B1-4, C6-1, C6-2 |
| 4 | The screw propeller (Arrangements , Geometry , slip), Design features of marine screw propellers | 1 | A3-1, A3-2, A3-3, B1-1,B1-2, B1-3, B1-4,B4-1, B4-2 |

| | | | |
|---|---|---|---|
| 5 | Drawing of screw propeller | 1 | C1-1, C1-2 |
| 6 | Theoretical bases of propeller action | 1 | A3-1, A3-2, A3-3, B1-1 |
| 7 | Model tests and laws of comparison for propellers | 1 | B1-1, B1-2, B1-3,C4-1,C4-2 |
| 8 | Design of propellers using standard series | 1 | C1-1, C1-2, C4-1,C4-2 |
| 9 | Optimum propeller design points and off design points | 1 | B4-1, B4-2, C1-1, C1-2 |
| 10 | Cavitation of propellers | 1 | A3-4, B1-1, B1-2, B1-3 |
| 11 | Various design considerations of propellers and computer application on propeller design | 1 | C6-1, C6-2 |

**Course Coordinator: Prof. Dr. Galal Mohamed Younis**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Ass. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 322 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | | 2 |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use techniques, skills, and modern engineering tools necessary for naval architecture and marine engineering practice. And familiarize students with main principles of measurements and instrumentation. The students should be familiarized with measurement procedures and instruments for measuring different parameters such as pressure, fluid flow, temperature, velocity, force, torque, power, plate thickness, and surface roughness. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize theories used for parameters measurements |
| A1-2 | identify and understanding of basic theories belong to different parameters for performance verification |
| A1-3 | define the normal and limitations for various parameters for satisfying function and performance. |
| B1-1 | Demonstrate the application of group of instruments for assessing overall function |
| B2-1 | Assess and evaluate the characteristics and performance of equipment's with reference to sensed parameters |
| C1-1 | Analyze the source of unusual readings of instruments |
| C1-2 | collect data about special instruments and problems diagnostic |
| C1-3 | Deliver selected parts of the course in active oral discussion |

| Course: Marine measurements and tests | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Recognize theories used for parameters measurements. |
| | A1-2 identify and understanding of basic theories belong to different parameters for performance verification |
| | A1-3 define the normal and limitations for various parameters for satisfying function and performance. |
| B1 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B1-1 Demonstrate the application of group of instruments for assessing overall function |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Assess and evaluate the characteristics and performance of equipment's with reference to sensed parameters |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Analyze the source of unusual readings of instruments |
| | C1-2 collect data about special instruments and problems diagnostic |
| | C1-3 Deliver selected parts of the course in active oral discussion |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Basic principles of measurements and instrumentation | 1-2 |
| 2 | Measurement of | 3-5 |
| 3 | Temperature, Pressure, Power | 6-8 |
| 4 | Thickness measurements onboard ships | 01-10 |
| 5 | Hull Roughness Measurements and Power Penalty | 12-13 |
| 6 | Vibration measurement, analysis, and condition monitoring | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1-1** | x | x | | x | | | x | | | | | | | | |
| | **A1-2** | x | x | | x | x | x | x | | | | | | | | |
| | **A1-3** | x | x | | x | x | x | x | | | | | | | | |
| **B-Level** | **B1-1** | x | x | | x | | x | x | | | | | | | | |
| | **B2-1** | x | x | | x | | x | | | | | | | | | |
| **C-Level** | **C1-1** | x | x | | x | | x | x | | | | | | | | |
| | **C1-2** | x | x | | x | | x | x | | | | | | | | |
| | **C1-3** | x | x | | x | x | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, C1-2, C1-2, C1-3 |
| 2 | Formative (quizzes – presentation - reports) | A1-1, A1-2, A1-3, B1-1 |
| 3 | Practical examination | B2-1,C1-2, C1-3 |
| 4 | Final Term Examination (written) | A1-1, A1-2, A1-3, B2-0, C1-1, C1-2, |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation - reports) | 11 |
| 3 | Laboratory practical examination | 20 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Dominique P., “Fundamentals of Instrumentation and Measurement,” London W1T, ISTE Ltd, 2007 |
| **2** | A.K.sawhney and P.Sawheny, "A course in Mechanical Measurements and Instrumentation", Dhanpat Rai, Delhi 1998 |
| **3** | Krautkrämer, Josef, Krautkrämer, Herbert “Ultrasonic Testing of Materials” Springer , 1990 |
| **4** | A. S. Birks , Ultrasonic Testing (Nondestructive Testing Handbook), Amer Society for Nondestructive Subsequent edition (January 1, 1991) |
| **5** | Ölçer, A.I. , Trends and Challenges in Maritime Energy Management, SPRINGER, 2018 |
| **6** | J. D. Smith, “vibration Measurement and Analysis”, Butterworth-Heinemann, 2015 |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Basic principles of measurements and instrumentation | 2 | A1-1, B1-1, C1-2 |
| 2 | Measurement of | 2 | A1-2, C1-2, B1-1, B2-1 |
| 3 | Temperature, Pressure, Power | 2 | C1-2, C2-0 |
| 4 | Thickness measurements onboard ships | 2 | B1-1, B1-2, C1-2, C1-2 |
| 5 | Hull Roughness Measurements and Power Penalty | 2 | A1-1, B2-1 |
| 6 | Vibration measurement, analysis, and condition monitoring | 2 | B1-1, B1-2, C1-2, C1-2 |

**Course Coordinator: Dr. Waleed Yehia**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Mechanical Power Engineering | | |
| **Course Code** | MPE 334 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use the essential skills and knowledge to study basic principles of heat transfer; conduction, convection and radiation, as well as refrigeration methods and air conditioning systems. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B1-1 | Analyze the temperature distribution, temperature gradient and the rate of heat transfer for each case, as well as the COP and cooling/ heating load calculations. |
| B2-1 | Carry out designs of mechanical systems and each mode of heat transfer, refrigeration and air condition software contemporary to the mechanical engineering field. |
| B3-1 | Select the mathematical issues associated with the heat transfer problems. |
| B3-2 | Show how different approaches (LMTD or E-NTU) may be used to accurately predict temperatures and heat transfer rate within the heat exchangers. |
| B4-1 | Use suitable national and international standards and codes to design the heat transfer for each case, as well as the COP and cooling/ heating load calculations. |

| **Course:** Heat Transfer and Refrigeration & Air Conditioning | |
|---|---|
| **Program LOs** | **Course LOs** |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Analyze the temperature distribution, temperature gradient and the rate of heat transfer for each case, as well as the COP and cooling/ heating load calculations. |

| | |
|---|---|
| B2-Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Carry out designs of mechanical systems and each mode of heat transfer, refrigeration and air condition software contemporary to the mechanical engineering field. |
| B3-Select conventional mechanical equipment according to the required performance. | B3-1 Select the mathematical issues associated with the heat transfer problems. |
| | B3-2 Show how different approaches (LMTD or E-NTU) may be used to accurately predict temperatures and heat transfer rate within the heat exchangers. |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1Use suitable national and international standards and codes to design the heat transfer for each case, as well as the COP and cooling/ heating load calculations. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to modes of heat Transfer | 1 |
| 2 | General Equation of heat conduction in one dimension through a plane wall and cylindrical systems. | 2-3 |
| 3 | Heat exchanger; Types & Analysis.  Fouling in heat exchangers | 4-5 |
| 4 | Thermal radiation | 6-7 |
| 5 | Introduction to Refrigeration & Air Conditioning | 9-10 |
| 6 | Psychrometry & Psychometric process | 11-12 |
| 7 | Summer & winter A/C system | 13-14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture (Online / in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **B-Level** | **B1-1** | x | x | | x | x | x | x | x | | | | | | | x |
| | **B2-1** | x | x | | x | x | x | x | x | | | | | | | x |
| | **B3-1** | x | x | | x | x | x | x | x | | | | | | | x |
| | **B3-2** | x | x | | x | x | x | x | x | | | | | | | x |
| | **B4-1** | x | x | | x | x | x | x | x | | | | | | | x |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination (written) | B1.1, B2.1, B3.1, B4.1 |
| **2** | Practical Examination | B1.1, B2.1, B3.1 |
| **3** | Oral Examination | B3.2, B4.1 |
| **4** | Formative (quizzes - presentation - assignments) | B1.1, B2.1, B3.1, B3.2, B4.1 |
| **5** | Final Term Examination (written) | B1.1, B2.1, B3.1, B3.2, B4.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination (written) | 8 |
| **2** | Practical/ Oral Examination | 15 |
| **3** | Formative (quizzes - presentation - assignments) | Every week |
| **4** | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights (%) |
|---|---|---|
| **1** | Mid Term Examination (written) | 10 |
| **2** | Practical/ Oral Examination | 20 |
| **3** | Formative (quizzes - presentation - assignments) | 10 |
| **4** | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | J. P. Holman, “Heat transfer”, McGraw-Hill series in mechanical engineering, 10th Edition, 2010. |
| **2** | C. P. ARORA, “3- Refrigeration and Air Conditioning”, 2000. |
| **3** | Manohar Prasad, “Refrigeration and Air Conditioning”, 2003. |
| **4** | C. P. kothandaraman: “Fundamentals of heat and mass transfer”, 3rd Edition, New Age International (P) Ltd., Publishers, 2006. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to modes of heat Transfer | 2 | B1-1, B2-1, B3-1 |
| 2 | General Equation of heat conduction in one dimension through a plane wall and cylindrical systems. | 2 | B1-1, B3-2,B4-1 |
| 3 | Heat exchanger; Types & Analysis. Fouling in heat exchangers | 2 | B1-1, B2-1, B3-1 |
| 4 | Thermal radiation | 2 | B1-1, B2-1, B3-1,B4-1 |
| 5 | Introduction to Refrigeration & Air Conditioning | 2 | B1-1, B2-1, B3-2,B4-1 |
| 6 | Psychrometry & Psychometric process | 2 | B1-1, B2-1, B3-1 |
| 7 | Summer & winter A/C system | 2 | B1-1, B2-1, B3-2,B4-1 |

**Course Coordinator: Assoc. Prof. Dr. Ibrahim AbdelrahmanIbrahim**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture and Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture and Marine Engineering | | |
| **Course Code** | **HUF305** | | |
| **Year/ Level** | **Third year- Second Semester** | | |
| **Specialization** | **Minor** | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | - | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| **5** | Work in and lead a heterogeneous team by applying rules of technical presentation to be a successful professional presenter and make an effective presentations. It also teaches the student to position himself and his ideas in a consistently positive and professional manner to make a professional impression |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A7-1 | Prepare an effective technical presentation. |
| A8-1 | Communicate effectively with colleges to Prepare an effective presentation. |
| A9-1 | Use creative thinking to introduce a novel ideas and contents in the presentation. |
| A10-1 | Recognize the biggest body language blunders. |
| A10-2 | Utilize the factors for successful presentation. |
| A10-3 | Research for the latest finding in effective presentation skills. |
| A10-4 | Recognize the different modern information technology tools for effective presentation. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | **Lecture:**<br>• **Presentation fundamentals:** Definition and elements of effective presentation. Main causes of presentation failure. Modern presentation tools and software. | 1-2 |
| 2 | **Lecture:**<br>• **Presentation preparation:** Importance of identifying presentation objective. Effective objective characteristics. Presentation audience identification. Preparing an idea map for your presentation. | 3-5 |
| 3 | **Lecture:**<br>• **Building your presentation**<br>• Basic presentation elements.<br>• Importance of developing a strong presentation opening. Various presentation body structure. Utilizing visual aids. Effective conclusion. | 6-7 |
| 4 | **Midterm** | 8 |
| 5 | **Lecture:**<br>**Effective Presentation Delivery**<br>• Presentation delivery methods and styles. Factors affecting delivery of presentation. Controlling presenter's characteristics. Effective Slide format (Fonts-colors- Size- Background). Fundamentals of effective audience communication.<br>• The biggest body language blunders | 9-12 |
| 6 | **Lecture:**<br>• **Group Presentation Practice**<br>• Practice presentation sessions. Each group prepares and presents an effective technical presentation. Peer evaluation and feedback is used for improving performance. | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Lecture (online / in class)** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A7-1** | x | x | | x | x | | | | x | | x | x | | | |
| **A8-1** | x | x | | | x | | | | x | | x | x | | | |
| **A9-1** | x | x | | x | x | | | | | | x | x | | | |
| **A10-1** | x | | x | x | x | | | | x | | x | x | | | |
| **A10-2** | x | | x | x | x | | | | x | | | x | | | |
| **A10-3** | x | | x | x | x | | | | x | | x | | | | |
| **A10-4** | x | | x | | x | | | | x | | x | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | A7-1, A8-1, A9-1, A10-2, A10-3, A10-4 |
| 2 | Formative (quizzes- online quizzes- presentation) | A8-1, A9-1, A10-1, A10-2, A10-3, A10-4. |
| 3 | Final Term Examination (written) | A7-1, A8-1, A9-1, A10-1, A10-2, A10-3, A10-4. |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 8 |
| 2 | Formative (quizzes- online quizzes- presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written/ online) | 10 |
| 2 | Formative (quizzes- online quizzes- presentation) | 10 |
| 4 | Final Term Examination (written) | 80 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Steele, William R. "Presentation Skills 201: How to Take It to the Next Level as a Confident, Engaging Presenter", 2009, Outskirt Press. |
| **2** | Carmine Gallo "Talk Like TED", St. Martin's press 2014 |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Online facilities. |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | **Lecture:**<br>• **Presentation fundamentals:**<br>• Definition and elements of effective presentation. Main causes of presentation failure. Modern presentation tools and software. | 5 | A7-1. |
| 2 | **Lecture:**<br>• **Presentation preparation:**<br>• Importance of identifying presentation objective. Effective objective characteristics. Presentation audience identification. Preparing an idea map for your presentation. | 5 | A7-1, A8-1 |
| 3 | **Lecture:**<br>• **Building your presentation**<br>• Basic presentation elements.<br>• Importance of developing a strong presentation opening. Various presentation body structure. Utilizing visual aids. Effective conclusion. | 5 | A9-1, A10-2, A10-3, A10-4. |
| 4 | **Midterm** | 5 | A7-1, A8-1, A9-1,<br>A10-2, A10-3,<br>A10-4. |
| 5 | **Lecture:**<br>**Effective Presentation Delivery**<br>• Presentation delivery methods and styles. Factors affecting delivery of presentation. Controlling presenter's characteristics. Effective Slide format (Fonts-colors- Size- Background). Fundamentals of effective audience communication.<br>• The biggest body language blunders | 5 | A10-1, A10-2,<br>A10-3, A10-4. |
| 6 | **Lecture:**<br>• **Group Presentation Practice**<br>• Practice presentation sessions. Each group prepares and presents an effective technical presentation. Peer evaluation and feedback is used for improving performance. | 5 | A8-1, A9-1, A10-1, A10-2, A10-3, A10-4. |

**Course: Presentation skills**

| Program LOs | Course LOs |
|---|---|
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Prepare an effective technical presentation. |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Communicate effectively with colleges to Prepare an effective presentation |
| A9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Use creative thinking to introduce a novel ideas and contents in the presentation |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Recognize the biggest body language blunders.<br>A10-2 Utilize the Factors for successful presentation.<br>A10-3 Research for the latest finding in effective presentation skills.<br>A10-4 Recognize the different modern information technology tools for effective presentation. |

**Course Coordinator: Dr. Heba M. Abdel-Atty.**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 323 | | |
| **Year/ Level** | Third year- 1st Semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 7 | Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools and provide the students with the basic knowledge and understanding of ship vibration and control principles with application of vibration theories in design and operation of marine units |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Define the basic concept of vibration. |
| A1-2 | Describe different types of vibration. |
| A1-3 | Distinguish the importance of automatic control for ships, and distinguish shafting vibrations. |
| B1-1 | Analyze different types of vibration onboard ships. |
| B2-1 | Investigate different methods of attenuating and eliminating ship vibrations. |
| B3-1 | Demonstrate proper sizing of propulsion system for minimum vibrations. |
| C1-1 | Apply the basic methods of classical control system design such as root locus for ships applications. |
| C1-2 | Use Laplace transform in time-domain analysis to study the ship dynamic response. |
| C6-1 | Use the internet for more marine control applications. |
| | |

| **Course: Ship Vibration and Control** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Define the basic concept of vibration. |
| | A1-2 Describe different types of vibration. |
| | A1-3 Distinguish the importance of automatic control for ships and distinguish shafting vibrations. |
| B1 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B1-1 Analyze different types of vibration onboard ships. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1Investigate different methods of attenuating and eliminating ship vibrations. |
| B3-Select conventional mechanical equipment according to the required performance. | B3-1 Demonstrate proper sizing of propulsion system for minimum vibrations |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Apply the basic methods of classical control system design such as root locus for ships applications. |
| | C1-2 Use Laplace transform in time-domain analysis to study the ship dynamic response. |
| C6-Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Use the internet for more marine control applications. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction of Vibration | 1-2 |
| 2 | Ship hull girder vibration types & its calculation methods | 3-5 |
| 3 | Shafting vibrations | 6-9 |
| 4 | Ship control systems design & modelling | 01-10 |
| 5 | Time and frequency domains analyses | 12-13 |
| 6 | Automatic control marine applications | 14-15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A1-1** | x | x | | x | | | x | | | | | | | | |
| | **A1-2** | x | x | | x | x | x | x | | | | x | | | | |
| | **A1-3** | x | x | | x | x | x | x | | | | x | | | | |
| **B-Level** | **B1-1** | x | x | | x | | x | x | | | | | | | | |
| | **B2-1** | x | x | | x | | x | | | | | | | | | |
| | **B3-1** | x | x | | x | | x | | | | | | | | | |
| **C-Level** | **C1-1** | x | x | | x | | x | x | | | | | | | | |
| | **C1-2** | x | x | | x | | x | x | | | | | | | | |
| | **C6-1** | x | x | | x | x | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, B3-1, C1-2, C1-2 |
| 2 | Formative (quizzes – presentation – problem worked examples) | A1-1, A1-2, A1-3, B1-1, B2-1,C1-2, C1-3 |
| 3 | Final Term Examination (written) | A1-1, A1-2, A1-3, B3-1, B2-0, C1-1, C1-2, C6-0 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation – problem worked examples) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation – problem worked examples) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Meirovitch, Leonard. Fundamentals of vibrations. Waveland Press, 2010. |
| **2** | Thomson, William. Theory of vibration with applications. CRC Press, 2008. |
| **3** | Ogata, Katsuhiko, and Yanjuan Yang. Modern control engineering. Vol. 4. India: Prentice hall, 2002. |
| **4** | Feese, T., and Hill, C., "Guidelines for Preventing Torsional Vibration Problems in Reciprocating Machinery," Gas Machinery Conference, Nashville, Tennessee, October 7, 2002 |
| **5** | Magazinvoić G. "Shafting Vibration Primer"technical report, CADEA, Split, Croatia, 2002. |
| **6** | G.Rajko "Propeller Shaft Excitation in the Ship Design Evaluation Procedure", Brodogradnja, Vol.53, 2005 |
| **7** | T.S. Koko, "Vibration Control in Ship Structures", 2002 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction of Vibration | 7 | A1-1, B1-1, B3-1, C1-2 |
| 2 | Ship hull girder vibration types & its calculation methods | 7 | A1-2, C1-2, B1-1, B2-1 |
| 3 | Shafting vibrations | 7 | B3-1, C1-2, C6-0 |
| 4 | Ship control systems design & modelling | 7 | B1-1, B1-2, C1-2, C1-2, C6-0 |
| 5 | Time and frequency domains analyses | 7 | A1-1, B2-1, B3-1 |
| 6 | Automatic control marine applications | 7 | B1-1, B1-2, C1-2, C1-2, C6-0 |

