Program Specification

For

Master of Science Degree

in

Naval Architecture and Marine Engineering

Program Specification

For

Master of Science Degree in
Naval Architecture and Marine Engineering

A- Basic Information

1- Program title: M. Sc. in Naval Architecture and Marine Engineering

2- Program type:	Single	X	Double		Multiple	

3- Department (s): Naval Architecture and Marine Engineering
4- Coordinator: Assoc. Prof. Dr. Moustafa Mohamed Moustafa
5- External evaluator(s): Prof. Dr. Mohamed A. Kotb
6- Last date of program specifications approval: October 2020

B- Professional Information

1. Introduction

The program should demonstrate that its graduates have the ability to collect and analyze data when studying any problem in at least one branch of engineering. The students should be prepared for a professional career with a broad knowledge of basics of Naval Architecture and Marine Engineering with high emphases on most recent issues. They should also be able to adapt with new technological trends and acquire technical and managerial leadership skills in their field of specialization. The program also aims to enhance the individual skills of using computer software, charts, tables, and standards in different fields of Naval Architecture and Marine Engineering applications as well as the communication skills in written, verbal and graphical forms. It is also intended to prepare the students to work effectively in team and multi-disciplinary technical environments.

1- Graduate Attributes:

After completing the program, the graduate would able to be:

A. Proficiency in the application of the basics and the methodologies of scientific research and the use of its different tools to serve professional practice in the field of Naval Architecture and Marine Engineering.
B. Apply the analytical approach and using it in the field of Naval Architecture and Marine engineering, as well as the topics that affect his/her professional practice.
C. Apply the specialized knowledge integrated with and the use of appropriate engineering

tools, such as, computational facilities, laboratory equipment, necessary for his / her professional practice and project management.

D. Specialized engineering concepts related to his / her professional practice in the field of Naval Architecture and Marine Engineering.
E. Show awareness of current problems and modern visions in the field of Naval Architecture and Marine Engineering.
F. Identify professional problems and find solutions for it.
G. Mastery of an appropriate range of specialized professional and intellectual skills and the use of appropriate technology means to carry out a research study, writing a scientific methodology plain. Add new information to the knowledge and write scientific paper.
H. Communicate effectively and lead team works effectively.
I. Take good decisions in different professional contexts
J. Employ available resources to achieve and maintain the highest benefit
K. Show awareness of his / her role in community development and environmental conservation in the light of the global and regional variables
L. Display professional responsibilities and ethical, societal and cultural concerns.
M. Recognize the need to engage to develop him / her academically and being able to learn continuously in the field of Naval Architecture and Marine Engineering.

2- Program Aims:

The graduate of the Master program must be able to:

1. Gain a depth of knowledge, understanding, and methodologies of scientific research including professional skills, pertinent software and appropriate technological means to make decisions, employ available resources efficiently, develop new skills to deal with high level complex problems, and engage in continuous learning practice in the field of Naval Architecture and Marine engineering.
2. Demonstrate sufficient essential knowledge and a deep understanding of concepts, theories, and practice in the field of Naval Architecture and Marine engineering, as well as the topics that affect his/her professional practice.
3. Apply the analytical approaches and its technological professional skills to develop techniques for identifying, formulating, solving, analyzing, and designing Naval Architecture and Marine engineering problems.
4. Communicate and lead team works effectively through professional system considering the detrimental impact of the engineer role on society, environment, societal and cultural concerns.
5. Demonstrate knowledge of contemporary, current, and advanced engineering issues related to Naval Architecture and Marine engineering problems.
6. Adopt basics and principles of quality and fundamentals of ethical & legal professional practice of scientific research in the field of Naval Architecture and Marine engineering.
7. Carry out a research study and writing a scientific methodology plain and add new information to the knowledge and write scientific paper.