**Course Coordinator: Dr. Waleed Yehia**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 324 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 6 | Act professionally in design and supervision of naval architecture and marine engineering. The course introduces basic energy saving strategies for marine power systems. The course presents new technologies and innovative studies in ship board energy conservations. Familiarity of new regulatory rules and conventions in relation to energy conservation are targeted in this course |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | List & outline the required thermodynamic rules. |
| A1-2 | Identify the regulations in relation to Energy Efficiency |
| A1-3 | Recognize the basic principles of the heat recovery. |
| B1-1 | Investigate alternatives of energy efficiency |
| B2-1 | Show methodology of different power saving technique |
| B3-1 | Evaluate the environmental impact by emission control |
| C1-1 | Determine the specific applicable technique for energy saving |
| C1-2 | Combine different alternatives |
| C1-3 | Assess the maximum gain in reducing fuel cost and emissions |
| C2-1 | Recognize the importance and the different applications of SEEMP |

| Course: Energy Conservation in Marine Systems | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 List & outline the required thermodynamic rules. |
| | A1-2 Identify the regulations in relation to Energy Efficiency |
| | A1-3 Recognize the basic principles of the heat recovery. |
| B1 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B1-1 Investigate alternatives of energy efficiency |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1Show methodology of different power saving technique |
| B3-Select conventional mechanical equipment according to the required performance. | B3-1 Evaluate the environmental impact by emission control |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Determine the specific applicable technique for energy saving |
| | C1-2 Combine different alternatives |
| | C1-3 Assess the maximum gain in reducing fuel cost and emissions |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Recognize the importance and the different applications of SEEMP |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | MARPOL Convention annex VI, IMO 2020 Sulphur CAP | 1-2 |
| 2 | Energy Efficiency Vs Energy Management, green ship concept, and Emission calculations | 3-5 |
| 3 | Waste heat recovery options, Trim Optimization, speed Management strategies, SEEMP Part I, II | 6-9 |
| 4 | Air Lubrication, Micro bubbles , Ballast Water Management | 01-10 |
| 5 | Advance ICE, Turbo charging system | 12-13 |
| 6 | Drag reduction technologies | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | X | X | | X | | | X | | | | | | | | |
| | A1-2 | X | X | | X | X | X | X | | | | | | | | |
| | A1-3 | X | X | | X | X | X | X | | | | | | | | |
| B-Level | B1-1 | X | X | | X | | X | X | | | | | | | | |
| | B2-1 | X | X | | X | | X | | | | | | | | | |
| | B3-1 | X | X | | X | | X | | | | | | | | | |
| C-Level | C1-1 | X | X | | X | | X | X | | | | | | | | |
| | C1-2 | X | X | | X | | X | X | | | | | | | | |
| | C1-3 | X | X | | X | X | | X | | | | | | | | |
| | C2-1 | X | X | | X | X | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, B3-1, C1-2, C1-2, C1-3 |
| 2 | Formative (quizzes – plans & proposals - presentation) | A1-1, A1-2, A1-3, B1-1, B2-1,C1-2, C1-3 |
| 3 | Final Term Examination (written) | A1-1, A1-2, A1-3, B3-1, B2-0, C1-1, C1-2, C2-0 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – plans & proposals - presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – plans & proposals - presentation) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | MARPOL ANNEX VI 2019 |
| **2** | Shipboard Energy Conservation Guide, Naval Sea Systems Command Revision, 2010 |

| | |
|---|---|
| **3** | Ship Energy Efficiency Regulations and Related Guidelines IMO COURSE MODUES , 2019 |
| **4** | Energy efficient operation of ships (IMO model course) – January 1, 2014 |
| **5** | Ölçer, A.I. , Trends and Challenges in Maritime Energy Management, SPRINGER, 2018 |
| **6** | Rob Winkel, "Study on energy efficiency technologies for ships", European Commission, 2015 |
| **7** | Mia Elg, , "Ship energy efficiency technologies - now and the future", Teknologian tutkimuskeskus VTT, 2017 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | MARPOL Convention annex VI, IMO 2020 Sulphur CAP | 6 | A1-1, B1-1, B3-1, C1-2 |
| 2 | Energy Efficiency Vs Energy Management, green ship concept, and Emission calculations | 6 | A1-2, C1-2, B1-1, B2-1 |
| 3 | Waste heat recovery options, Trim Optimization, speed Management strategies, SEEMP Part I, II | 6 | B3-1, C1-2, C2-0 |
| 4 | Air Lubrication, Micro bubbles , Ballast Water Management | 6 | B1-1, B1-2, C1-2, C1-2, C2-0 |
| 5 | Advance ICE, Turbo charging system | 6 | A1-1, B2-1, B3-1 |
| 6 | Drag reduction technologies | 6 | B1-1, B1-2, C1-2, C1-2, C2-0 |

**Course Coordinator: Dr. Waleed Yehia**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 325 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use the techniques and principles of computational geometric and computational fluid dynamic (CFD) in marine application, both theory and calculations to illustrate the key ideas related to discretization and solution of the Momentum and Navier-Stokes equations for incompressible flows. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2-1 | Define the geometry rules & numerical computational geometrical methods in marine application. |
| A2-2 | Investigate the governing equation system for marine CFD. |
| A4-1 | Show the use of CFD programs in marine application to evaluate hydrodynamic performance. |
| A4-2 | Describe the design and performance in marine application with numerical methods. |
| B1-1 | Demonstrate the calculations and drawings of numerical marine applications using numerical computer software. |
| B1-2 | Practice how to simplify a marine's hulls geometry to numerical bodies apply CFD solve problems on marine applications. |
| B2-1 | Practice calculations and learning appropriate ways to solve problems on marine applications. |
| B2-2 | Identify appropriate ways to modeling and numerically solve problems marine applications. |
| C1-1 | Apply knowledge of mathematics and specific theory to solve the problems on marine applications. |
| C1-2 | Conduct computational geometrical analysis and assessment. |
| C2-1 | Assess numerically & Evaluate the hydrodynamic and aerodynamic performance of different marine bodies. |
| C2-2 | Assess the difference between different methods of treatment of marine CFD applications. |

| **Course: Computational Geometric Modeling Related Marine Applications** | |
|---|---|
| **Course LOs** | **Program LOs** |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Define the geometry rules & numerical computational geometrical methods in marine application. |
| | A2-2 Investigate the governing equation system for marine CFD. |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Show the use of CFD programs in marine application to evaluate hydrodynamic performance. |
| | A4-2 Describe the design and performance in marine application with numerical methods. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Demonstrate the calculations and drawings of numerical marine applications using numerical computer software. |
| | B1-2 Practice how to simplify a marine's hulls geometry to numerical bodies apply CFD solve problems on marine applications. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Practice calculations and learning appropriate ways to solve problems on marine applications. |
| | B2-2 Identify appropriate ways to modeling and numerically solve problems marine applications. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Apply knowledge of mathematics and specific theory to solve the problems on marine applications. |
| | C1-2 Conduct computational geometrical analysis and assessment. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Assess numerically & Evaluate the hydrodynamic and aerodynamic performance of different marine bodies. |
| | C2-2 Assess the difference between different methods of treatment of marine CFD applications. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Course Introduction & Objectives; Theory and Practical of Marine CFD | 1-2 |
| 2 | Computational geometrical in Marine applications | 3-4 |
| 3 | Fundamentals of Governing Equations for CFD | 5-7 |
| 4 | Discretization of Governing Equation | 9-10 |
| 5 | Solution of Discretized Equations | 11-13 |
| 6 | Tutorial Applications & Examinations | 14-15 |

## 5. Teaching and Learning Methods:

| LO’s | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A -Level** | A2-1 | X | X | | | | | | | | | | | | | |
| | A2-2 | X | X | | | | | | | | | | | | | |
| | A4-1 | X | X | | | | X | | | | | | | | X | |
| | A4-2 | X | X | | | | | | | | | | | | | |
| **B - Level** | B1-1 | X | X | | | | X | | | | | | | | X | |
| | B1-2 | X | X | | | | X | | | | | | | | X | |
| | B2-1 | X | X | | | | X | | | | | | | | X | |
| | B2-2 | X | X | | | | | | | | | | | | | |
| **C - Level** | C1-1 | X | X | | | | | | | | | | | | | |
| | C1-2 | X | X | | | | X | | | | | | | | X | |
| | C2-1 | X | X | | | | | | | | | | | | | |
| | C2-2 | X | X | | | | | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A2-1, A2-2, A4-1, A4-2, B2-1 |
| 2 | Formative (quizzes – drawings) | B2-1, B2-2, C1-2 |
| 3 | Final Term Examination (written) | A2-1, A2-2, A4-1, A4-2, B1-1, B1-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – drawings) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – drawings) | 20 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Joel H. Ferziger and Milovan Peric, Computational Methods for Fluid Dynamics, 3rd Version, Springer, 2002. |
| **2** | HK Versteeg and W Malasekera, An introduction of computational fluid dynamics the finite volume method, Longman Scientific Technical, 2007. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |
| 5 | Lab facility |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Course Introduction & Objectives; Theory and Practical of Marine CFD | 2 | A2-1, A2-2, A4-1 |
| 2 | Computational geometrical in Marine applications | 2 | A2-2, B1-1, B1-2 |
| 3 | Fundamentals of Governing Equations for CFD | 2 | A2-2, C1-1 |
| 4 | Discretization of Governing Equation | 2 | B2-2, C1-1 |
| 5 | Solution of Discretized Equations | 2 | C1-1, C1-2 |
| 6 | Tutorial Applications & Examinations | 2 | C2-1, C2-2 |

**Course Coordinator: Assoc. Prof. Dr. Islam Amin**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B.Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 326 | | |
| **Year/ Level** | Third year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 2 | Use techniques, skills, and modern engineering tools necessary for ship repair practice. |
| 7 | Apply analytical, design principles and construction processes with proficiency to plan feasible ship conversion projects. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B4-1 | Recognize the repair standards, recommendations and requirements addressed by the national and international bodies. |
| B4-2 | Distinguish the ship conditions leading to necessary upgrade of equipment and/or machinery. |
| C3-1 | Recognize the main aspects of hull deterioration and accidental damages |
| C3-2 | Plan different conversion projects taking into account all ship systems. |
| C4-1 | Identify the proper procedures to repair the propeller and shafting sytem. |
| C5-1 | Identify the different techniques of testing (visual or NDT) to judge the severity of a damage. |
| C5-2 | Utilize the IACS standards and guidelines for hull maintenance and repair. |

| Course: Technology of Ship Repair & Conversion | |
|---|---|
| **Program LOs** | **Course LOs** |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Recognize the repair standards, recommendations and requirements addressed by the national and international bodies. |
| | B4-2 Distinguish the ship conditions leading to necessary upgrade of equipment and/or machinery. |
| C3-Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Recognize the main aspects of hull deterioration and accidental damages |
| | C3-2 Plan different conversion projects taking into account all ship systems. |
| C4-Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Identify the proper procedures to repair the propeller and shafting sytem. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Identify the different techniques of testing (visual or NDT) to judge the severity of a damage. |
| | C5-2 Utilize the IACS standards and guidelines for hull maintenance and repair. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Ship Corrosion and hull deterioration | 1+2 |
| 2 | Damages occurring due to ship casualties | 3 |
| 3 | Hull repair | 4+5+6 |
| 4 | Propeller and Shaft repair | 7 |
| 5 | Types and Feasibility of Ship Conversion | 9+10 |
| 6 | Conversion of Powering and propulsion systems | 11 |
| 7 | Structural Modifications for Conversion projects. | 12+13 |
| 8 | Ship Breaking | 14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture(online & in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| B-Level | B4-1 | x | | | | | | x | | | | x | | | | |
| | B4-2 | | x | | | | | x | | | x | | | | | |
| C-Level | C3-1 | x | | | | | | | | | x | x | | | | |
| | C3-2 | | x | | | | x | x | | | | | | | | |
| | C4-1 | x | | | | | | | | | | x | | | | |
| | C5-1 | x | | | | | | | | | x | | | | | |
| | C5-2 | x | | | | | x | | | | | | | x | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | C3-1, C5-2, |
| 2 | Formative (drawings – reports ) | B4-1, B4-2, C5-1, C5-2 |
| 3 | Final Term Examination (written) | C3-2, C4-1, C5-1, C5-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (drawings – reports ) | 2, 3, 4 |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (drawings – reports ) | 20 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | R.L. Storch, Ship Production, SNAME, 2007 |
| **2** | No 47 Shipbuilding and Repair Quality Standard, IACS, 2013 |
| **3** | Bulk Carriers - Guidelines for Surveys, Assessment and Repair of Hull Structure", IACS Rec 76, 2017 |
| **4** | Don Butler, "Guide to Ship Repair Estimates (in Man-Hours)", Butterworth-Heinemann, 2000 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Ship Corrosion and hull deterioration | 2 | C3-1, C5-1 |
| 2 | Damages due to ship casualties | 2 | C3-1 |
| 3 | Hull repair | 2 | B4-1, C5-2 |
| 4 | Propeller and Shaft repair | 2 | B4-2, C4-1 |
| 5 | Types and Feasibility of Ship Conversion | 7 | C3-2 |
| 6 | Conversion of Powering and propulsion systems | 7 | B4-2 |
| 7 | Structural Modifications for Conversion projects. | 7 | C3-2 |
| 8 | Ship Breaking | 7 | C3-2 |

**Course Coordinator: Prof. Heba S. El-Kilani**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 327 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 1 | Apply a wide spectrum of engineering knowledge of the fundamentals of engineering science, and build the ability to apply this knowledge in marine engineering practice. This course discusses the selection and evaluation of commercial and naval ship power systems. It covers the analysis of prime mover working principle. The course also emphasize analysis of alternatives in propulsion plant design for given physical, performance, and economic constraints. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize thermodynamic power theories |
| A1-2 | Identify and understanding of basic terms belong to power train systems |
| A1-3 | Distinguish the new technologies in power systems for maritime applications |
| B1-1 | Demonstrate different theories and combined cycles in power developments |
| B2-1 | Accomplish different assignments and problems in power systems. |
| B3-1 | Practice the application of power train calculation for various plant systems |
| C1-1 | Prepare data about newly technologies in power applications |
| C1-2 | Deliver selected parts of the course in active oral discussion |
| C1-3 | Refer to open courses and relevant lectures |

| Course: Marine Power Plants | |
|---|---|
| **Program LOs** | **Course LOs** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Recognize thermodynamic power theories. |
| | A1-2 Identify and understanding of basic terms belong to power train systems |
| | A1-3 Distinguish the new technologies in power systems for maritime applications |
| B1 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B1-1Demonstrate different theories and combined cycles in power developments |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Accomplish different assignments and problems in power systems. |
| B3-Select conventional mechanical equipment according to the required performance. | B3-1 Practice the application of power train calculation for various plant systems |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Prepare data about newly technologies in power applications |
| | C1-2 Deliver selected parts of the course in active oral discussion |
| | C1-3 Refer to open courses and relevant lectures |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Thermodynamics cycles, Combustion | 1-2 |
| 2 | Power Plant selection and Reliability | 3-5 |
| 3 | Classification of Marine Diesel Engines | 6-8 |
| 4 | Marine Diesel Engine System Operation: Fuel, Lubricating Oil, Exhaust system, cooling system ,and starting system | 01-10 |
| 5 | Power Transmissions: Reduction gears, Electric drive | 12-13 |
| 6 | Dual Fuel propulsion engines | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A1-2 | x | x | | x | x | x | x | | | | | | | | |
| | A1-3 | x | x | | x | x | x | x | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B2-1 | x | x | | x | | x | | | | | | | | | |
| | B3-1 | x | x | | x | | x | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | x | x | | | | | | | | |
| | C1-2 | x | x | | x | | x | x | | | | | | | | |
| | C1-3 | x | x | | x | x | | x | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, B3-1, C1-2, C1-2, C1-3 |
| 2 | Formative (quizzes – problems worked example - reports) | A1-1, A1-2, A1-3, B1-1, B2-1,C1-2, C1-3 |
| 3 | Final Term Examination (written) | A1-1, A1-2, 1-3, B3-1, B2-0, C1-1, C1-2, |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – problems worked example - reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – problems worked example - reports) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Woud, et all, “Design of Propulsion and Electric Power Generation Systems.” London, UK: IMarEST, (Institute of Marine Engineering, Science and Technology), 2002. |
| **2** | Lewis, Edward V. "Resistance and Propulsion." Principles of Naval Architecture. Vol. II. Jersey City, NJ: Society of Naval Architects and Marine Engineers, 1988. |
| **3** | Van Wylen, Gordon J., and Richard E. Sonntag. Fundamentals of Classical Thermodynamics. New York, NY: Wiley, 1973 |
| **4** | Energy efficient operation of ships (IMO model course) – January 1, 2014 |
| **5** | Harrington R.Y., "Marine Engineering", 2nd edition, SNAME, USA 1992. |
| **6** | Mina Morgan, "Marine Technology Reference book",1 edition Butterworth Ltd., Uk 1995. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | MARPOL Convention annex VI, IMO 2020 Sulphur CAP | 1 | A1-1, B1-1, B3-1, C1-2 |
| 2 | Energy Efficiency Vs Energy Management, green ship concept, and Emission calculations | 1 | A1-2, C1-2, B1-1, B2-1 |
| 3 | Waste heat recovery options, Trim Optimization, speed Management strategies, SEEMP Part I, II | 1 | B3-1, C1-2 |
| 4 | Air Lubrication, Micro bubbles , Ballast Water Management | 1 | B1-1, B1-2, C1-2, C1-2 |
| 5 | Advance ICE, Turbo charging system | 1 | A1-1, B2-1, B3-1 |
| 6 | Drag reduction technologies | 1 | B1-1, B1-2, C1-2, C1-2 |

**Course Coordinator: Dr. Waleed Yehia**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B.Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 328 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| No. | Aim |
|---|---|
| 5 | Work in and lead a heterogeneous team by adopting scalable planning methods and decision making tools in project management. |
| 8 | Lead and manage projects based on risk management techniques in order to improve the safety and security of international shipping and to prevent pollution from ships. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Apply SWOT analysis in strategic planning |
| A4-2 | Apply the basics of qualitative and quantitative risk management |
| A6-1 | Describe how to start project with optimum budgeting, planning and scheduling. |
| A6-2 | Identify how to solve conflict of interests and make negotiations based on ethics and professional responsibilities. |
| C1-1 | Identify hazards in a specific marine industry project |
| C1-2 | Define proper control options related to a specific marine industry project |
| C3-1 | Judge project failure based on proper criteria |
| C3-2 | Implementation of quality management into ship building projects. |

| Course: Project Management and Risk | |
|---|---|
| **Program LOs** | **Course LOs** |
| A4-Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1-Apply SWOT analysis in strategic planning |
| | A4-2 Apply the basics of qualitative and quantitative risk management |
| A6- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | A6-1 Describe how to start project with optimum budgeting, planning and scheduling. |
| | A6-2 Identify how to solve conflict of interests and make negotiations based on ethics and professional responsibilities. |
| C1 - Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Identify hazards in a specific marine industry project |
| | C1-2 Define proper control options related to a specific marine industry project |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Judge project failure based on proper criteria |
| | C3-2 Implementation of quality management into ship building projects. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | SWOT Analysis and Project launch | 1 |
| 2 | Budgeting | 2 |
| 3 | Planning and scheduling | 3 |
| 4 | Networking and resource requirements | 4+5 |
| 5 | Quality management | 6 |
| 6 | Conflict of interests and negotiations | 7 |
| 7 | Ethics and professional responsibilities | 8 |
| 8 | Risk management concepts | 10 |
| 9 | Quantitative and qualitative risk assessment | 11+12 |
| 10 | Examples : Offshore projects risk management | 13 |
| 11 | Project failure; Bayes' rule | 14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (online & in | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A4-1 | X | X | | | | X | | X | X | | | | | | |
| | A4-2 | X | | | | | X | X | | | | | | | | |
| | A6-1 | X | | | | | X | | | | | | | | | |
| | A6-2 | X | | | | | | | | | | X | | | | |
| C-Level | C1-1 | | X | | | | | | X | | | X | X | | | |
| | C1-2 | | X | | | | | | X | | | X | X | | | |
| | C3-1 | X | X | | | | X | | | | | | | | | |
| | C3-2 | X | | | | | | | | | X | X | | | | |

### 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

### 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A4-1, A4-2, A6-1 |
| 2 | Formative (quizzes – self-learning assignments) | A4-1, A6-1, A6-6, C1-1 |
| 3 | Final Term Examination (written) | A4-2, A6-1, A6-2, C1-2, C3-1, C3-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – self-learning assignments) | 2, 10, 13 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – self-learning assignments) | 20 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | OBERLENDER, Garold D., et al., Project management for engineering and construction, 3rd edition, McGraw-Hill Education, 2014. |
| **2** | Ayyub, Bilal M., Risk analysis in engineering and economics, Crc Press, 2014. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | SWOT Analysis and Project launch | 5 | A4-1 |
| 2 | Budgeting | 5 | A6-1 |
| 3 | Planning and scheduling | 5 | A6-1 |
| 4 | Networking and resource requirements | 5 | A6-1 |
| 5 | Quality management | 5 | A6-1, C1-1 |
| 6 | Conflict of interests and negotiations | 5 | A6-2 |
| 7 | Ethics and professional responsibilities | 5 | A6-2 |
| 8 | Risk management concepts | 8 | A4-2 |
| 9 | Quantitative and qualitative risk assessment | 8 | A4-2 |
| 10 | Examples : Offshore projects risk management | 8 | C1-1, C1-2 |
| 11 | Project failure; Bayes' rule | 8 | C3-1 |

**Course Coordinator: Prof. Heba S. El-Kilani**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | Elective (2) - NME 329 | | |
| **Year/ Level** | Third year- 2nd semester – Law 2014 | | |
| | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Oral |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Apply the knowledge of engineering practice and mathematics, with the design and dynamics of some important and applicable types of small marine crafts and units. The track of the acquainted knowledge about design and dynamics of these units is different from conventional ships. Acquire the knowledge about small marine unit function, form, application, dynamic lift and drag, methods of propulsion and steering. Investigate and analyze the hydrodynamics and design of small and high-speed marine boats such as; planing, catamaran, tri-maran, hydrofoil, SWATH, sea slice and sailing boats. Acquire the knowledge of design of well spread out of small vessels such as tugboats, fishing trawlers, and other service small units. Investigate modern methods of propulsion applied to small units as jet propulsion, z-propellers, POD and others. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Recognize types, functions, forms, applications, and investigate water resistance, propulsion and dynamics of small marine units. Investigate the hydrodynamic design of high-speed marine boats; planing, hydrofoil, SWATH, and others. |
| A1-2 | Investigate the aerodynamics, hydrodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. |
| A1-3 | Investigation of small vessels' form, layout of floors, decks, and engine room for tugboats, fishing trawlers, and other units. Investigation of modern methods of non-conventional propulsion of small units as POD, z-peller, ducted and Jet Propulsion. |
| B1-1 | Analyze the functions, forms, applications, and investigate the water resistance, propulsion and dynamics of small marine units. Investigate the hydrodynamic design of high-speed marine boats; planning, hydrofoil, SWATH, and others. |
| B1-2 | Recognize and analyze the aerodynamics, hydrodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. |
| B1-3 | Analyze and investigate other small vessels' form, layout of floors, decks, and engine room, for tugboats, fishing trawlers, and other units. Investigation of modern methods of non-conventional propulsion of small units as z-pellers, POD, ducted and jet propulsion. |

| | |
|---|---|
| C1-1 | Carry out design of high-speed marine boats using series charts of planing boats, hydrofoil, and SWATH small ships. |
| C1-2 | Based on sailing yacht's aerodynamics, hydrodynamics, and intact stability rules, carry out the design of a racing / cruising sailing boat. |
| C1-3 | Carry out other small vessels' form, layout of floors, decks, and engine room, for tugboats, fishing trawlers, and other units. |
| C2-1 | Evaluate the behavior of some high-speed small units among inland, coastal, shallow, and deep open sea. |

**Course: Design and Dynamics of Small Marine Units**

| **Program LOs** | **Course Los** |
|---|---|
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Recognize the functions, form and boat geometry, applications, and investigate the water resistance, propulsion and dynamics of small marine units. Investigate the hydrodynamic design of high-speed marine boats; planing boat equilibrium and porpoising instability dynamic pressure, flow separation, lift and drag forces, boat equilibrium and porpoising instability, and also for hydrofoil, SWATH, and others. |
| | A1-2 Investigate the aerodynamics, hydrodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. |
| | A1-3 Investigation of small vessels' form, layout of floors, decks, and engine room for tugboats, fishing trawlers, and other units. Investigation of modern methods of non-conventional propulsion of small units as POD, z-peller, ducted and Jet Propulsion. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Analyze the functions, forms, applications, and investigate the water resistance, propulsion and dynamics of high-speed small marine units. Investigate the hydrodynamic design of high-speed marine boats such as; planning boats dynamic pressure, flow separation, lift and drag forces, boat equilibrium and porpoising instability, and hydrofoil, SWATH. |

| | |
|---|---|
| | B1-2 Recognize and analyze the aerodynamics, hydrodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. |
| | B1-3 Analyze and investigate other small vessels' form, layout of floors, decks, and engine room, for tugboats, fishing trawlers, and other units. Investigate theory of operation for non-conventional propulsion of small units as Z-pellers, POD, ducted and jet propulsion. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting taking into consideration economic, social, safety and environmental factors. | C1-1 Carry out design of high-speed marine boats using series charts of planing boats, hydrofoil, and SWATH small ships. |
| | C1-2 Apply the principles of aerodynamics, hydrodynamics, and intact stability rules, to carry out the design of a racing / cruising sailing boat. |
| | C1-3 Carry out other small vessels' form, layout of floors, decks, and engine room, for tugboats, fishing trawlers, and other units. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate the behavior of some high-speed small units among inland, coastal, shallow, and deep open sea. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to small marine units types, functions, forms, applications for each type | 1-2 |
| 2 | Dynamic pressure, hull form geometry, flow separation, lift and drag forces, boat equilibrium and porpoising instability, methods of propulsion and dynamics of small marine units. | 3-6 |
| 3 | Hydrodynamic design of high-speed marine boats; planing crafts, hydrofoil, SWATH, and others. Dynamic behavior of some high-speed small units among inland, coastal, shallow, and deep open sea. | 7-9 |
| 4 | Hydrodynamics, aerodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. | 10-11 |
| 5 | Small marine units design of form, layout of floors, decks, and engine room for tugboats, fishing trawlers, and other small units. | 12-13 |
| 6 | Modern methods of non-conventional propulsion of small units as POD, Z-peller, ducted and Jet Propulsion. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | x | x | | | | | | | | |
| | A1-2 | x | x | | x | | x | x | | | | | | | | |
| | A1-3 | x | x | | x | | | | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B1-2 | x | x | | x | | x | x | | | | | | | | |
| | B1-3 | x | x | | x | | x | | | | | | | | | |
| C-Level | C1-1 | x | x | | x | | x | | | | | | | | | |
| | C1-2 | x | x | | x | | x | X | | | | | | | | |
| | C1-3 | x | x | | x | | | | | | | | | | | |
| | C2-1 | x | x | | x | | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, C1-1, C2-1 |
| 2 | Formative (quizzes – presentation - Report) | A1-1, A1-2, A1-3, B1-1, B1-2, C1-1, C212, C5-1 |
| 3 | Final Term Examination (written) | A1-1, A1-2, A1-3, B1-1, B1-2, B1-3, C1-1, C1-2, C1-3, C2-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - reports) | Every 2nd week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – presentation - reports) | 20 |
| 3 | Oral / Written Exam | --- |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Edward Lewandawski, “High Speed Boats”, Cambridge Press, USA, 1998. |
| **2** | Group of Authors, “Principles of Naval Architecture“, SNAME Publications, Vol. 2, USA, 2012. |
| **3** | P. Gutelle, “The design of Sailing Yachts”, Mc Graw-Hill, USA, 1984 |
| **4** | J. Newman, “Marine Hydrodynamics”, Cambridge Press, USA, 1980 |
| **5** | **Keywords for Internet Search**<br>Hydrodynamics of High Speed Marine Crafts, Design of Sailing Boats Hydro- and Aero-dynamics, Design of Small Marine Units, Propulsion of Small Marine Units. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presentation in Person |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | Aim | LO's |
|---|---|---|---|
| 1 | Introduction to small marine units types, functions, forms, applications for each type | 1 | A1-1, B1-1 |
| 2 | Dynamic pressure, hull form geometry, flow separation, lift and drag forces, boat equilibrium and porpoising instability, methods of propulsion and dynamics of small marine units. | 1 | A1-1, B1-1 |
| 3 | Hydrodynamic design of high-speed marine boats; planing crafts, hydrofoil, SWATH, and others. Dynamic behavior of some high-speed small units among inland, coastal, shallow, and deep open sea. | 1 | A1-1, B1-1, C1-1, C2-1 |
| 4 | Hydrodynamics, aerodynamics, intact stability, and the design of racing and cruising sailing boats, catamaran, and tri-maran. | 1 | A1-2, B1-2, C1-2 |
| 5 | Small marine units design of form, layout of floors, decks, and engine room for tugboats, fishing trawlers, and other small units. | 1 | A1-3, B1-2, C1-3 |
| 6 | Modern methods of non-conventional propulsion of small units as POD, Z-peller, ducted and Jet Propulsion. | 1 | A1-3, B1-3, |

**Course Coordinator: Prof. Dr. Mo’men M. Gaafary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 330 | | |
| **Year/ Level** | Third year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 5 | Work in and lead a heterogeneous team using the basic concepts of the organization and management, and to use of statistical models and operations research to solve engineering problems and to make decisions. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A6-1 | Define Reasons for scheduling. |
| A6-2 | Describe the meaning of the organization. |
| A6-3 | Reconize the meaning of management and the characterization of manager. |
| A6-4 | Identify the types and theories of organization. |
| A7-1 | Identify scheduling Techniques and allocation used in ship production. |
| A7-2 | Identify the organizational framework of the shipyard and the function of each of its levels. |
| A9-1 | Recognize the ship production processes, resource, and information necessary for scheduling. |
| B2-1 | Compare between Scheduling Techniques. |
| B2-2 | Discuss the Network analysis, source allocation, scheduling technique,<br>Gantt chart and linear programming for solving engineering problems. |
| B2-3 | Investigate the most important resource in the different production department in shipyard. |
| B3-1 | Assign the shipyard equipment to perform the different missions. |
| B3-2 | Assign the human power to attain the jobs suitable for their skills. |
| C3-1 | Practice the analysis of each ship production activity. |
| C3-2 | Set up completely the network activates including relationship between |

| | |
|---|---|
| | activates. |
| C3-3 | Conduct the scheduling production planning for maximizing the profits. |
| C4-1 | Follow up the implementation of programs for building, repair and maintenance of marine units and facilities. |
| C4-2 | Control the quality of manufactured and maintained units in the arsenal and make reports on them. |

| **Course: Organization and Management of Shipyards** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A6- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | A6-1 Define Reasons for scheduling. |
| | A6-2 Describe the meaning of the organization. |
| | A6-3 Reconize the meaning of management and the characterization of manager. |
| | A6-4 Identify the types and theories of organization. |
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Identify scheduling Techniques and allocation used in ship production. |
| | A7-2 Identify the organizational framework of the shipyard and the function of each of its levels. |
| A9- Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Recognize the ship production processes, resource, and information necessary for scheduling. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Compare between Scheduling Techniques. |
| | B2-2 Discuss the Network analysis, source allocation, scheduling technique, Gantt chart and linear programming for solving engineering problems. |
| | B2-3 Investigate the most important resource in the different production department in shipyard. |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Assign the shipyard equipment to perform the different missions. |
| | B3-2 Assign the human power to attain the jobs suitable for their skills. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Practice the analysis of each ship production activity. |
| | C3-2 Set up completely the network activates including relationship between activates. |

| | |
|---|---|
| | C3-3 Conduct the scheduling production planning for maximizing the profits. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Follow up the implementation of programs for building, repair and maintenance of marine units and facilities. |
| | C4-2 Control the quality of manufactured and maintained units in the arsenal and make reports on them. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction and organization theories | 1 |
| 2 | Shipyard organization | 2 |
| 3 | Meaning of management & Manager characteristics | 3 |
| 4 | Ship production processes – Definition of scheduling | 4 |
| 5 | Purpose and information for scheduling & scheduling technique | 5 |
| 6 | Gantt chart – Network technique | 6 |
| 7 | Critical path method – analysis of network | 7 |
| 8 | Written/ on line Mid-Term Exam | 8 |
| 9 | Resource allocation | 9 |
| 10 | Planning resource requirement – Resource aggregation | 10 |
| 11 | Linear programming technique | 11 |
| 12 | (Linear programming technique ) Graphical method | 12 |
| 13-14 | (Linear programming technique ) simplex method | 13 - 14 |
| 15 | Tutorial and application Examination | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A6-1 | x | x | | | | x | | | | | | | | | |
| | A6-2 | x | x | | | x | | | | | | | | | | |
| | A6-3 | x | x | | | x | | | | | | | | | | |
| | A6-4 | x | x | | | x | | | | | | | | | | |
| | A7-1 | x | x | | | x | | x | | | | | | | | |
| | A7-2 | x | x | | | | x | | | | | | | | | |
| | A9-1 | x | x | | | | x | | | | | | | | | |
| B-Level | B2-1 | x | x | | x | | | | | | | | | | | |
| | B2-2 | x | x | | x | | | x | | | | | | | | |
| | B2-3 | x | x | | x | | | x | | | | | | | | |
| | B3-1 | x | x | | x | | | x | | | | | | | | |
| | B3-2 | x | x | | | | | x | | | | | | | | |
| C-Level | C3-1 | x | x | | x | | x | x | | | | | | | | |
| | C3-2 | x | x | | x | | | x | | | | | | | | |
| | C3-3 | x | x | | x | | | x | | | | | | | | |
| | C4-1 | x | x | | x | | x | x | | | | | | | | |
| | C4-2 | x | x | | x | | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Assign a portion of the office hours for those students. |
| 2 | Give them specific tasks. |
| 3 | Repeat the explanation of some of the material and tutorials. |
| 4 | Assign a teaching assistance to follow up the performance of this group of students. |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A6-1, A6-2, A6-3, A6-4,A7-1, A7-2, A9-1, B2-1, B2-2, B2-3, C3-2 |
| 2 | Formative (quizzes – proposals - plans) | A6-1, A6-2, A6-3, A6-4,A7-1, A7-2, A9-1, B2-1, B2-2, B2-3, b3-1, b3-2, c3-1, C3-2, c3-3, c4-1, c4-2 |
| 3 | Final Term Examination (written) | A6-1, A6-2, A6-3, A6-4,A7-1, A7-2, A9-1, B2-1, B2-2, B2-3, b3-1, b3-2, c3-1, C3-2, c3-3, c4-1, c4-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – proposals - plans) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights % |
|---|---|---|
| 1 | Mid Term Examination (written) | 15 |
| 2 | Formative (quizzes – proposals - plans) | 15 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Operations Research, applications and Algorithms, Wayne L. Winston, Indiana University, Fourth edition, Transcontinental Printing, Louiseville, , Thomson LearningTM, 2004. |
| 2 | Introduction to Operations Research, Frederick S. Hillier- Stanford University, Gerald J. Lieberman- Late of Stanford University, McGraw-Hill, New York, 2001. |
| 3 | Operations Research, Tommi Sottinen, University of Vaasa, August 27, 2009 |
| **4** | Operations Research, P. Rama Murthy, Collage of Engineering, Anantapur , New Age International (P) Ltd., Publishers, 2007. |