3- Graduate Attributes with Program Aims

Program Aims	Graduates Attributes
1. Gain a depth of knowledge, understanding and methodologies of scientific research including professional skills, pertinent software and appropriate technological means to make decisions, employ available resources efficiently, develop new skills to deal with a high-level complex problems, and engage in continuous learning practice in the field of Naval Architecture and Marine engineering.	A, G, J, and I
2. Demonstrate sufficient essential knowledge and a deep understanding of concepts, theories, and practice in the field of Naval Architecture and Marine engineering, as well as the topics that affect his/her professional practice.	C and G
3. Apply the analytical approaches and its technological professional skills to develop techniques for identifying, formulating, solving, analyzing, designing, and analyze risks of the professional practice in Naval Architecture and Marine engineering.	B and F
4. Communicate and lead team works effectively through professional system considering the detrimental impact of the engineer role on society, environment, societal and cultural concerns.	H, K, and L
5. Demonstrate knowledge of contemporary, current, and advanced engineering issues related to Naval Architecture and Marine engineering problems.	D
6. Adopt basics and principles of quality and fundamentals of ethical & legal professional practice of scientific research in the field of Naval Architecture and Marine engineering.	M
7. Carry out a research study and writing a scientific methodology plain and add new information to the knowledge and write scientific paper.	N

4- Intended Learning Outcomes (ILOs) for the whole program

Naval Arch Engineering Master Program is designed to achieve the above objectives through the following Intended **Learning Outcomes (ILOs)**:

A. Knowledge and understanding			
NAQAAE Academic Reference Standards (ARS)	**ILOs**	**Graduate Attributes**	**Courses Covering such ILOs (by code)**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	A, B	NME501, NME502, NME503, NME506, NME508, NME509, NME510, NME 511, NME512, NME513, NME516, NME517, NME519, NME520, NME522, NME523, NME524, NME525, NME527, NME528, SCI604, SCI 605, NME601, NME602, NME605, NME606, NME607, NME608, NME609, NME610, NME611, NME612
	a1-2Understand the theories, basics and specialized knowledgein the field of**Marine Engineering.**		NME503, NME507, NME518, NME518, NME519, NME523, NME524, SCI604, SCI605, NME602, NME603, NME607, NME608
	a1-3 Understand the theories, basics and specialized knowledge in the field of **Ship Construction and production.**		NME502, NME504, NME505, NME514, NME515, NME526, NME529, NME604, M. Sc. Thesis
	a1-4 Understand the theories, basics and specialized knowledge in the field of **Naval Architecture and Ship and Design.**		NME501, NME508, NME509, SCI604, NME613,M. Sc. Thesis
	a1-5 Exhibit ability to in detail, creatively, with a high level of clarity and authority, using scientific scrutiny		M. Sc. thesis

	and adequate tools identify, explain, analyze and assess issues pertinent to the M.Sc. thesis in the research field.		
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	J	NME506, NME509, NME 510, NME511, NME513, NME516, NME517, NME519, NME520, NME521, NME522, NME527, NME604, NME609, NME610, M. Sc. Thesis
	a2-2Recognize the different effects of marine industries on the environment.		NME506, NME509, NME511, NME513, NME516, NME520, NME521, NME527, NME604, NME605, NME610, NME611, NME612
A3- Main scientific advances in the field of specialization.	a3-1Search new advances in analysis and design methodologies in the specific topic of research.	D, F, L	NME506, NME508, NME516, M. Sc. Thesis
	a3-2 Report the recent and update developments in the most important themes related to the specific topic of research.		NME525,NME606, M. Sc. Thesis
A4- Fundamentals of ethical & legal professional practice in the field of specialization.	a4-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	K,N	NME520, NME521, NME527, SCI604, NME606, M. Sc. Thesis
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	F, H, I	NME502, NME504, NME505, NME507, NME512, NME514, NME515, NME518, NME522, NME523, NME524, NME525, NME526, NME528, NME529, NME601, NME603, NME607, NME608
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	K	NME503, NME512, NME601, NME602, NME609, M. Sc. Thesis

B. Intellectual skills			
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	B, C	NME503, NME504, NME505, NME506, NME508, NME509, NME511, NME512, NME513, NME514, NME515, NME516, NME517, NME518, NME519, NME520, NME522, NME523, NME524, NME525, NME527, NME528, NME529, SCI604, SCI 605, NME601, NME602, NME604, NME605, NME606, NME610, NME611, NME612
	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.		NME501, NME504, NME505, NME506, NME507, NME508, NME510, NME512, NME513,NME514, NME515, NME518, NME521, , NME528, NME529, SCI 605, NME601, NME603, NME606, NME607, NME608, NME613
B2- Solve specialized problems with lack of some data and variables(incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	B, C, E	NME501, NME503, NME506, NME507, NME526, NME602, NME603, NME609, NME613,M. Sc. Thesis
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	B, C, E, H, I	NME502, NME506, NME509, NME510, NME511, NME513, NME516, NME517, NME520, NME527, SCI604, NME605, NME610, NME611, NME612, M. Sc. Thesis
	b3-2 Use integrated approaches to solve scientific problem.		NME604, NME608, M. Sc. Thesis