| | |
|---|---|
| **5** | Introduction to Operations Research - Deterministic Models, Juraj Stacho, Department of Industrial Engineering and Operations Research, Columbia University, July 26, 2014. |
| **6** | Operations Research: An Introduction, Hamdy A. Taha, University of Arkansas, ighth Edition, Pearson Prentice Hall, New Jersey, 2007. |
| **7** | Operations Research - Business Information Systems, Michał Kulej, Wrocław University of Technology, Printpap Lodz, Wrocław 2011. |
| **8** | Operations Research Methods: Related Production, Distributions, and Inventory, B. D. Craven - University of Melbourne, S. M. N. Islam - Victoria University, Management Applications, March 2005. |
| **9** | The Basic Roles of Manager in Business Organization, Katarzyna Cieslinska, Roczniki Akademii Rolniczej w Poznaniu, 2007. |
| **10** | Modern Management Theories and Practices, Yasin Olum , 15th East African Central Banking Course, Kenya School of Monetary Studies, 12th July 2004. |
| **11** | Shipbuilding Processes from Project Management Perspective, Editura Academiei Române, 15th International Conference on Manufacturing Systems, University of Bucharest, Machine and Manufacturing Systems Department, Bucharest, Romania, 26 – 27 October, 2006. |
| **12** | Organization Theory and the Public Sector - Instrument, culture and myth, Routledge Tom Christensen, Per Lægreid, Paul G. Ronessand Kjell Arne Røvik, Taylor & Francis, London and New York, 2007. |
| **13** | Organization Theory and Design, Richard L. Daft, Vanderbilt University, , Tenth edition, South-Western, Cengage Learning, 2010. |
| **14** | Organization Theories: from Classical to Modern, Chun-Xia Yang, Han-Min Liu and Xing-Xiu Wang, Department of Business Administration, School of Management, Junan University, Guang Zhou, China, 2013. |
| **15** | Organizational Theory, Jorgen Laegaard and Mill Bindslev, Ventus Publishing APS, 2006. |
| **16** | Organization Theory and the Public Sector, Tom Christensen, Per Laegreid, Paul G. Roness and Kjell Arne Rovik, Routledge, London and New York, Feb. 2007. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction and organization theories | 5 | A6-1 |
| 2 | Shipyard organization | 5 | A6-2, A6-4 |
| 3 | Meaning of management & Manager characteristics | 5 | A6-3 |
| 4 | Ship production processes – Definition of scheduling | 5 | A7-1, A7-2, A9-1, B2-1 |
| 5 | Purpose and information for scheduling & scheduling technique | 5 | A7-1, A7-2, A9-1, B2-1 |
| 6 | Gantt chart – Network technique | 5 | B2-2, B2-3, |
| 7 | Critical path method – analysis of network | 5 | B2-2, B2-3, C3-2 |
| 8 | Written/ on line Mid-Term Exam | 5 | A6-1, A6-2, A6-3, A6-4,A7-1, A7-2, A9-1, B2-1, B2-2, B2-3, C3-2 |
| 9 | Resource allocation | 5 | B3-1, B3-2, C3-1 |
| 10 | Planning resource requirement – Resource aggregation | 5 | B3-1, B3-2, C3-1C3-2C3-3 |
| 11 | Linear programming technique | 5 | B3-1, B3-2, C4-1, C4-2 |
| 12 | (Linear programming technique ) Graphical method | 5 | B3-1, B3-2, C4-1, C4-2 |
| 13 | (Linear programming technique ) simplex method | 5 | B3-1, B3-2, C4-1, C4-2 |
| 14 | Revision, Tutorial and application Examination | 5 | A6-1, A6-2, A6-3, A6-4,A7-1, A7-2, A9-1, B2-1, B2-2, B2-3, b3-1, b3-2, c3-1, C3-2, c3-3, c4-1, c4-2 |

**Course Coordinator: Emeritus Prof. Dr. Mohamed A. Mansour**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 431 | | |
| **Year/ Level** | Fourth year - 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 4 | Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles, also develop engineering economy skills to work in and lead a task and display leadership qualities, business administration. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Describe different approaches in ship design. And definitions of economical abbreviations applicable to marine engineering fields |
| A3-2 | Recognize the Interest relationships and making time addition of cash flow |
| A10-1 | Identify the time value of cash flow and Identify the feasibility of engineering projects |
| A10-2 | Apply economic criteria and decision making considering different economical, technical and environmental issues. |
| B4-1 | Evaluate the optimum life, optimum speed, permissible price and operation constraints of ships. |
| B4-2 | Make cost and freight statistics and Searching for statistical information about expenses of building and operating ships and rates of escalation and taxation affairs |
| C1-1 | Make sensitivity analyses to investigate the effects of different economical and technical aspects on ship design. |
| C1-2 | Perform the economic analyses of projects and Differentiating between various alternatives. |
| C6-1 | Proper decision making, evaluation of economical utility, dealing with ship design economics and marine transport management. |
| C6-2 | Have a research task to determine the Optimum characteristics of ships and present by the end of the term. |

| Course: Ship Economy & Feasibility Studies | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3-1 descripe of different approaches in ship design. And definitions of economical abbreviations applicable to marine engineering fields. |
| | A3-2 Recognize the Interest relationships and making time addition of cash flow . |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Identify the time value of cash flow and Identify the feasibility of engineering projects |
| | A10-2 apply economic criteria and decision making considering different economical, technical and environmental issues. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Evaluate the optimum life, optimum speed, permissible price and operation constraints of ships. |
| | B4-2 Make cost and freight statistics and Searching for statistical information about expenses of building and operating ships and rates of escalation and taxation affairs |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Make sensitivity analyses to investigate the effects of different economical and technical aspects on ship design |
| | C1-2 Perform the economic analyses of projects and Differentiating between various alternatives |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Proper decision making, evaluation of economical utility, dealing with ship design economics and marine transport management. |
| | C6-2 Have a research task to determine the Optimum characteristics of ships and present by the end of the term. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design | 1-2 |
| 2 | Interest Relationships | 3 |
| 3 | Economic Criteria for Design and Operation | 4 |
| 4 | Profitability of ships before and after Tax | 5 |
| 5 | Optimum Speeds of Ships | 6 - 7 |
| 6 | Estimation of Cost of Building and Operating Ships | 9 |
| 7 | Optimum Life and Replacement Analyses | 10 |
| 8 | Chartering of Ships | 11 |
| 9 | Permissible Price of Ships | 12 |
| 10 | Computer Aided Ship Design Economics | 13 |
| 11 | Elements of Marine Transport , Multi purpose ships, Stowage factors, Bill of Lading , Freight Rate , and Containerization | 14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3-1 | x | x | | | | x | x | | | | | | | | |
| | A3-2 | x | x | | | | x | x | | | | | | | | |
| B-Level | A10-1 | x | x | | | | x | x | | | | | | | | |
| | A10-2 | x | x | | | | x | | | | | | | | | |
| | B4-1 | x | x | | | | x | | | | | | | | | |
| | B4-2 | x | x | | | | x | | | | | | | | | |
| C-Level | C1-1 | x | x | | | | x | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **C1-2** | x | x | | | | | x | | | | | | | | |
| | **C6-1** | x | x | | x | | | x | | | | | | | | |
| | **C6-2** | x | x | | x | | x | | | x | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1 , A3-2 , A10-1 , A10-2 |
| 2 | Formative (quizzes - reports) | A3-1 , A3-2 , A10-1 , A10-2, B4-1 , B4-2 , C1-1 , C1-2 |
| 3 | Final Term Examination (written) | A3-1 , A3-2 , A10-1 , A10-2, B4-1 , B4-2 , C1-1 , C1-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes - reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes - reports) | 01 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Prof.Dr. Galal Younis " Lecture Notes on Ship Economy " - Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port said , 2003.<br>https://www.facebook.com/groups/1819292491715304/ |
| **2** | Harry Benford " Fundamentals of Ship Design Economics" - University of Michigan, Department of Naval Architecture & Marine Engineering, ANN RBOR ,1965 |
| **3** | Harry Benford " Profitability Before and After Tax"-University of Michigan, Department of Naval Architecture & Marine Engineering , ANN ARBOR ,1966 |
| **4** | Lamb, Thomas: "Ship Design and Construction", Volumes 1-2, Society of Naval Architects and Marine Engineers (SNAME), 2004. |
| **5** | H. Schneekluth & V. Bertram: "Ship Design for Efficiency and Economy", Butterworth-Heinemann , (1998). |
| **6** | L. Blank & Anthony Tarquin, "Engineering Economy", 7th Edition, McGraw-Hill, 2012. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design | 4 | A3-1, A3-2 , A10-1 |
| 2 | Interest Relationships | 4 | A3-1 , A3-2 , A10-1 |
| 3 | Economic Criteria for Design and Operation | 4 | A10-1 , A10-2 , C1-2 |
| 4 | Profitability of ships before and after Tax | 4 | , B4-2, C1-1 , C1-2 |
| 5 | Optimum Speeds of Ships | 4 | B4-1 , B4-2 , C1-1 , C1-2 |
| 6 | Estimation of Cost of Building and Operating Ships | 4 | A3-1 , A3-2 , A10-1 , A10-2 , B4-1 , B4-2 |
| 7 | Optimum Life and Replacement Analyses | 4 | A3-1 , A3-2 , A10-1 , A10-2 , C1-1 , C1-2 , C6-1 |

| | | | |
|---|---|---|---|
| 8 | Chartering of Ships | 4 | A3-1 , A3-2 , C1-2 , C6-1 |
| 9 | Permissible Price of Ships | 4 | A3-2 , B4-1 , B4-2 , C6-1 |
| 10 | Computer Aided Ship Design Economics | 4 | A3-1 , A3-2 , A10-1 , A10-2 B4-1 , B4-2, C1-1 , C1-2 , C6-1 |
| 11 | Elements of Marine Transport , multi purpose ships, Stowage factors, Bill of Lading , Freight Rate , and Containerization | 4 | A3-1 , A3-2 , C1-2 , C6-1 |

**Course Coordinator: Prof. Dr. Galal Mohamed Younis**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 432 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 2 | Use the marine engineering knowledge, techniques and skills of how to recognize the different main auxiliary equipment on shipboard and be familiar with the main principles of electric power generation for ship activities. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A5-1 | Identify the most important equipment onboard ships. |
| B1-1 | Compare different systems of electric power generation and distribution onboard ships |
| B1-2 | Analyze the performance of different steam boilers and condenser types. |
| B3-1 | Select the most suitable steam boiler type according to its essentials and requirements |
| B3-2 | Select the suitable heat exchanger type for shipboard applications |
| C1-1 | Design the auxiliary electric power plant for a ship using electric load analysis |
| C1-2 | Employ the classification society regulations to arrange the required auxiliary machinery and firefighting equipment onboard ships. |
| C4-1 | Evaluate the operational performance of steam cycles and its components through heat balance analysis |
| C4-2 | Choose the most suitable type of pumps for different ship applications |

| Course: Ship Machinery and Auxiliary Engines | |
|---|---|
| **Course LOs** | **Program LOs** |
| A5- Practice research techniques and methods of investigation as an inherent part of learning. | A5-1 Identify the most important equipment onboard ships. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Compare different systems of electric power generation and distribution onboard ships |
| | B1-2 Analyze the performance of different steam boilers and condenser types. |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Select the most suitable steam boiler type according to its essentials and requirements |
| | B3-2 Select the suitable heat exchanger type for shipboard applications |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design the auxiliary electric power plant for a ship using electric load analysis |
| | C1-2 Employ the classification society regulations to arrange the required auxiliary machinery and firefighting equipment onboard ships. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Evaluate the operational performance of steam cycles and its components through heat balance analysis |
| | C4-2 Choose the most suitable type of pumps for different ship applications |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Electric power generation and distribution in shipboard. | 1-2 |
| 2 | Steam generation systems in shipboard. | 3 |
| 3 | Steam boilers and components | 4-5 |
| 4 | condensers | 6-7 |
| 5 | Heat exchangers | 9-10 |
| 6 | Auxiliary machinery (pumps, compressors, separators, waste water treatment, etc.) | 11-13 |
| 7 | Firefighting systems onboard ship | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A - Level | A5-1 | X | X | | | X | | | X | | | | | | | |
| B - Level | B1-1 | X | X | | | | | | | | | X | | | | |
| | B1-2 | X | X | | | | | | | | | | | | | |
| | B3-1 | X | X | | | X | | | | | | | | | | |
| | B3-2 | X | X | | | | X | | | | | | | | | |
| C - Level | C1-1 | X | X | | | X | X | | | | | | | | | |
| | C1-2 | X | X | | | | | | | | | | | | | |
| | C4-1 | X | X | | | | X | | | | | | | | | |
| | C4-2 | X | X | | | | X | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A5-1, B1-1, B2-1, B3-1, B3-2, C1-1 |
| 2 | Formative (quizzes – discussions) | B3-2, C1-1, C4-2 |
| 3 | Oral assessment | A5-1, B3-2, C1-1, C4-2 |
| 4 | Practical assessment | C1-1, C4-2 |
| 5 | Final Term Examination (written) | A5-1, B1-1, B1-2, B3-1, B3-2, C1-1, C1-2, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – discussions) | Every week |
| 3 | Oral assessment | 15 |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Oral assessment | 10 |
| 3 | Formative (quizzes – discussions) | 21 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Smith, D. W., Crawford, J., & Moore, P. S. Marine auxiliary machinery. Elsevier, 2016. |
| **2** | Mc-George H.D., Marine Auxiliary Machinery, 7th edition, Butterworth, London 1995. |
| **3** | Professor Adel Tawfik Lecture Notes. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facility |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Electric power generation and distribution in shipboard. | 2 | A5-1, B1-1, C1-1, C1-2 |
| 2 | Steam generation systems in shipboard. | 2 | A5-1, B1-2 |
| 3 | Steam boilers and components | 2 | A5-1, B1-2, B3-1, C4-1 |
| 4 | condensers | 2 | A5-1, B1-2, C4-1 |
| 5 | Heat exchangers | 2 | A5-1, B3-2, C4-1 |
| 6 | Auxiliary machinery (pumps, compressors, separators, waste water treatment, etc.) | 2 | A5-1, C1-2, C4-2 |
| 7 | Firefighting systems onboard ship | 2 | C1-2, C4-2 |