B4- Conduct a research studyand/or writingsystematicscientific study about the research topic.	b4-1 Perform applied research on industrial and societal concerns problems related to marine industries (thesis).	A, D, E, F,N	NME506, NME519, NME520, NME521, SCI604, M. Sc. Thesis
B5- Assess risks in professional practicein the field of specialization,	b5-1 Evaluate pros and cons of given methodologies or procedures adopted in the specific research field.	J, K	NME521, NME526, M. Sc. Thesis
B6- Plan for performance development in the field of practice .	b6-1 Plan to guide progress in his / her professional career.	C, L	NME522, NME523, NME524, NME525, NME607, NME608, M. Sc. Thesis
B7- Take professional decisions in different professional practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	H	NME502, NME512, NME526, NME601, NME607, NME609, M. Sc. Thesis
C. Professional and practical skills			
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	A, B, C, D, E, F	NME502, NME503, NME506, NME509, NME510, NME511, NME512, NME513, NME516, NME519, NME520, NME522, NME523, NME524, NME525, NME526, NME527, NME528, SCI604, NME601, NME602, NME604, NME605, NME606, NME607, NME608, NM609,NME610, NME611, NME612, NME613
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	A, L,N	NME501, NME503, NME504, NME505, NME506, NME507, NME508, NME509, NME510, NME511, NME513, NME514, NME515, NME516, NME518, NME519, NME520, NME521, NME522, NME523, NME524, NME525, NME526, NME527,

			NME528, NME529, SCI604, CI 605, NME602, NME603, NME604, NME608, NME611, NME612
C3- Evaluate means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches concerning specified problem related to marine technology.	A, E, F, H, I	NME 512, SCI 605, NME601, NME607, M. Sc. Thesis
D. General and transferrable skills			
D1- Communicate effectively using all methods.		G	NME517, NME520, SCI604, NME601, NME606, NME609, M. Sc. Thesis
D2- Use information technology to improve his/her professional practice.		A, F, I, L	NME501, NME503, NME506, NME507, NME509, NME510, NME511, NME512, NME513, NME516, NME518, NME519, NME520, NME521, NME522, NME523, NME524, NME525, NME527, NME528, NME601, NME602, NME603, NME604, NME605, NME607, NME608, NME610, NME611, NME612, NME613
D3- Apply self evaluation and define personal educational needs.		L	NME506, NME520, NME521, NME526, SCI605, M. Sc. Thesis
D4- Set evaluation criteria and benchmarks for others.		G, K	NME503, NME504, NME505, NME511, NME515, NME529, SCI604, NME606, M. Sc. Thesis
D5- Use different sources to obtain knowledge and information.		C, L	NME508, NME514, NME521, NME526, NME610, M. Sc. Thesis
D6- Lead a team in familiar professional context		G	NME501, NME503, NME507, NME509, NME516, NME527,

			NME602, NME603, NME604, NME609, NME611, NME612
D7- Manage time effectively		G, I	NME502, NME510, NME513, NME526, SCI604, M. Sc. Thesis
D8- Learn independently and seek continuous learning.	d8-1 Express a strong foundation of continuous learning so they can maintain their technical competency.	L	NME609, M. Sc. Thesis
	d8-2 Seek continuous learning through continuous education, organizing and participating in seminars, workshops, national and international conferences.		NME606, M. Sc. Thesis

5- ProgramAcademic Reference Standards (ARS)

The external references for standards considered in the development of this program were the Academic Reference Standards (ARS) for postgraduate programsprepared bythe National Authority for Quality Assurance and Accreditation (NAQAAE) on 2009. These standards set out the attributes and academic characteristics that are expected to be achieved by the end of the program.