**Course Coordinator: Dr Ameen Bassam**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 433 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| **No.** | **Aim** |
|---|---|
| 7 | Apply analytical and experimental methos to estimate ship powering, design propeller and predict the ship performance in service and use procedures to account for ship hull and propeller roughness during powering estimation and tug performance. Apply also engneering processes to keep students familiar with Sea trails and measurements conducted during these trials according to the Intrnational Maritime requirements. Also apply methods to predect ship speed loss due to waves and wind in service. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B1-1 | Recognize the different resistance calculation methods. |
| B1-2 | Outline ship powering estimation. |
| B1-3 | Investigate hull and propeller surfaces roughness characteristic in service |
| C1-1 | Investigate the conduction of sea trails. |
| C1-2 | Describe propeller design. |
| C2-1 | Predict ship performance in service |
| C2-2 | Investigate marine engine performance. |
| C4-1 | Determine power penalty due to hull and propeller roughness, using figures. |
| C5-1 | Discuss sea trials data sheet. |
| C6-1 | Generate seminars on natural gas powered vessels. |

| **Course: Ship Performance** | |
|---|---|
| **Program LOs** | **Course Los** |
| B1. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Recognize the different resistance calculation methods. |
| | B1-2. Outline ship powering estimation. |
| | B1-3 Investigate hull and propeller surfaces roughness characteristic in service |
| | C1-2 Describe propeller design. |
| C2. Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Predict ship performance in service |
| | C2-2 Investigate marine engine performance. |
| C.4 Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Determine power penalty due to hull and propeller roughness, using figures. |
| C5. Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Discuss sea trials data sheet. |
| C6. Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Generate seminars on natural gas powered vessels. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Review of resistance estimation methods | 1 |
| 2 | Powering Estimation methods | 2 |
| 3 | Propeller Design | 3 |
| 4 | Propeller performance | 4 |
| 5 | Hull Roughness | 5 |
| 6 | Propeller Roughness | 6 |
| 7 | Power Penalty and speed loss | 7 |
| 8 | Midterm Examination | 8 |
| 9 | Modern propulsion Systems | 9-10 |
| 10 | Sea trails | 11 |
| 11 | Speed loss due to wind and waves | 12 |
| 12 | Performance  of Tug boats | 13 |
| 13 | Application of Natural Gas in marine field | 14 |
| 14 | Laboratory Examination | 15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B1-2 | x | x | | x | | x | | | | | | | | | |
| | B1-3 | x | x | | x | | x | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C-Level** | **C1-1** | x | x | | x | | x | | | | | | | | | |
| | **C1-2** | x | x | | x | | | x | | | | | | | | |
| | **C2-1** | x | x | | x | | | x | | | | | | | | |
| | **C2-2** | x | x | | x | | x | | | | | | | | | |
| | **C4-1** | x | x | | x | | x | x | | | | | | | | |
| | **C5-1** | x | x | | x | | x | X | | | | | | | | |
| | **C6-1** | X | X | | X | X | | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written) | B1-1, C1-1, C1-2, C1-3 |
| 2 | Formative (quizzes – work sheets) | B1-1, B1-2, C1-2, C1-3 |
| 3 | Practical examination | C2-1, C4-1 |
| 4 | Oral examination | C6-1, C5-1 |
| 5 | Final Term Examination (written) | B1-1, B1-2, C1-1, C1-2, C1-3, C2-1, C4-1,C5-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – work sheets) | Every two week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 20 |
| 2 | Formative (quizzes – work sheets) | 02 |
| 3 | Final Term Examination (written) | 60 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Carlton, J. S., "Marine Propellers and Propulsion", Elsevier Ltd., Second edition, 2007. |
| **2** | Rawson, K. J., Tupper, E. C., "Basic Ship Theory", Elsevier Ltd., Vol.2, Chapters 10 to 16, Ship Dynamics and design, 5th edition, 2001. |
| **3** | Comstock, J. P., "Principals of Naval Architecture", SNAME Publications, Vol. III, 1989. |
| **4** | Mosaad, M. A., "Marine Propeller Roughness Penalties", Dept. of Marine Technology, University of Newcastle upon Tyne, England, Ph.D. Thesis, 1986. |
| **5** | Mosaad, M. A., "Experiments and Application on the Effect of Propeller Surface Roughness", International Workshop on Drag and Roughness, RINA, England, March 1990. |
| **6** | Mosaad, M. A., "Underwater Ship Surface - Drag and Fuel Economy", First International Conference on E.R.D.A., Faculty of Engineering, University of Suez Canal, Port Said, Egypt, November 1991. |
| **7** | Mosaad, M. A., "Ship-Model Surface Roughness Allowance" MEET MARIND'2002, Varna, Bulgaria, October 6-11, 2002. |
| **8** | Mosaad, M. A., "Natural Gas Powered Ships", Gulf Maritime Conference 2007, Sharjah, UAE, April 15-18, 2007. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | On line teaching and communications |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Resistance estimation methods and powering calculations | 7 | B1-1, C1-1, C1-2 |
| 2 | Propeller Design. | 7 | B1-2, C1-2 |
| 3 | Hull and propeller roughness surface characteristic | 7 | B1-2, C1-3 |
| 4 | Hull and propeller roughness penalties | 7 | B1-3, C1-2, C1-3, C2-1 |
| 5 | Sea trails | 7 | B1-1, B1-2 |
| 6 | Speed loss due to wind and waves | 7 | C1-2, C2-1, C4-1 |
| 7 | Performance of Tug boats | 7 | C1-2, C2-2, C4-1 |
| 8 | Application of Natural Gas in marine field | 7 | B1-1, C2-2, C5-1, C6-1 |

**Course Coordinator: Prof. Dr. Mohamed Ahmed Mosaad**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | HUD 401 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Minor | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | -- | -- |

## 2. Course aims:

| No. | aim |
|---|---|
| 4 | Behave professionally and adhere to the engineering ethics and standards of the international maritime law, Charterparties, Bills of Lading and different types of marine insurance, concepts, risks and policies. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Define the main public and private regulation that applies to a ship in regard to casualties. |
| A4-2 | Utilize international and national legislation in the liability issues in shipping |
| A10-1 | Recognize different contracts of carriage and bills of lading. |
| A10-2 | Investigate different types of marine insurance and contracts |
| B4-1 | Discuss different responsibilities of the ship owner, captain, crew, shipbroker, shipping agencies, etc. |
| B4-2 | Analyze and apply general principles of law regulating salvage |

| Course: Maritime law and insurance | |
|---|---|
| **Course LOs** | **Program LOs** |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Define the main public and private regulation that applies to a ship in regard to casualties. |
| | A4-2 Utilize international and national legislation in the liability issues in shipping |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Recognize different contracts of carriage and bills of lading. |
| | A10-2 Investigate different types of marine insurance and contracts |

| | |
| --- | --- |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Discuss different responsibilities of the ship owner, captain, crew, shipbroker, shipping agencies, etc. |
| | B4-2 Analyze and apply general principles of law regulating salvage |

## 4. Course Contents:

| No. | Topics | Week |
| --- | --- | --- |
| 1 | Principals and introduction to maritime law and insurance | 1-2 |
| 2 | General rules on liability in shipping | 3-4 |
| 3 | Carriage of goods by Sea, Charterparties, and Bills of Lading | 5-7 |
| 4 | Liability of collision, oil pollution, vicarious, etc. | 9-10 |
| 5 | Salvage and marine insurance | 11-12 |
| 6 | National and international regulations of maritime law and case studies | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A -Level | A4-1 | X | X | | | | | | | | | | | | | |
| | A4-2 | X | X | | | | | | | | | | | | | |
| | A10-1 | X | X | | | | | | | | | | | | | |
| | A10-2 | X | X | | | | | | | | | | | | | |
| B - Level | B4-1 | X | X | | | | | | | | | | | | | |
| | B4-2 | X | X | | | | | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A4-1, A4-2, A10-1, B4-1 |
| 2 | Final Term Examination (written) | A4-1, A4-2, A10-1, A10-2, B4-1, B4-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 20 |
| 2 | Final Term Examination (written) | 80 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Mostafa Taha, Maritime law, ISBN: 9789777612258, 2018 |
| **2** | Özlem Gürses, Marine Insurance Law, Routledge, 1st edition, 2015 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Principals and introduction to maritime law and insurance | 4 | A4-1, B4-1 |
| 2 | General rules on liability in shipping | 4 | A4-2, B4-1 |
| 3 | Carriage of goods by Sea, Charterparties, and Bills of Lading | 4 | A10-1, B4-1 |
| 4 | Liability of collision, oil pollution, vicarious, etc. | 4 | A4-2, B4-1 |
| 5 | Salvage and marine insurance | 4 | A4-2, A10-2 |
| 6 | National and international regulations of maritime law and case studies | 4 | B4-1, B4-2 |

**Course Coordinator: Mr Refaat Mousa**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 434 | | |
| **Year/ Level** | Fourth year– 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | -- | -- | 5 |

## 2. Course aims:

| No. | aim |
|---|---|
| 6 | Act professionally in collecting, presenting, discussing a specific research project in the Departmental Annual Scientific Seminar, to deal with academic/professional challenges in a critical and creative manner. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A7-1 | Think in a creative and innovative way in problem solving and design. |
| A7-2 | Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. |
| A8-1 | Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. |
| A9-1 | Select and appraise appropriate ICT tools to a variety of engineering problems. |
| A9-1 | Incorporate economic, societal, environmental dimensions and risk management in design. |
| C1-1 | Analyze and interpret data and design experiments to obtain new data. |
| C1-2 | Design a marine system, component, or process to meet a need. |
| C2-1 | Evaluate designs, shipbuilding processes and propose improvements. |
| C3-1 | Solve ship design and shipbuilding problems. |
| C5-1 | Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| C6-1 | Collaborate effectively within multidisciplinary team. |
| C6-2 | Search for information and engage in life-long self-learning discipline. |

| **Course: Project (A)** | |
|---|---|
| **Program LOs** | **Course LOs** |

| | |
|---|---|
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Think in a creative and innovative way in problem solving and design. |
| | A7-2 Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. |
| A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. |
| A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Select and appraise appropriate ICT tools to a variety of engineering problems. |
| | A9-2 Incorporate economic, societal, environmental dimensions and risk management in design. |
| C1- Design ships, small units, and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Analyze and interpret data and design experiments to obtain new data. |
| | C1-2 Design a marine system, component, or process to meet a need. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate designs, shipbuilding processes and propose improvements. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair, and conversion projects. | C3-1Solve ship design and shipbuilding problems. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules, and regulations governing marine activities. | C5-1 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Collaborate effectively within multidisciplinary team. |
| | C6-2 Search for information and engage in life-long self-learning discipline. |

## 4. Course Contents:

## 5. Teaching and Learning Methods:

| | **Teaching and Learning Method** |
|---|---|

| **LO's** | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A-Level** | A7-1 | | | | x | | | | x | x | x | x | x | | | |
| | A7-2 | | | | x | | | | x | x | x | x | x | | | |
| | A8-1 | | | | x | | | | x | x | x | x | x | | | |
| | A9-1 | | | | x | | | | x | x | x | x | x | | | |
| | A9-1 | | | | x | | | | x | x | x | x | x | | | |
| **C-Level** | C1-1 | | | | x | | | | x | x | x | x | x | | | |
| | C1-2 | | | | x | | | | x | x | x | x | x | | | |
| | C2-1 | | | | x | | | | x | x | x | x | x | | | |
| | C3-1 | | | | x | | | | x | x | x | x | x | | | |
| | C5-1 | | | | x | | | | x | x | x | x | x | | | |
| | C6-1 | | | | x | | | | x | x | x | x | x | | | |
| | C6-2 | | | | x | | | | x | x | x | x | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| **No.** | **Teaching Method** |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| **No.** | **Assessment Method** | **LOs** |
|---|---|---|
| 1 | Formative (presentation - report) | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C6-1, C6-2 |
| 2 | Oral Examination | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C6-1, C6-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Formative (presentation - report) | Every week |
| 2 | Final Term Oral Examination | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Formative (presentation - report) | 50 |
| 2 | Final Term Oral Examination | 75 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| | Variable according to the research topic |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

### 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Variable according to the research topic.** | 6 | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C6-1, C6-2 |

**Course Coordinator: Variable according to the research topic.**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 435 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply the engineering knowledge of the fundamentals of ship outfitting systems onboard and inboard the ship to introduce the students with the main differences between these systems. Moreover, it gives them a general idea about the job required from each system. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B3-1 | Distinguish the differences between different ship outfitting systems and each system importance |
| B3-2 | Select the suitable equipment of each ship outfitting system according to the required tasks and the requirements and standards of classifications societies. |
| B4-1 | Select the suitable standards required for the design of different ship outfitting systems. |
| B4-2 | Discuss the required data to design and operate different ship outfitting systems |
| C1-1 | Design different ship outfitting systems according to the classifications societies' regulations. |
| C1-2 | Evaluate the design and performance of different ship outfitting systems |
| C4-1 | Plan the required steps to be taken for the proper installation, operation, and maintenance of different ship outfitting systems. |
| C5-1 | Conduct some field trips to be familiar with different ship outfitting systems. |

| **Course: Ship Outfitting** | |
|---|---|
| **Course LOs** | **Program LOs** |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Distinguish the differences between different ship outfitting systems and each system importance |
| | B3-2 Select the suitable equipment of each ship outfitting system according to the required tasks and the requirements and standards of classifications societies. |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Select the suitable standards required for the design of different ship outfitting systems. |
| | B4-2 Discuss the required data to design and operate different ship outfitting systems |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design different ship outfitting systems according to the classifications societies' regulations. |
| | C1-2 Evaluate the design and performance of different ship outfitting systems |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Plan the required steps to be taken for the proper installation, operation, and maintenance of different ship outfitting systems. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Conduct some field trips to be familiar with different ship outfitting systems. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to ship outfitting | 1 |
| 2 | Ship Mooring and Anchoring Systems | 2 |
| 3 | Loading & unloading systems | 3-5 |
| 4 | Lifesaving and firefighting systems | 6-7 |
| 5 | Piping systems outfitting | 9-10 |
| 6 | Internal accommodation outfitting | 11-12 |
| 7 | Painting and corrosion prevention Systems | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **B - Level** | B3-1 | **X** | **X** | | | | | | | | | | | | | |
| | B3-2 | **X** | **X** | | **X** | | | | | | | | | | | |
| | B4-1 | **X** | **X** | | | | | | | | | | | | | |
| | B4-2 | **X** | **X** | | | **X** | | | | | | | | | | |
| **C - Level** | C1-1 | **X** | **X** | | | | **X** | | | | | | | | | |
| | C1-2 | **X** | **X** | | | | **X** | | | | | | | | | |
| | C4-1 | **X** | **X** | | | | | | | | | | | | | |
| | C5-1 | **X** | **X** | | | | | | | | **X** | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | B3-1, B3-2, B4-1, B4-2 |
| 2 | Formative (quizzes – presentation) | B3-1, B3-2, C5-1 |
| 3 | Final Term Examination (written) | B3-1, B3-2, B4-1, B4-2, C1-1, C1-2, C4-1 |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Roh, Myung-Il, and Kyu-Yeul Lee. Computational Ship Design. Springer Singapore, 2018. |
| **2** | R A Shenoi, Part II - Ship Production Technology Lecture Notes, School of Engineering Sciences, University of Southampton, 2016. |
| **3** | Wärtsilä Encyclopedia of Marine Technology, Accessed on July 2018 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to ship outfitting | 1 | B3-1 |
| 2 | Ship Mooring and Anchoring Systems | 1 | B3-2, B4-1, B4-2, C1-1, C1-2, C4-1, C5-1 |
| 3 | Loading & unloading systems | 1 | B3-2, B4-1, B4-2, C1-1, C1-2, C4-1, C5-1 |
| 4 | Lifesaving and firefighting systems | 1 | B3-2, B4-1, B4-2, C1-1, C1-2, C4-1, C5-1 |
| 5 | Piping systems outfitting | 1 | B3-2, B4-1, B4-2, C1-1, C1-2, C4-1, C5-1 |
| 6 | Internal accommodation outfitting | 1 | B4-1, B4-2, C1-1, C1-2, C4-1, C5-1 |
| 7 | Painting and corrosion prevention Systems | 1 | B3-2, B4-1, B4-2, C1-1, C1-2, C4-1 |

**Course Coordinator: Prof Mo’men Gaafary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 436 | | |
| **Year/ Level** | Fourth year- $2^{nd}$ semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | 1 |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 7 | Apply numerical methods and experiments in the structural design of ship structures to correctly define the acting loads and to analysis both local and global behavior of ship structural components against different loads and ageing parameters. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B1-1 | Distinguish the different capabilities expected from structural design software. |
| B1-2 | Use commercial software to analyze simple ship panels |
| B1-3 | Measure initial imperfections and residual stresses during construction process. |
| C1-1 | Search new ship structural configurations and superstructure design. |
| C1-2 | Design proper openings and minimize the effects of structural discontinuities. |
| C1-3 | Design ship structural components against buckling. |
| C2-1 | Apply the calculation geometrical properties of sections to evaluate the sectional properties in case of composite structures and after addition of superstructure. |
| C3-1 | Identify the critical areas in ship structures due to different discontinuities and openings and recall the required precautions. |
| C3-2 | Carry out fatigue analysis of welded joints. |

| **Course: Ship Structural Design** | |
|---|---|
| **Program LOs** | **Course LOs** |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, | B1-1 Distinguish the different capabilities expected from structural design software. |
| | B1-2 Use commercial software to analyze simple ship panels. |

| | |
|---|---|
| Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics, and Vibrations. | B1-3 Measure initial imperfections and residual stresses during construction process. |
| C1- Design ships, small units, and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Search new ship structural configurations and superstructure design. |
| | C1-2 Design proper openings and minimize the effects of structural discontinuities. |
| | C1-3 Design ship structural components against buckling. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge | C2-1 Apply the calculation geometrical properties of sections to evaluate the sectional properties in case of composite structures and after addition of superstructure. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair, and conversion projects. | C3-1 Identify the critical areas in ship structures due to different discontinuities and openings and recall the required precautions. |
| | C3-2 Carry out fatigue analysis of welded joints. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to finite element method and use of commercial software | 1-2 |
| 2 | Composite sections | 3-4 |
| 3 | Plate bending and orthotropic plate theory | 5-6-7-8 |
| 4 | Discontinuities, Hull- Superstructure interaction | 10-11 |
| 5 | Fatigue analysis of welded joints | 13-12 |
| 6 | Tutorial Applications & Examinations | 14 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| B-Level | B1-1 | X | X | | X | | | X | | | | X | | | X | |
| | B1-2 | X | X | | X | | | X | | | | X | | | | |
| | B1-3 | X | X | | | | X | X | | | | | | | | |
| C-Level | C1-1 | X | X | | X | | X | | | | X | | | | | |
| | C1-2 | X | X | | | | X | X | | | | | | | X | |
| | C1-3 | X | X | | X | | X | | X | | | | | | X | |
| | C2-1 | X | X | | X | | | | | X | | | | | X | |
| | C3-1 | X | X | | | | | | X | X | | | | | X | |
| | C3-2 | X | X | | | | | | | | | | | | X | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | B1-1, B1-2, B1-3, C1-1 |
| 2 | Practical Examinations | C1-1, C1-3, C2-1 |
| 3 | Oral Examinations | C3-1, C3-2 |
| 4 | Formative (quizzes – proposals - presentation) | B1-1, B1-2, B1-3 |
| 5 | Final Term Examination (written) | B1-1, B1-2, B1-3, C1-1, C1-2, C1-3, C2-1, C3-1, C3-2 |

## 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Practical/Oral Examinations | 15 |
| 3 | Formative (quizzes – proposals - presentation) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

## 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 3 | Practical/Oral Examinations | 10 |
| 3 | Formative (quizzes – proposals - presentation) | 02 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | R. Taggart (1980), Ship Design and Construction, SNAME |
| **2** | K.J.Rawson and E.C.Tupper 1968 and 1976, 'Basic Ship theory', Vol.1 |
| **3** | O.F.Hughes(1988), 'Ship structural design', SNAME |
| **4** | IACS (2010). Common structural rules for double hull oil tankers. IACS Common structural Rules, Det Norske Veritas. |
| **5** | DNV (2014). Fatigue Assessment of Ship Structures, Classification Notes - No. 30.7. Det Norske Veritas. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to finite element method and use of commercial software | 7 | B1-1, B1-2, B1-3 |
| 2 | Composite sections | 7 | B1-1 C1-1, C1-2 |
| 3 | Plate bending and orthotropic plate theory | 7 | C1-1, C2-1, C3-1 |
| 4 | Discontinuities, Hull- Superstructure interaction | 7 | C1-1, C2-1, C3-1 |
| 5 | Fatigue analysis of welded joints | 7 | C1-1, C2-1, C3-1, C3-2 |