6- ProgramStructure and Contents:

4.1 Program Duration: a minimum of 2 years & a maximum of 5 years (including one year of preparatory courses)

4.2 Program Structure:

Awarding a Master Degree in Naval Architecture and Marine Engineering required the study of courses amounting to 18 hours weekly for one academic year. 9 hours of them are devoted to department basic requirements. The other 9 hours constitute specialized courses are selected by the supervision team and approved by the department council. These courses are chosen from among the 500 and 600 levels and are directly related to the research topic. Also, required for awarding the Master Degree in Naval Architecture and Marine Engineering is the execution of a scientific research that terminates by writing a thesis containing the research results and its complete analysis and defending it successfully.

4.3 Program Contents:

- Courses

➢ **Department Basic Requirements Courses:**

Course Code	Course Title	Course Hours/Week	Marks Written Exam
SCI 604	Engineering Probabilities and Statistics	3	100
SCI 605	Finite Element Methods	3	100
NME 601	Marine Systems Economics	3	100

Elective Course*

NME 501	Numerical Methods and Programming	3	100
NME 502	Operation Research	3	100
NME 503	Ship Propulsion System	3	100
NME 504	Ship Hydrodynamics	3	100
NME 505	Hydrodynamics of High Speed Units	3	100
NME 506	Ship Rescue	3	100
NME 507	Ship Performance	3	100
NME 508	Design of Small Marine Units	3	100
NME 509	Propellers Design Theory	3	100
NME 510	Ship Motion Among Waves	3	100
NME 511	Ship Steering and Manoeuvrability	3	100
NME 512	Marine Systems Economics	3	100
NME 513	Design of On-shore Units	3	100
NME 514	Ship Outfitting	3	100
NME 515	Domestic Transport Units	3	100
NME 516	Ship Vibrations	3	100

NME 517	Ships Structural Design (1)	3	100
NME 518	Ship Machinery	3	100
NME 519	Performance of Ship Machinery	3	100
NME 520	Marine Measuring Tools	3	100
NME 521	International Conventions and Ship safety	3	100
NME 522	Thermal Applications in Marine Engineering	3	100
NME 523	Marine power stations	3	100
NME 524	Marine Auxiliary Machinery	3	100
NME 525	Automatic Control Applications in Marine Engineering	3	100
NME 526	Under Water Technology	3	100
NME 527	Ship Construction (1)	3	100
NME 528	ship production and quality assurance	3	100
NME 529	Pollution of Marine environment (1)	3	100
NME 602	Ship Propulsion System	3	100
NME 603	Ship Performance	3	100
NME 604	Ship Construction (2)	3	100
NME 605	Ship Structural Design (2)	3	100
NME 606	Pollution of Marine Environment (2)	3	100
NME 607	Advanced Marine Engineering	3	100
NME 608	Marine Power Systems	3	100
NME 609	Boundary Layer Theory and Viscous Flow	3	100
NME 610	Ocean Engineering Dynamics	3	100
NME 611	Sea Wave Dynamics and Wave Theory	3	100
NME 612	Stochastic Analysis of Ship Motion Among Waves	3	100

NME 613	Marine Structural Reliability	3	100

* Select only three courses related to the research topic.

- Thesis

5- Evaluation of program intended learning outcomes:

- Written examinations for the preparatory year after 30 weeks.
- An examiners committee is approved by the faculty council (including at least one external examiner). The evaluation of the thesis and the discussion is carried out in an open session.

6- Program Matrix:

The following table explains the ILO's (of the current program) – Course (main ILOs) matrix.

Program Matrix: ILO's (M. Sc. program) – Course (main ILOs) matrix.

Code	Course Title	a1-1	a1-2	a1-3	a1-4	a1-5	a2-1	a2-2	a3-1	a3-2	a4-1	a5-1	a6-1	b1-1	b1-2	b2-1	b3-1	b3-2	b4-1	b5-1	b6-1	b7-1	c1-1	c2-1	c3-1	D1	D2	D3	D4	D5	D6	D7	d8-1	d8-2
NME 501	Numerical Methods and Programming	x			x										x	x								x			x				x			
NME 502	Operation Research	x		x								x					x					x	x									x		
NME 503	Ship Propulsion System	x	x										x	x		x							x	x			x		x		x			
NME 504	Ship Hydrodynamics			x								x		x	x									x						x				
NME 505	Hydrodynamics of High Speed Units			x								x		x	x									x						x				
NME 506	Ship Rescue	x					x	x	x					x	x	x	x		x				x	x			x	x						
NME 507	Ship Performance		x									x			x	x								x			x				x			
NME 508	Design of Small Marine Units	x			x				x					x	x									x						x				
NME 509	Propellers Design Theory	x					x	x						x			x						x	x			x				x			
NME 510	Ship Motion Among Waves	x					x								x		x						x	x			x					x		
NME 511	Ship Steering and Manoeuvrability	x					x	x						x			x						x	x			x			x				
NME 512	Marine Systems Economics	x										x	x	x	x							x	x		x	x	x							
NME 513	Design of On-shore Units	x					x	x						x			x						x	x			x					x		
NME 514	Ship Outfitting			x								x		x	x									x						x				
NME 515	Domestic Transport Units			x								x		x	x									x						x				

Code	Course Title	a1-1	a1-2	a1-3	a1-4	a1-5	a2-1	a2-2	a3-1	a3-2	a4-1	a5-1	a6-1	b1-1	b1-2	b2-1	b3-1	b3-2	b4-1	b5-1	b6-1	b7-1	c1-1	c2-1	c3-1	D1	D2	D3	D4	D5	D6	D7	d8-1	d8-2
NME 516	Ship Vibrations	x					x	x	x					x			x						x	x			x				x			
NME 517	Ships Structural Design (1)	x					x							x			x						x			x								
NME 518	Ship Machinery		x									x		x	x									x			x							
NME 519	Performance of Ship Machinery	x	x				x							x					x				x	x			x							
NME 520	Marine Measuring Tools	x					x	x			x			x			x		x				x	x		x	x	x						
NME 521	International Conventions and Ship safety						x	x			x				x				x	x				x			x	x		x				
NME 522	Thermal Applications in Marine Engineering	x	x									x		x							x		x	x			x							
NME 523	Marine power stations	x	x									x		x							x		x	x			x							
NME 524	Marine Auxiliary Machinery	x	x									x		x							x		x	x			x							
NME 525	Automatic Control Applications in Marine Engineering	x	x									x		x							x		x	x			x							
NME 526	Under Water Technology			x								x				x				x		x	x	x				x		x		x		
NME 527	Ship Construction (1)	x					x	x			x			x			x						x	x			x				x			
NME 528	ship production and quality assurance	x										x		x	x									x			x							
NME 529	Pollution of Marine environment (1)			x								x		x	x									x						x				

Code	Course Title	a1-1	a1-2	a1-3	a1-4	a1-5	a2-1	a2-2	a3-1	a3-2	a4-1	a5-1	a6-1	b1-1	b1-2	b2-1	b3-1	b3-2	b4-1	b5-1	b6-1	b7-1	c1-1	c2-1	c3-1	D1	D2	D3	D4	D5	D6	D7	d8-1	d8-2
SCI 604	Engineering Probabilities and Statistics	x	x		x						x			x			x		x				x	x		x			x			x		
SCI 605	Finite Element Methods	x	x											x	x									x	x			x						
NME 601	Marine Systems Economics	x										x	x	x	x							x	x		x	x	x							
NME 602	Ship Propulsion System	x	x										x	x		x							x	x			x		x		x			
NME 603	Ship Performance		x									x			x	x								x			x				x			
NME 604	Ship Construction (2)			x			x	x						x				x					x	x			x				x			
NME 605	Ship structural design (2)	x						x						x			x						x				x							
NME 606	Pollution of Marine environment (2)	x								x	x			x	x								x			x			x					x
NME 607	Advanced Marine Engineering	x	x									x			x						x	x	x		x		x							
NME 608	Marine Powersystems	x	x									x			x			x			x		x	x			x							
NME 609	Boundary Layer Theory and viscous flow	x					x						x			x						x	x			x					x		x	
NME 610	Ocean Engineering Dynamics	x					x	x						x			x						x				x			x				
NME 611	Sea wave Dynamics and wave theory	x						x						x			x						x	x			x				x			
NME 612	stochastic analysis of ship motion among waves	x						x						x			x						x	x			x				x			
NME 613	Marine Structural Reliability				x										x	x							x				x							
---	M. Sc. Thesis			x	x	x	x		x	x	x		x			x	x	x	x	x	x	x			x	x		x	x	x		x	x	x