**Course Coordinator: Assoc. Prof. Dr. Saad Bahey Eldeen**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME **437** | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | - |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 2 | Use the suitable techniques, skills and modern engineering tools to fight the main sources of the marine pollution and the ways of prevention. It teaches also the necessary measures to reduce and eliminate the inputs to sea. This course provides also a study of the pollution due to ship accidents and treatments of pollution due to oil spill. The different structural ship design for minimum pollution , equipments and marine units for treatment of marine pollution are also among the main aims of this course |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Show how to design a ship for minimum pollution |
| A4-2 | Recognize the methods used for treatment of pollution due to oil spills |
| A10-1 | Recognize the international convention for the prevention of pollution from ships |
| B1-1 | Investigate the different methods for reduction and avoidance of marine pollution in ship design |
| B1-2 | Determine the extent of the pollution due to different ship accidents |
| B1-3 | Differentiate between the different methods of treatment of pollution due to oil spill |
| B4-1 | Recognize the types of pollution due to ship operation |
| B4-2 | Show how to design a ship for minimum pollution |
| C1-1 | Estimate the oil spill after tanker accidents |
| C1-2 | Choose the suitable methods for the treatment of pollution |
| C5-1 | Collect data about pollution sources and prevention methods |
| C6-1 | Collect data about pollution sources and prevention methods |

| **Course:** Engineering Methods for Fighting Marine pollution | |
|---|---|
| **Program LOs** | **Course LOs** |
| A4-Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Show how to design a ship for minimum pollution |
| | A4-2 Recognize the methods used for treatment of pollution due to oil spills |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies | A10-1 Recognize the international convention for the prevention of pollution from ships |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Investigate the different methods for reduction and avoidance of marine pollution in ship design |
| | B1-2 Determine the extent of the pollution due to different ship accidents |
| | B1-3 Differentiate between the different methods of treatment of pollution due to oil spill |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Recognize the types of pollution due to ship operation |
| | B4-2 Show how to design a ship for minimum pollution |
| C1-Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors | C1-1 Estimate the oil spill after tanker accidents |
| | C1-2 Choose the suitable methods for the treatment of pollution |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Collect data about pollution sources and prevention methods |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend. | C6-1 Collect data about pollution sources and prevention methods |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Definition of Pollution | 1 |
| 2 | Pollution due to ship operations | 2-3 |
| 3 | Reduction and avoidance of marine pollution | 4-5 |
| 4 | Accidental pollution | 6 |
| 5 | Estimation of oil spill after tanker accidents | 7-8 |
| 6 | Recovery of oil spill | 9-10 |
| 7 | Ship design to minimize pollution | 11-12 |
| 8 | Equipment and marine units for treatment of marine pollution | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A4-1 | X | X | | X | X | | | | X | X | | X | | | |
| | A4-2 | X | X | | X | X | | | | X | X | | X | | | |
| | A10-1 | X | X | | X | X | | | | X | X | | X | | | |
| B-Level | B1-1 | X | X | | X | X | | | | X | X | | X | | | |
| | B1-2 | X | X | | X | X | | | | X | X | | X | | | |
| | B1-3 | X | X | | X | X | | | | X | X | | X | | | |
| | B4-1 | X | X | | X | X | | | | X | X | | X | | | |
| | B4-2 | X | X | | X | X | | | | X | X | | X | | | |
| C-Level | C1-1 | X | X | | X | X | | | | X | X | | X | | | |
| | C1-2 | X | X | | X | X | | | | X | X | | X | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **C5-1** | x | x | | x | x | | | | x | x | | x | | | |
| | **C6-1** | x | x | | x | x | | | | x | x | | x | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A10-1,B1-1,B1-2,B4-1,B4-2 |
| 2 | Formative (quizzes – presentation – case studies & reports) | A4-2,B1-3,C1-1 |
| 3 | Final Term Examination (written) | A4-1,A4-2,B1-1,B1-3,C1-2,C5-1, C6-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation – case studies & reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 20 |
| 2 | Formative (quizzes – presentation – case studies & reports) | 10 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | R.D. Clark "The long-term effect of oil pollution on marine population, communities an ecosystem" Royal Society, London 1982 |
| 2 | R.B. Clark "Marine Pollution "Published in the United States by Oxford University Press, New York 1998 |
| 3 | National Research Council "Oil in the sea: input, fates and effects National Academy Press, Washington, D.C. 1985 |
| 4 | P.G. Wells, J.N. Butler "Exxon Valdez oil spill: fate and effect and J.S. Hughes Alaskan w American Society for Testing and Materials, Philadelphia 1995 |
| 5 | Periodical & Web sites of RINA & SNAME |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Definition of Pollution | 2 | A10-1 |
| 2 | Pollution due to ship operations | 2 | B4-1 |
| 3 | Reduction and avoidance of marine pollution | 2 | B1-1 |
| 4 | Accidental pollution | 2 | B1-2 |
| 5 | Estimation of oil spill after tanker accidents | 2 | B1-3,C1-1 |
| 6 | Recovery of oil spill | 2 | A4-2,C1-2,C5-1 |
| 7 | Ship design to minimize pollution | 2 | A4-2 |
| 8 | Equipment and marine units for treatment of marine pollution | 2 | C6-1 |

**Course Coordinator: Prof. Dr. Eng. Laila Bassiony Kamar**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 438 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 1 | 1 |

## 2. Course aims:

| No. | aim |
|---|---|
| 5 | Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills related to all aspects of ship production. Moreover, it helps the student to apply the principles of quality control necessary to produce a ship. Additionally, it introduces the concept of A/C team and its crucial role for ship production. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A4-1 | Identify the importance of Quality Control & Accuracy Control in shipbuilding. |
| A4-2 | Clarify the main requirements from each section concerning A/C. |
| A6-1 | Learn the job of the A/C team. |
| A6-2 | Recognize the importance of the troubleshooting teams in any shipyard. |
| B4-1 | Distinguish the role of Accuracy Control in all levels of any ship production project. |
| B4-2 | Interpret the relevant rules and codes of A/C required for shipbuilding processes. |
| C3-1 | Illustrate some of the different quality assurance applications in shipbuilding. |
| C3-2 | Appraise the importance of planning, executing, evaluation, and application levels of ship production procedures. |
| C6-1 | Appreciate the role of the internet for more advanced knowledge. |
| C6-2 | Prepare reports in certain topics related to the course. |
| C6-3 | Conduct some presentations on chosen topics related to the course. |

| Course: Ship Production & Quality Control | |
|---|---|
| **Program LOs** | **Course LOs** |
| A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | A4-1 Identify the importance of Quality Control & Accuracy Control in shipbuilding. |
| | A4-2 Clarify the main requirements from each section concerning A/C. |
| A6- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | A6-1 Learn the job of the A/C team. |
| | A6-2 Recognize the importance of the troubleshooting teams in any shipyard. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Distinguish the role of Accuracy Control in all levels of any ship production project. |
| | B4-2 Interpret the relevant rules and codes of A/C required for shipbuilding processes. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair and conversion projects. | C3-1 Illustrate some of the different quality assurance applications in shipbuilding. |
| | C3-2 Appraise the importance of planning, executing, evaluation, and application levels of ship production procedures. |
| C6- Carry on specific research topic and develop the appropriate skills to present and defend | C6-1 Appreciate the role of the internet for more advanced knowledge. |
| | C6-2 Prepare reports in certain topics related to the course. |
| | C6-3 Conduct some presentations on chosen topics related to the course. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Quality Control in ship production. | 1-2 |
| 2 | Financial, Personal & Production Control | 3-4 |
| 3 | Planning & Executing in shipyards. | 5-8 |

| | | |
|---|---|---|
| 4 | Trouble shooting team. | 01-10 |
| 5 | Evaluation of A/C requirements regarding all procedures. | 12-13 |
| 6 | Application of all A/C instructions. | 14-15 |

## 5. Teaching and Learning Methods:

| LO’s | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A4-1 | X | X | | X | | | X | | | | | | | | |
| | A4-2 | X | X | | X | | | X | | | | | | | | |
| | A6-1 | X | X | | X | | X | X | | | | | | | | |
| | A6-2 | X | X | | X | | X | | | | | | X | | | |
| B-Level | B4-1 | X | X | | X | | X | | | | | | | | | |
| | B4-2 | X | X | | X | | X | | | | | | X | | | |
| C-Level | C3-1 | X | X | | X | | X | | | | | | | | | |
| | C3-2 | X | X | | X | | | X | | | | | | | | |
| | C6-1 | X | X | | X | X | | X | | | | X | | | | |
| | C6-2 | X | X | | X | X | X | | | | | | X | | | |
| | C6-3 | X | X | | X | X | X | X | | | | X | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A4-1, A4-2, A6-1, A6-2 |
| 2 | Formative (quizzes – presentation -reports) | A4-1, A6-2, B4-2 |
| 3 | Oral examination | C3-1, C3-2 |
| 4 | Final Term Examination (written) | A4-1, A4-2, A6-1, A6-2, C3-1, C3-2, B4-1, B4-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation -reports) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation -reports) | 21 |
| 3 | Oral Exam | 10 |
| 4 | Final Term Examination (written) | 60 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Ship Design and Construction 1st Edition, Robert Taggart (Editor), ISBN-13: 978-0960304806. |
| **2** | Ship Construction, Fifth Edition 5th Edition, D J Eyres (Author), ISBN-13: 978-0750648875. |
| | |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Quality Control in ship production. | 5 | A4-1, B4-1, B4-2 |
| 2 | Financial, Personal & Production Control | 5 | A4-2, C6-1 |
| 3 | Planning & Executing in shipyards. | 5 | A6-1, B4-1 |
| 4 | Trouble shooting team. | 5 | A6-2, B4-2 |
| 5 | Evaluation of A/C requirements regarding all procedures. | 5 | C3-1, C3-2 |
| 6 | Application of all A/C instructions. | 5 | A4-2, B4-1, C6-1, C6-2, C6-3 |

**Course Coordinator: Dr. Randa Ramadane**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 439 | | |
| **Year/ Level** | Fourth year– 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | -- | -- | 5 |

## 2. Course aims:

| No. | aim |
|---|---|
| 7&8 | Apply design and construction process to carry-out, develop, present, and discuss a specific design project within the area of naval architrave and marine engineering, to meet the requirements of international classification societies with the aid of modern engineering tools by leading or working as a team member in a student group. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A7-1 | Think in a creative and innovative way in problem solving and design. |
| A7-2 | Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. |
| A8-1 | Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. |
| A9-1 | Select and appraise appropriate ICT tools to a variety of engineering problems. |
| A9-1 | Incorporate economic, societal, environmental dimensions and risk management in design. |
| C1-1 | Analyze and interpret data and design experiments to obtain new data. |
| C1-2 | Design a marine system, component, or process to meet a need. |
| C2-1 | Evaluate designs, shipbuilding processes and propose improvements. |
| C3-1 | Solve ship design and shipbuilding problems. |
| C5-1 | Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| C5-2 | Collaborate effectively within multidisciplinary team. |

| **Course: Project (B)** | |
|---|---|
| **Program LOs** | **Course LOs** |

| | |
|---|---|
| A7- Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | A7-1 Think in a creative and innovative way in problem solving and design. |
| | A7-2 Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. |
| A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | A8-1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. |
| A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | A9-1 Select and appraise appropriate ICT tools to a variety of engineering problems. |
| | A9-2 Incorporate economic, societal, environmental dimensions and risk management in design. |
| C1- Design ships, small units, and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Analyze and interpret data and design experiments to obtain new data. |
| | C1-2 Design a marine system, component, or process to meet a need. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate designs, shipbuilding processes and propose improvements. |
| C3- Plan, manage and carry out ships' construction, maintenance, repair, and conversion projects. | C3-1Solve ship design and shipbuilding problems. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules, and regulations governing marine activities. | C5-1 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. |
| | C5-2 Collaborate effectively within multidisciplinary team. |

## 4. Course Contents:

## 5. Teaching and Learning Methods:

| | **Teaching and Learning Method** |
|---|---|

| **LO's** | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A-Level** | A7-1 | | | | X | | | | X | X | X | X | X | | | |
| | A7-2 | | | | X | | | | X | X | X | X | X | | | |
| | A8-1 | | | | X | | | | X | X | X | X | X | | | |
| | A9-1 | | | | X | | | | X | X | X | X | X | | | |
| | A9-1 | | | | X | | | | X | X | X | X | X | | | |
| **C-Level** | C1-1 | | | | X | | | | X | X | X | X | X | | | |
| | C1-2 | | | | X | | | | X | X | X | X | X | | | |
| | C2-1 | | | | X | | | | X | X | X | X | X | | | |
| | C3-1 | | | | X | | | | X | X | X | X | X | | | |
| | C5-1 | | | | X | | | | X | X | X | X | X | | | |
| | C5-2 | | | | X | | | | X | X | X | X | X | | | |

## 6. Teaching and Learning Methods of Disable Students:

| **No.** | **Teaching Method** |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| **No.** | **Assessment Method** | **LOs** |
|---|---|---|
| 1 | Formative (plans – proposals - presentation) | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C5-2 |
| 2 | Oral Examination | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C5-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Formative (plans – proposals - presentation) | Every week |
| 2 | Final Term Oral Examination | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Formative (plans – proposals - presentation) | 50 |
| 2 | Final Term Oral Examination | 75 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Variable according to the research topic. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

### 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | **Variable according to the research topic.** | 7 & 8 | A7-1, A7-2, A8-1, A9-1, A9-1, C1-1, C1-2, C2-1, C3-1, C5-1, C5-2 |

**Course Coordinator: Variable according to the research topic.**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 440 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 6 | Act professionally in design and supervision of naval architecture and marine engineering. And provide the Student, with the basic knowledge and skills of how to recognize the different marine systems on shipboard. This course will also provide students with the ability to be familiar with the main propulsion and power transmission systems. The students have to know the advanced methods for energy conservation and heat recovery onboard ships. They have to be familiar with dual fuel engines, NG engines and should be capable of install, design and laying the equipment and systems using to reduce the marine pollution and ship emissions. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Identify the properties and specification of the elements. |
| A1-2 | Investigate the simple mechanical elements. |
| A1-3 | Outline and collect the required data for a certain design |
| B1-1 | Select the suitable protective scheme for different system configurations based on analysis. |
| B2-1 | Select and determine the suitable requirements for safety and environmental protection |
| B3-1 | Practice the ability to apply the recent and new technology. |
| C1-1 | Solve the engineering problems related to Marine engineering and naval architecture |
| C1-2 | Analyze the classification society rules and regulations to predict the safety |
| C1-3 | Practice the ability to improve and add new ideas to marine disciplines |
| C2-1 | Apply the modern and recent software |

**Course: Energy Conservation in Marine Systems**

| Program LOs | Course LOs |
|---|---|
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Identify the properties and specification of the elements. |
| | A1-2 Investigate the simple mechanical elements. |
| | A1-3 Outline and collect the required data for a certain design |
| B1 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B1-1 Select the suitable protective scheme for different system configurations based on analysis. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Select and determine the suitable requirements for safety and environmental protection |
| B3-Select conventional mechanical equipment according to the required performance. | B3-1 Practice the ability to apply the recent and new technology. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Solve the engineering problems related to Marine engineering and naval architecture |
| | C1-2 Analyze the classification society rules and regulations to predict the safety |
| | C3-1 Practice the ability to improve and add new ideas to marine disciplines |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Apply the modern and recent software |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Ship propulsion systems, Shafting and power transmission | 1-2 |
| 2 | Arrangement of stern tube, Shaft alignment | 3-5 |
| 3 | Stress analysis of shafting system, Noise and vibration of ship propulsion system | 6-9 |
| 4 | Application of NG in marine engines | 01-10 |
| 5 | Energy saving and heat recovery systems onboard ship | 12-13 |
| 6 | Reduction of ship emission methodology , Water desalination onboard ship | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | X | X | | X | | | X | | | | | | | | |
| | A1-2 | X | X | | X | X | X | X | | | | | | | | |
| | A1-3 | X | X | | X | X | X | X | | | | | | | | |
| B-Level | B1-1 | X | X | | X | | X | X | | | | | | | | |
| | B2-1 | X | X | | X | | X | | | | | | | | | |
| | B3-1 | X | X | | X | | X | | | | | | | | | |
| C-Level | C1-1 | X | X | | X | | X | X | | | | | | | | |
| | C1-2 | X | X | | X | | X | X | | | | | | | | |
| | C1-3 | X | X | | X | X | | X | | | | | | | | |
| | C2-1 | X | X | | X | X | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, B1-1, B3-1, C1-2, C1-2, C1-3 |
| 2 | Formative (quizzes – presentation - drawings) | A1-1, A1-2, A1-3, B1-1, B2-1,C1-2, C1-3 |
| 3 | Final Term Examination (written) | A1-1, A1-2, A1-3, B3-1, B2-0, C1-1, C1-2, C2-0 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - drawings) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation - drawings) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | D. Yogi Goswami and Frank Kreith, Energy Conversion, CRC Press, Taylor& Francis Group 2008. |
| **2** | Ghazi A. Karim, dual fuel diesel engines, CRC Press, Taylor& Francis Group 2015. |
| **3** | Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992 |
| **4** | R. Taggart, "ship Design and Construction", SNAME, USA 1980 |
| **5** | SNAME and RINA periodicals |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Ship propulsion systems, Shafting and power transmission | 6 | A1-1, B1-1, B3-1, C1-2 |
| 2 | Arrangement of stern tube, Shaft alignment | 6 | A1-2, C1-2, B1-1, B2-1 |
| 3 | Stress analysis of shafting system, Noise and vibration of ship propulsion system | 6 | B3-1, C1-2, C2-0 |
| 4 | Application of NG in marine engines | 6 | B1-1, B1-2, C1-2, C1-2, C2-0 |
| 5 | Energy saving and heat recovery systems onboard ship | 6 | A1-1, B2-1, B3-1 |
| 6 | Reduction of ship emission methodology , Water desalination onboard ship | 6 | B1-1, B1-2, C1-2, C1-2, C2-0 |