- ***Program Coordination Committee:***

Program coordinator: **Assoc. Prof. Dr. Moustafa Mohammed**

Head of the department: **Prof. Dr. Heba El-Kilani**

Date: 10 / 2020

NME 501
Numerical Methods and Programming
Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Numerical Methods and Programming	**Code Symbol**: NME 501	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to provide the students with the essential knowledge to understand the methods of Solution and programming of linear and non-linear systems. Also, students get specifically acquainted with the differentiation and integration programming, curves and polynomials fitting and programming, surface creation. This course aims to provide the students with the skills and principles of Numerical Methods and Programming to solve several problems related to the field of marine engineering.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Identify linear and non-linear systems. a1-1-2 Categorize the methods of differentiation and integration programming. a1-1-3 Show the methods of curves and polynomials fitting and programming.

	a1-4Understand the theories, basics and specialized knowledge in the field of Naval Architecture and Ship Design.	a1-4-1 Show the methods of surface creation to check the hydrodynamics aspects of marine units..
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Evaluate the results of any non-linear system to find the optimum ship design. b1-2-2 Formulate ship hydrostatical data using the differentiation and integration programming methods.
B2- Solve specialized problems with lack of some data and variables(incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Solve non-linear system to get the hydrodynamic characteristics of marine units. b2-1-2 Create ship lines (ship hull) using the principles of curves and polynomials fitting and programming.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional report on hydrodynamic characteristics of marine units and its hydrostatical data.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use a programming software to solve several design problems in marine filed.
D6- Lead a team in familiar professional context		d6-1 Use different information recourses to collect the available data on Numerical Methods and Programming d6-2 Design a plan to achieve the steps of programming any problem in marine field based on Numerical Methods and Programming.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
Solution and programming of linear systems	18	18	---	---	a1-1-1, b1-2-1, d2-1, d6-1
solution and programming of non-linear systems	18	18	---	---	a1-1-1, b2-1-1, d2-1, d6-1
differentiation and integration programming	18	18	---	---	a1-1-2 , b1-2-2 , d2-1, d6-1
curves and polynomials fitting and programming	18	18	---	---	a1-1-3 , b2-1-2 , d2-1, d6-1
surface creation, applications on marine fields.	18	18	---	---	a1-4-1, b1-2-1, b1-2-2, b2-1-1, b2-1-2, c2-1-1, d2-1, d6-2
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1), (a1-4)	B1(b1-2), B2 (b2-1)	C2(c2-1)	D2 D6

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
5%	**10%**	**20%**	**35%**	**20%**	**10%**	**--**	**100%**

6.Course Topics

Topic No.	Topic	Weeks
1st	Solution and programming of linear systems	1 - 6
2nd	solution and programming of non-linear systems	7 - 12
3rd	differentiation and integration programming	13– 18
4th	curves and polynomials fitting and programming	19–24
5th	surface creation, applications on marine fields.	25–30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**
Course ILOs	**Knowledge & Understanding**				
a1-1-1 Identify linear and non-linear systems.	X	X			
a1-1-2 Categorize the methods of differentiation and integration programming.			X		
a1-1-3 Show the methods of curves and polynomials fitting and programming.				X	
a1-4-1 Show the methods of surface creation to check the hydrodynamics aspects of marine units..					X
Course ILOs	**Intellectual skills**				
b1-2-1 Evaluate the results of any non-linear system to find the optimum ship design.	X				X
b1-2-2 Formulate ship hydrostatical data using the differentiation and integration programming methods.			X		X
b2-1-1 Solve non-linear system to get the hydrodynamic characteristics of marine units.		X			X
b2-1-2 Create ship lines (ship hull) using the principles of curves and polynomials fitting and programming.				X	X

Course ILOs	Professional and practical skills				
c2-1-1 Prepare a professional report on hydrodynamic characteristics of marine units and its hydrostatical data.					X
Course ILOs	**General and transferrable skills**				
d2-1 Use a programming software to solve several design problems in marine filed.	X	X	X	X	X
d6-1 Use different information recourses to collect the available data on Numerical Methods and Programming	X	X	X	X	
d6-2 Design a plan to achieve the steps of programming any problem in marine field based on Numerical Methods and Programming.					X