**Course Coordinator: Prof. Dr. Adel Abdalla Tawfik**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | Elective (3) - NME 441 | | |
| **Year/ Level** | Fourth year- 1st semester – Law 2014 | | |
| | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical/Oral |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | Aim |
|---|---|
| 2 | Use the hydrodynamic analysis of the velocity and pressure fields in the surrounding domain of a rotating propeller blade using the airfoil theory. Investigate an efficient method to determine the optimum propeller diameter and/or RPM, for a given propeller thrust and/or torque. Acquire the knowledge of the most recent theories of marine propeller action such as; linear lifting line theory, lifting surface theory, blade mesh methods. Apply engineering practice to develop the knowledge of methods to reduce cavitation and generated vibration to improve propeller performance. Apply the acquainted knowledge of different non-conventional propulsion devices including theory of operation, to decide which type is more suitable for which kind of ship application. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A1-1 | Investigate the airfoil theory to develop expressions of the velocity and dynamic pressure fields and pressure distribution along the blade airfoil sections. |
| A1-2 | Investigation of the Wageningen equations and series to simulate the propeller characteristics' as in Burrill charts. Develop a method to determine optimum propeller diameter and RPM, for a given propeller thrust or torque. |
| A1-3 | Investigate the marine propeller theories and characteristics of the linearized lifting line theory, linearized lifting surface theory, and panel methods. Investigate the propeller cavitation, vibration, and propeller performance. |
| B1-1 | Analyze and investigate the methods to reduce vibration, cavitation, and to improve performance of marine propulsion. |
| B1-2 | Recognize and analyze different non-conventional propulsion devices, features, theory of operation, performance and marine applications. |
| B4-1 | Analyze and investigate assessment standards of the international maritime organization, IMO, of cavitation and vibration due to propulsion. |
| C2-1 | Evaluate the dynamic pressure distribution for propeller blades airfoil section. Apply the Wageningen Series to estimate optimum propeller diameter and RPM, given thrust or torque. |
| C2-2 | Check and estimate propeller cavitation, and adopt methods to reduce hull vibration and improve propeller performance. |

| | |
|---|---|
| C5-1 | Apply the assessment standards of the International Maritime Organization, to check and evaluate propeller cavitation and hull vibration due to propulsion. |

| **Course:** Propulsion of Marine Units | |
|---|---|
| **Program LOs** | **Course Los** |
| A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | A1-1 Investigate the airfoil theory to develop expressions of the velocity and dynamic pressure fields and pressure distribution along the blade airfoil sections. |
| | A1-2 Investigation of the Wageningen equations and series to simulate the propeller characteristics' as in Burrill charts. Develop a method to determine optimum propeller diameter and RPM, for a given propeller thrust or torque. |
| | A1-3 Recognize the marine propeller theories and characteristics of the linearized lifting line theory, lifting surface theory, and panel methods. Investigate different non-conventional propulsion devices, features, and theory of operation. Investigate the propeller cavitation, vibration, and performance. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Analyze and investigate different propeller theory. Analyze methods to reduce vibration, cavitation, and to improve propeller performance. |
| | B1-2 Analyze and investigate different non-conventional propulsion devices, features, theory of operation, performance and marine applications. |
| B4 - Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Analyze and investigate the requirements of the International Maritime Organization, assessment standards of cavitation and hull vibration due to marine propulsion. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate the dynamic pressure distribution for propeller blades airfoil section. Apply the Wageningen Series, to estimate optimum propeller diameter / RPM, given thrust / torque. |

| | |
|---|---|
| | C2-2 Check and estimate propeller cavitation, and adopt methods to reduce hull vibration to improve propeller performance. |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Apply the assessment standards of the International Maritime Organization, to check and evaluate propeller cavitation and hull vibration due to propulsion. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Airfoil theory and pressure distribution along the propeller blades cross-section. | 1-3 |
| 2 | Propeller linearized lifting line, lifting surface theories, and panel methods. | 4-6 |
| 3 | Wageningen Series and Charts Method to Represent Burrill charts of Propeller Characteristics of Type B. | 7-9 |
| 4 | Optimum propeller diameter and RPM, for a given propeller thrust or torque. | 10-11 |
| 5 | Propeller Cavitation and Effect on Propeller Performance. Methods to reduce hull vibration due to propeller cavitation. | 12-13 |
| 6 | Non-Conventional propulsion devices theory of operation aiming to ship energy conservation and its applications in marine units. | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A1-1 | x | x | | x | | | x | | | | | | | | |
| | A1-2 | x | x | | x | | | x | | | | | | | | |
| | A1-3 | x | x | | x | | | x | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | x | | | | | | | | |
| | B1-2 | x | x | | x | | x | | | | | | | | | |
| | B4-1 | x | x | | x | | x | | | | | | | | | |
| C-Level | C2-1 | x | x | | x | | x | | | | | | | | | |
| | C2-2 | x | x | | x | | | X | | | | | | | | |
| | C5-1 | x | x | | x | | | X | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Mid Term Examination (written) | A1-1, A1-2, A1-3, B1-1, C2-1 |
| 2 | Formative (quizzes – presentation - reports) | A1-1, A1-2, A1-3, B1-1, B1-2, C2-1, C2-2, C5-1 |
| 3 | Final Term Examination (written) | A1-1, A1-2, A1-3, B1-1, B1-2, B4-1, C2-1, C2-2, C5-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - reports) | Every 2nd week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (quizzes – presentation - reports) | 20 |
| 3 | Oral / Written Exam | --- |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | John Breslin, and Poul Andersen, “Hydrodynamics of Ship Propellers”, Ocean Technology Series 3, Cambridge, USA, 1994. |
| **2** | Group of Authors, “Principles of Naval Architecture“, SNAME Publications, Vol. 2, USA, 2012. |
| **3** | Mo’men Gaafary, “Some 20 Published International Research Papers on Marine Propulsion and Non-Conventional Propulsion Systems and Devices,” 1990-2010. |
| **4** | Rawson, and Tupper, "Basic Ship Theory,” Vol.2, Longman, England, 1999. |
| **5** | **Keywords for Internet Search**<br>Marine Propulsion, Hydrodynamics of Marine propellers, Ship Propeller Cavitation and Vibration, and Non-Conventional Propulsion. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presentation in Person |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Airfoil theory and pressure distribution along the propeller blades cross-section. | 2 | A1-1, C2-1 |
| 2 | Propeller linearized lifting line, lifting surface theories, and panel methods. | 2 | A1-3, B1-1 |
| 3 | Wageningen Series and Charts Method to Represent Burrill charts of Propeller Characteristics of Type B. | 2 | A1-2, C2-1 |
| 4 | Optimum propeller diameter and RPM, for a given propeller thrust or torque. | 2 | A1-2, C2-1 |
| 5 | Propeller Cavitation and Effect on Propeller Performance. Methods to reduce hull vibration due to propeller cavitation. | 2 | A1-3, B1-1, B4-1, C2-2, C5-1 |
| 6 | Non-Conventional propulsion devices theory of operation aiming to ship energy conservation and its applications in marine units. | 2 | A1-3, B1-2 |

**Course Coordinator: Prof. Dr. Mo’men M. Gaafary**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 442 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| No. | aim |
|---|---|
| 7 | Apply new technologies in the design and operation of offshore structures to withstand applied loads, to perform safe drilling and production of oil and gas by floating or fixed offshore structures. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Describe the theoretical principles of design of offshore units. |
| A3-2 | Distinguish and design of offshore units and design of mooring lines system. |
| A10-1 | Outline different types of offshore units. |
| A10-2 | Identify methods of design offshore units and mooring lines. |
| B1-1 | Generate calculations and drawings of design of offshore units and mooring lines |
| B1-2 | Practice how to simplify a dynamic problem to static and qusi-static solutions. |
| B2-1 | Design a process to carry out engineering problems of mooring lines design. |
| C1-1 | Perform offshore design analysis and assessment. |
| C2-1 | Stimulate self-learning ability by searching for new treatments and methods of offshore mooring. |

**Course: Technology of Offshore Structures**

| Program LOs | Course LOs |
|---|---|
| A3- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, | A3-1 Describe the theoretical principles of design of offshore units. |

| | |
|---|---|
| economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A3-2 Distinguish and design of offshore units and design of mooring lines system. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Outline different types of offshore units. |
| | A10-2 Identify methods of design offshore units and mooring lines. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics, and Vibrations. | B1-1 Generate calculations and drawings of design of offshore units and mooring lines |
| | B1-2 Practice how to simplify a dynamic problem to static and qusi-static solutions. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Design a process to carry out engineering problems of mooring lines design. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Perform offshore design analysis and assessment. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge | C2-1 Stimulate self-learning ability by searching for new treatments and methods of offshore mooring. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Theoretical background of design of offshore units. | 1-2 |
| 2 | Principles of design methods of mooring lines, both theory and calculations. | 3-4-5 |
| 3 | Illustrate the different types of offshore unites | 6-7-9 |
| 4 | Forces acting on Offshore Structure | 10-11-12 |
| 5 | Offshore applications | 13-14 |
| 6 | Tutorial Applications & Examinations | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A3-1 | x | x | | x | | | x | | | | x | | | | |
| | A3-2 | x | x | | x | | | x | | | | x | | | | |
| | A10-1 | x | x | | | | x | | | | | | | | | |
| | A10-2 | x | x | | | | x | | | | | | | | | |
| B-Level | B1-1 | x | x | | x | | x | | | | x | | | | | |
| | B1-2 | x | x | | | | x | | | | | | | | | |
| | B2-1 | x | x | | x | | x | | | | | | | | | |
| C- Leve | C1-1 | x | x | | x | | | | | x | | | | | | |
| | C2-1 | x | x | | | | | | x | x | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1, A10-2, B1-1,B2-1, C1- |
| 2 | Formative (report – presentation-quiz) | A10-2, B1-1, B1-2, C1-1, C2-1 |
| 3 | Final Term Examination (written) | A3-1, A3-2, A10-1, A10-2, B1-1, B1-2, B2-1, C1-1, C2-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (report – presentation-quiz) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (report – presentation-quiz) | 01 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Mather, A. (2000). Offshore Engineering: An Introduction. London, England, Witherby& Co L.td. |
| **2** | HSE (2004). Guidelines for jack-up rigs with particular reference to foundation integrity, Crown copyright. |
| **3** | Tanaka, S., et al. (2005). Offshore drilling and production equipment. Encyclopedia of Life Support Systems (EOLSS), Eds, K. Horikawa, and Guo, Q. Oxford ,UK, Eolss Publishers. |
| **4** | Haritos, N. (2007). Introduction to the Analysis and Design of Offshore Structures-An Overview. Electronic Journal of Structural Engineering Special Issue: 55-65. |
| **5** | DNV-OS-F101 (2007); Submarine Pipeline Systems, Det Norske Veritas (DNV), Oslo, Norway. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Theoretical background of design of offshore units. | 7 | A3-1, A3-2, A10-1, A10-2 |
| 2 | Principles of design methods of mooring lines, both theory and calculations. | 7 | B1-1, B1-2, B2-1 |
| 3 | Illustrate the different types of offshore unites | 7 | C1-1, C1-2, C2-1 |
| 4 | Forces acting on Offshore Structure | 7 | A10-2, C2-1, C2-2, B2-1 |
| 5 | Offshore applications | 7 | C3-1 |

**Course Coordinator: Assoc. Prof. Dr. Saad Bahey Eldeen**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 444 | | |
| **Year/ Level** | Fourth year- 1st semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 4 | Behave professionally and adhere to engineering ethics, standards, and work to develop the profession and the community and promote sustainability principles to apply special construction techniques and systems used to build non-conventional onshore and offshore units. Additionally, it guides the student to apply different practices and innovations for special functional requirements. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A3-1 | Recognize the functional requirements of some special important marine units widely used regionally. |
| A3-2 | Identify the different types of offshore platforms. |
| A10-1 | Relate the minimum requirements of the Rules of classification societies regarding the considered special units. |
| B1-1 | Discuss various theories and idealizations of structural analysis with the corresponding structural parts. |
| B1-2 | Investigate the critical areas in different structural configuration considered. |
| B2-1 | Interpret the basic principles using appropriate idealizations to design some structural components (panels) of an offshore platform. |
| C1-1 | Illustrate preliminary strength calculation to start the structural design. |
| C1-2 | Utilize the classification society Rules to carry out the structural design of the midship section of two ships (e.g., aluminum pilot boat, Nile cruiser). |
| C2-1 | Identify critical areas from the structural point of view for different structural configurations and loading conditions. |

| | |
|---|---|
| C2-2 | Assess the presence of various structural members as well as the adoption of a specific system of stiffening. |

| **Course: Construction of Special Marine Units** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | A4-1 Recognize the functional requirements of some special important marine units widely used regionally. |
| | A4-2 Identify the different types of offshore platforms. |
| A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | A10-1 Relate the minimum requirements of the Rules of classification societies regarding the considered special units. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Discuss various theories and idealizations of structural analysis with the corresponding structural parts. |
| | B1-2 Investigate the critical areas in different structural configuration considered. |
| B2- Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field. | B2-1 Interpret the basic principles using appropriate idealizations to design some structural components (panels) of an offshore platform. |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfittings taking into consideration economic, social, safety and environmental factors. | C1-1 Illustrate preliminary strength calculation to start the structural design. |
| | C1-2 Utilize the classification society Rules to carry out the structural design of the midship section of two ships (e.g., aluminum pilot boat, Nile cruiser). |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Identify critical areas from the structural point of view for different structural configurations and loading conditions. |

| | |
|---|---|
| | C2-2 Assess the presence of various structural members as well as the adoption of a specific system of stiffening. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Onshore Marine structures (types- design loads- structural configuration and design). | 1-3 |
| 2 | Structural design and construction of Special Marine vessels (commercial vessels- service vessels- industrial vessels- warships). | 4-8 |
| 3 | Offshore structures (types, design loads, structural configuration and design); tension leg platform, jack-up platforms. | 10-15 |

## 5. Teaching and Learning Methods:

| **LO's** | | **Teaching and Learning Method** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lecture** | **Interactive lectures** | **Flipped Classroom** | **Presentation** | **Discussion** | **Tutorial** | **Problem-solving** | **Brain storming** | **Projects** | **Site visits** | **Self-learning** | **Cooperative** | **Drawing Studio** | **Computer Simulation** | **Practical Experiments** |
| **A-Level** | **A3-1** | x | x | | x | | | x | | | | | | | | |
| | **A3-2** | x | x | | x | | | x | | | x | | | | | |
| | **A10-1** | x | x | | x | | | | x | | | | | | | |
| **B-Level** | **B1-1** | x | x | | x | | | | | | | | | | | |
| | **B1-2** | x | x | | x | | x | x | | | | | | | | |
| | **B2-1** | x | x | | x | | x | | | | x | | | | | |
| **C-Level** | **C1-1** | x | x | | x | | x | | x | | | | | | | |
| | **C1-2** | x | x | | x | | | x | | | | | | | | |
| | **C2-1** | x | x | | x | | | x | | | | | | | | |
| | **C2-2** | x | x | | x | | x | | | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A3-1, A3-2, A10-1, B1-2 |
| 2 | Formative (quizzes – presentation - plans) | A3-2, B1-1, C1-1, C1-2, C2-2 |
| 3 | Final Term Examination (written) | A3-1, A3-2, B2-1, C1-1, C1-2, C2-1, C2-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - plans) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quizzes – presentation - plans) | 01 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Ship Design and Construction (2003), Robert Taggart (Editor), ISBN-13: 978-0960304806. |
| 2 | Ship Construction, (2001) Fifth Edition 5th Edition, D J Eyres (Author), ISBN-13: 978-0750648875. |
| 3 | M. El-Reedy (2012), 'Offshore Structures: Design, Construction and Maintenance', 1st edition, Elsevier. |
| 4 | J.K. Paik, A.Thayamballi (2003), Ship-shaped offshore installations: Design, building and operation, Cambridge University Press. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Onshore Marine structures (types- design loads- structural configuration and design). | 4 | A3-1, A3-2, A10-1, C1-2 |
| 2 | Structural design and construction of Special Marine vessels (commercial vessels- service vessels- industrial vessels- warships). | 4 | B1-1, B1-2, C2-1 |
| 3 | Offshore structures (types, design loads, structural configuration and design); tension leg platform, jack-up platforms. | 4 | B2-1, C1-1, C1-2 |

**Course Coordinator: Dr. Randa Ramadane**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 444 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 6 | Act professionally in the design of the advanced ship propulsion machinery, the dual fuel cycles, and the application of LNG as a marine fuel, the combined power plants, the electric propulsion systems, the propulsion machinery performance and alternative fuels. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2-1 | Investigate the performance of mixed cycle engines. |
| B1-1 | Analyze the application of dual fuel engines for ship propulsion systems |
| B1-2 | Discuss the possibility of using alternative fuels for marine applications and its environmental impacts |
| C1-1 | Design electric and hybrid propulsion systems for container ships. |
| C1-2 | Design and optimize energy conversion and conservation systems and technologies onboard ships |
| C2-1 | Evaluate the performance of compressed and liquefied natural gas carriers propulsion systems |
| C2-2 | Evaluate the performance of exhaust emissions reduction methods and technologies |
| C4-1 | Recognize the most common energy management strategies and risk analysis for hybrid propulsion system operation |

| **Course: Advanced Marine Engines** | |
|---|---|
| **Course LOs** | **Program LOs** |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Investigate the performance of mixed cycle engines. |
| B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations. | B1-1 Analyze the application of dual fuel engines for ship propulsion systems |
| | B1-2 Discuss the possibility of using alternative fuels for marine applications and its environmental impacts |
| C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Design electric and hybrid propulsion systems for container ships. |
| | C1-2 Design and optimize energy conversion and conservation systems and technologies onboard ships |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Evaluate the performance of compressed and liquefied natural gas carriers propulsion systems |
| | C2-2 Evaluate the performance of exhaust emissions reduction methods and technologies |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Recognize the most common energy management strategies and risk analysis for hybrid propulsion system operation |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction to mixed cycle engines | 1 |
| 2 | Duel fuel engines | 2 |
| 3 | Electric and hybrid propulsion systems | 3-5 |
| 4 | Natural gas carrier and Containerships power plants | 6-7 |
| 5 | Exhaust emissions reduction onboard ships | 9-10 |
| 6 | Energy conservation and conversion systems | 11-12 |
| 7 | Energy management and risk analysis | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A - Level | A2-1 | X | X | | | | | | | | | | | | | |
| B - Level | B1-1 | X | X | | | | | | | | | | | | | |
| | B1-2 | X | X | | | X | | | X | | | | | | | |
| C - Level | C1-1 | X | X | | | | | | | | | | | | | |
| | C1-2 | X | X | | | | X | | | | | | | | | |
| | C2-1 | X | X | | | | X | | | | | | | | | |
| | C2-2 | X | X | | | | | | | | | | | | | |
| | C4-1 | X | X | | | | | | | | | X | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A2-1, B1-1, C1-1, C2-1 |
| 2 | Formative (quizzes – presentation – discussions) | A2-1, B1-2, C1-1, C4-1, C4-2 |
| 3 | Final Term Examination (written) | A2-1, B1-1, B1-2, C1-1, C1-2, C2-1, C2-2, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation – discussions) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 3 | Formative (quizzes – presentation – discussions) | 21 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Yang, Z.et all, Marine Power Plant, Springer, 2021 |
| **2** | Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992. |
| **3** | Patel, Mukund R. Shipboard propulsion, power electronics, and ocean energy. Crc Press, 2012. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to mixed cycle engines | 6 | A2-1 |
| 2 | Duel fuel engines | 6 | B1-1, B1-2 |
| 3 | Electric and hybrid propulsion systems | 6 | B1-1, C1-1 |
| 4 | Natural gas carrier and Containerships power plants | 6 | B1-2, C1-1, C2-1 |
| 5 | Exhaust emissions reduction onboard ships | 6 | B1-2, C1-1, C2-2 |
| 6 | Energy conservation and conversion systems | 6 | C1-1, C1-2 |
| 7 | Energy management and risk analysis | 6 | C2-1, C4-1 |

**Course Coordinator: Dr Ameen Bassam**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 445 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | -- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 1 | Apply the basic knowledge and physics of different types of new and renewable energies including its marine applications. Targeted energies include solar, wind, wave, tidal, fuel cells, hydrogen, etc. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2-1 | Investigate the performance of solar and wind power systems through simulation |
| B1-1 | Analyze the application of different renewable energy recourses for ship different applications |
| B1-2 | Model solar, wind, and wave systems mathematically. |
| C1-1 | Design renewable solar energy systems with energy storage for marine applications |
| C1-2 | Design and optimize wind turbine renewable energy systems using an open source calculation software |
| C2-1 | Compute the performance of renewable energy systems and components over its operational range |
| C2-2 | Evaluate ships performance that integrates new and renewable energies |
| C4-1 | Recognize the most common failure reasons and disadvantages of marine renewable energy systems |

<table>
<tr><th colspan="2">Course: New and Renewable Energy</th></tr>
<tr><th>Course LOs</th><th>Program LOs</th></tr>
<tr><td>A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.</td><td>A2-1 Investigate the performance of solar and wind power systems through simulation.</td></tr>
<tr><td rowspan="2">B1- Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.</td><td>B1-1 Analyze the application of different renewable energy recourses for ship different applications</td></tr>
<tr><td>B1-2 Model solar, wind, and wave systems mathematically.</td></tr>
<tr><td rowspan="2">C1- Design ships, small units and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors.</td><td>C1-1 Design renewable solar energy systems with energy storage for marine applications</td></tr>
<tr><td>C1-2 Design and optimize wind turbine renewable energy systems using an open source calculation software</td></tr>
<tr><td rowspan="2">C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge.</td><td>C2-1 Compute the performance of renewable energy systems and components over its operational range</td></tr>
<tr><td>C2-2 Evaluate ships performance that integrates new and renewable energies</td></tr>
<tr><td>C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures.</td><td>C4-1 Recognize the most common failure reasons and disadvantages of marine renewable energy systems</td></tr>
</table>

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Introduction and Egypt potential of renewable energy | 1 |
| 2 | Conventional energy and its negative environmental impacts | 2 |
| 3 | Solar energy and marine applications | 3-4 |
| 4 | Wind energy and marine applications | 5-7 |
| 5 | Wave energy and marine applications | 9-10 |
| 6 | Tidal energy and marine applications | 11-12 |
| 7 | New energy and energy storage | 13-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A - Level | A2-1 | X | X | | | | | | | | | | | | | |
| B - Level | B1-1 | X | X | | | | | | | | | | | | | |
| | B1-2 | X | X | | | | X | | | | | | | | | |
| C - Level | C1-1 | X | X | | | | X | | | | | | | | | |
| | C1-2 | X | X | | | | X | | | | | | | | X | |
| | C2-1 | X | X | | | | X | | | | | | | | | |
| | C2-2 | X | X | | | X | | | | | | | | | | |
| | C4-1 | X | X | | | X | | | X | | | | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A2-1, B1-1, C1-1, C2-2 |
| 2 | Formative (quizzes – presentation - discussions) | C1-1, C4-1, C4-2 |
| 3 | Final Term Examination (written) | A2-1, B1-1, B1-2, C1-1, C1-2, C2-2, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quizzes – presentation - discussions) | Every week |
| 4 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 3 | Formative (quizzes – presentation - discussions) | 21 |
| 4 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Tester, Drake, Driscoll, Golay, and Peters; Sustainable Energy: Choosing Among Options; The MIT Press, Cambridge MA, 2005. |
| **2** | Handbook of Solar Energy - Theory, Analysis and Applications - G.N. Tiwari et al., Springer, 2016 |
| **3** | A K Aliyu, B Modu, C W Tan, A review of renewable energy development in Africa: A focus in South Africa, Egypt and Nigeria, Renewable and Sustainable Energy Reviews, Volume 81, 2018. |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facility |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction and Egypt potential of renewable energy | 1 | A2-1, C2-2, C4-1 |
| 2 | Conventional energy and its negative environmental impacts | 1 | A2-1, C2-2, C4-1 |
| 3 | Solar energy and marine applications | 1 | A2-1, B1-1, B1-2 |
| 4 | Wind energy and marine applications | 1 | A2-1, B1-1, C1-1, C1-2 |
| 5 | Wave energy and marine applications | 1 | B1-1, C1-1, C2-1 |
| 6 | Tidal energy and marine applications | 1 | B1-1, C1-1, C2-1 |
| 7 | New energy and energy storage | 1 | B1-1, C2-1, C2-2 |

**Course Coordinator: Dr Ameen Bassam**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B.Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 446 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 8 | Lead and manage proper ship surveys to meet the International Maritime Organization and classification society's requirements to improve the safety and security of international shipping. |
| 2 | Use techniques, skills, and modern NDT tools, necessary for ship survey practice. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2-1 | Practice a number of available testing to recognize hull or equipment deficiencies. |
| B4-1 | Recognize the different parties involved in ship survey. |
| B4-2 | Identify the importance and purpose of different inspections and surveys |
| C2-1 | Recognize the different operational and accidental scenarios acquiring special inspections and surveys for hull and equipment. |
| C2-2 | Acquire the proper terminology used for addressing survey comments and certificates issuance |
| C5-1 | Identify the hull critical areas according to IACS guidelines |
| C5-2 | Recognize the survey requirements of a distinguished classification society. |

| Course: Ship Surveys | |
|---|---|
| **Program LOs** | **Course LOs** |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | A2-1 Practice a number of available testing to recognize hull or equipment deficiencies. |
| B4- Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems. | B4-1 Recognize the different parties involved in ship survey. |
| | B4-2 Identify the importance and purpose of different inspections and surveys |
| C2-Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Recognize the different operational and accidental scenarios acquiring special inspections and surveys for hull and equipment. |
| | C2-2 Acquire the proper terminology used for addressing survey comments and certificates issuance |
| C5- Carry out different marine surveys and investigation in accordance to engineering code of ethics, conventions, rules and regulations governing marine activities. | C5-1 Identify the hull critical areas according to IACS guidelines |
| | C5-2 Recognize the survey requirements of a distinguished classification society. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Types of surveys | 1 |
| 2 | Load Line Survey | 2 |
| 3 | Survey Requirements of the classification societies | 3 |
| 4 | Relevant background: NDT and measurements | 4+5 |
| 5 | Hull Survey (applied to bulk carriers and tankers as examples) | 6+7 |
| 6 | Equipment Survey (chains, anchors….etc) | 9 |
| 7 | Machinery and propulsion survey | 10+11 |
| 8 | Steering gear survey | 12 |
| 9 | Survey of ship systems (lifesaving equipment, cargo gear .. etc.) | 13+14 |

## 5. Teaching and Learning Methods:

| LO’s | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture(online & in class) | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A2-1 | x | | | | | | | | | | | | | | x |
| B-Level | B4-1 | x | | | | | | | | | x | x | | | | |
| | B4-2 | | x | | | | x | x | | | | | | | | |
| C-Level | C2-1 | x | | | | | | | | | | x | | | | |
| | C2-2 | x | | | | | | | | | | | | | | |
| | C5-1 | x | | | | | | | x | | x | | | | | |
| | C5-2 | x | | | | | | | | | | x | | | | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional videos (internet) |
| 2 | Online lectures |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | C3-1, C5-2, |
| 2 | Formative (drawings – reports ) | B4-1, B4-2, C5-1, C5-2 |
| 3 | Final Term Examination (written) | C3-2, C4-1, C5-1, C5-2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (drawings – reports ) | 2, 3, 4 |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 10 |
| 2 | Formative (drawings – reports ) | 20 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

### 8. List of References

| No. | Reference List |
|---|---|
| **1** | Rules of Ship Classification published by a specified society (e.g. Lloyd's Register) |
| **2** | Bulk Carriers - Guidelines for Surveys, Assessment and Repair of Hull Structure”, IACS Rec 76, 2017 |
| **4** | www.eagle.org, publications and guidelines of the American Buro of Shipping |

### 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Types of surveys | 8 | B4-1, C2-2 |
| 2 | Load Line Survey | 8 | C3-1 |
| 3 | Survey Requirements of the classification societies | 8 | B4-1, B4-2, C2-1, C5-2 |
| 4 | Relevant background: NDT and measurements | 2 | A2-1 |
| 5 | Hull Survey (applied to bulk carriers and tankers as examples) | 8 | C2-1, C5-1, C5-2 |
| 6 | Equipment Survey (chains, anchors….etc) | 8 | B4-2, C2-1, C5-2 |
| 7 | Machinery and propulsion survey | 8 | C2-1, C5-2 |
| 8 | Steering gear survey | 8 | C2-1, C5-2 |
| 9 | Survey of ship systems (lifesaving equipment, cargo gear .. etc.) | 8 | C2-1, C5-2 |

**Course Coordinator: Prof. Heba S. El-Kilani**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**

## 1. Basic Information

| | | | |
|---|---|---|---|
| **Program Title** | B. Sc. in Naval Architecture & Marine Engineering | | |
| **Department offering the Program** | Naval Architecture & Marine Engineering | | |
| **Department Responsible for the Course** | Naval Architecture & Marine Engineering | | |
| **Course Code** | NME 447 | | |
| **Year/ Level** | Fourth year- 2nd semester | | |
| **Specialization** | Major | | |
| **Teaching Hours** | Lectures | Tutorial | Practical |
| | 2 | 2 | --- |

## 2. Course aims:

| **No.** | **aim** |
|---|---|
| 7 | Apply numerical methods, finite element theory and commercial codes as ANSYS in the structural modeling and analysis of ship structural components 2D and 3D to understand both local and global behavior along the ship service life. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| A2-1 | Select the most appropriate software based on the problem definition i.e ANSYS. |
| A2-2 | Generate the model in 2D or 3D modules using ANSYS interface to i.e., plate with an opening or stiffened plate or mid-ship section. |
| B3-1 | Identify the solver condition i.e., activating the arc-length to facilitate the convergence. |
| B3-2 | Select the needed results to be plotted and extract the nodal solutions i.e., reaction forces, bending moment and stress distribution. |
| C1-1 | Apply the beam and plat theories to find out the deformation and bending moment. |
| C1-2 | Apply Euler equation to find out Euler load and calculate the elastic range. |
| C2-1 | Plot the stress distribution and find out the location with high deformation. |
| C4-1 | Evaluate the ability of the modeled structural components to withstand the applied load and comply with the design codes. |

| **Course: Ship Structural Modeling** | |
|---|---|
| **Program LOs** | **Course LOs** |
| A2- Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use | A2-1 Select the most appropriate software based on the problem definition i.e ANSYS. |

| | |
|---|---|
| statistical analyses and objective engineering judgment to draw conclusions. | A2-2 Generate the model in 2D or 3D modules using ANSYS interface to i.e., plate with an opening or stiffened plate or mid-ship section. |
| B3- Select conventional mechanical equipment according to the required performance. | B3-1 Identify the solver condition i.e., activating the arc-length to facilitate the convergence. |
| | B3-2 Select the needed results to be plotted and extract the nodal solutions i.e., reaction forces, bending moment and stress distribution. |
| C1- Design ships, small units, and offshore platforms, and all their components including hull, propulsion, steering systems, and outfitting's taking into consideration economic, social, safety and environmental factors. | C1-1 Apply the beam and plat theories to find out the deformation and bending moment. |
| | C1-2 Apply Euler equation to find out Euler load and calculate the elastic range. |
| C2- Evaluate the behavior and performance of ships in both inland, coastal waterways and open sea based on his accumulated engineering knowledge. | C2-1 Plot the stress distribution and find out the location with high deformation. |
| C4- Carry out the installation, operation, and maintenance, repair processes for the machineries and propulsion systems of ships and marine structures. | C4-1 Evaluate the ability of the modeled structural components to withstand the applied load and comply with the design codes. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| 1 | Give examples of common use of mild and high tensile steel, aluminum, composite materials in ship building and offshore industry. | 1 |
| 2 | Calculate the deflection, bending capacity, section modulus of different cross-sections configuration and draw the load curve and calculate the sagging ad hogging bending moment along the ship hull. | 2-3 |
| 3 | Understand the finite element theory and its applications in engineering files, the capabilities of each software and its applications in marine filed and select the most appropriate software based on the problem definition i.e ANSYS. | 4-5-6 |
| 4 | Use ANSYS interface to generate the model in 2D or 3D modules, generate the appropriate mesh size, apply loads and boundary conditions and identify the solver condition i.e. activating the arc-length in order to facilitate the convergence. | 7-9 |

| | | |
|---|---|---|
| 5 | Select the needed results to be plotted and extract the nodal solutions i.e., reaction forces, bending moment and stress distribution.<br>Apply the beam and plat theories to find out the deformation and bending moment.<br>Apply Euler equation to find out Euler load and calculate the elastic range. | 01-10 |
| 6 | Understand the stress distribution and find out the location with high deformation.<br>Decided the ability of the modeled structural components to withstand the applied load and comply with the design codes. | 12-13 |
| 7 | Quiz, discussion, and General revision | 14-15 |

## 5. Teaching and Learning Methods:

| LO's | | Teaching and Learning Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Interactive lectures | Flipped Classroom | Presentation | Discussion | Tutorial | Problem-solving | Brain storming | Projects | Site visits | Self-learning | Cooperative | Drawing Studio | Computer Simulation | Practical Experiments |
| A-Level | A2-1 | x | x | | | | | x | | | | x | | | x | |
| | A2-2 | x | x | | | | | x | | | | x | | | x | |
| B-Level | B3-1 | x | x | | | | x | | | | | | | | x | |
| | B3-2 | x | x | | | | x | | | | | | | | x | |
| C-Level | C1-1 | x | x | | | | x | | | | x | | | | x | |
| | C1-2 | x | x | | | | x | | | | | | | | x | |
| | C2-1 | x | x | | | | x | | | | | | | | x | |
| | C4-1 | x | x | | | | | | | | | | | | x | |

## 6. Teaching and Learning Methods of Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination (written) | A2-1, A2-2, B3-1, B3-2 |
| 2 | Formative (quiz – draft - worksheet) | A2-2, B3-1, B3-2, C1-1, C2-1 |
| 3 | Final Term Examination (written) | A2-1, A2-2, B3-1, B3-2, C1-1, C1-2, C2-1, C4-1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Formative (quiz – draft - worksheet) | Every week |
| 3 | Final Term Examination (written) | Decided by Faculty Council |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 01 |
| 2 | Formative (quiz – draft - worksheet) | 21 |
| 3 | Final Term Examination (written) | 70 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | O.F.Hughes(1988), 'Ship structural design', SNAME |
| **2** | Faulkner D. (1975). A review of effective plating for use in the analysis of stiffened plating in bending and compression. J Ship Res; 19:1-17. |
| **3** | Paik J.K., Thayamballi, A.K. (2003). Ultimate limit state design of steel-plated structures, John Wiley & Sons, Ltd, Chichester, U.K. |
| **4** | DNV (2014). Fatigue Assessment of Ship Structures, Classification Notes - No. 30.7. Det Norske Veritas. |
| **5** | ANSYS Mechanical APDL Basic Analysis Guide, Release 14.5, 2013, U.S.A. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Presenter |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to the finite element theory and the different commercial codes based on finite element analysis as ANSYS. Identify the application of ANSYS in ship structural design and offshore structures | 7 | A1-1, A1-2, B1-1 |
| 2 | Modeling of 2D and 3D modules | 7 | B1-1, B1-2, C1-2 |
| 3 | Apply different loading and bondary conditions | 7 | B1-1, B1-2, C1-1 |
| 4 | Plot and extract the results | 7 | C2-1, C2-2 |
| 5 | Check the validity of the solutuion | 7 | C4-1 |

**Course Coordinator: Assoc. Prof. Dr. Saad Bahey Eldeen**

**Program Coordinator: Dr Ameen Bassam**

**Head of Department: Assoc. Prof. Dr. Moustafa Mohamed Moustafa**