8- Teaching and Learning Method:

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X	X											
	a1-1-2	X	X											
	a1-1-3	X	X											
	a1-4-1	X	X											
Intellectual Skills	b1-2-1	X	X			X								
	b1-2-2	X	X			X								
	b2-1-1	X	X			X								
	b2-1-2	X	X			X								
Professional Skills	c2-1-1	X	X			X								
General Skills	d2-1	X	X											
	d6-1	X	X											
	d6-2	X	X											

9- Assessment

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- List of references:

1. Claude Brezinski:"Numerical Methods and Algorithms", Springer, ISSN: 1571-5698, 2007.
2. Sastry S.S : " Introductory Methods of Numerical Analysis", Fifth Edition, PHI Learing Private Limited, New Delhi, 2012.
3. Timmy Siauw&Alexandre Bayen: "An Introduction to MATLAB Programming and Numerical Methods for Engineers", First Edition, Academic Press ©2014 , 2014.

Key words for Internet Search:

Numerical Methods, linear and nonlinear programming, curve and polynomials fitting, surface creation.

12- Program Coordination Committee:

Course Coordinator: **Dr. Moustafa Mohammed Moustafa**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 502
Course Specification
Operations Research

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Operations Research**	**Code Symbol**: NME 502	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to provide the student with skills to deal with the problems facing the industrial establishments and formulate these problems in the form of mathematical models that can be solved to assist in making decisions in favor of the establishment such as reducing the cost, increasing the profit, determining the optimal production quantity. It also helps in optimal allocation of available resources such as manpower, machinery, equipment or materials as well as in optimal planning and Scheduling processes.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a a1-1-1 Show the importance Operation Research a1-1-2 Demonstrate the importance of formulating the problem correctly a1-1-3 Identify mathematical models of Operation Research a1-1-4 Describe and interpret special cases of optimal solution.

		a1.1.5 Show what is an assignment problem
	a1-3. Understand the theories, basics and specialized knowledge in the field of Operation Research	a1.3.1. Show the methods to derive a solution of the model of Operation Research. a1.3.2. Interpret the optimal solution which is in mathematical form for decision making
A5- Basics and principles of quality in professional practice in the field of specialization.	A5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Recognize different methods of finding Initial Basic Feasible solution to a Transportation problem a5-1-2 Distinguish among the different types of a Transportation Problem a5-1-3 Outline an assignment problem. a5-1-4 Identify different types of assignment problems.
B. Intellectual skills		
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Use integrated approaches to solve scientific problem.	b3-1-1 Categorize graphical and simplex methods to find optimal solution to LP problems b3-1-2 Choose different methods to find optimal solution to transportation problems. b3-1-3 choose different methods to find optimal solution to assignment problems.
B7- Take professional decisions in different professional practical contexts.	B7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration	b7-1-1 Select the different previous methods to take optimal decisions
C. Professional and practical skills		

C1- Master the basic as well as the latest professional skills in the field of specialization.	C1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Use the concept of networks for the planning and management of projects
D. General and transferrable skills		
D7- Manage time effectively	d7-1Use a network to display a Project d7-2 Schedule a Project with CPM (Time Controlling) d7-3 Schedule and Controlling Project Costs	

3- <u>Course Contents</u>

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1. Nature of operation research	9	9	---	---	a1-1-1, d7-1
2. Overview of modeling approach	9	9	---	---	a1-1-2, a1-1-3,b7-1-1
3. Linear programming model – graphical method	6	6	---	---	a1-1-2 , a1-1-3 , a1-1-4,a1-3-1,a1-3-2, b3-1-1,b7-1-1
4. Linear programming model – simplex method	9	9	---	---	a1-1-2 , a1-1-3 , a1-1-4,a1-3-1,a1-3-2,b3-1-1, b7-1-1
5. Linear programming model – duality and dual simplex method	6	6	---	---	a1-1-2 , a1-1-3 , a1-1-4,a1-3-1,a1-3-2,b3-1-1, b7-1-1
6. Transportation problem	9	9	---	---	a1-1-4, a1-3-1,a1-3-2.a5-1-1,a5-1-2,b3-1-2, b7-1-1,
7. Assignment problem	9	9			a1-1-1,a1-1-2,a1-1-5,a1-3-1,a1-3-2,a5-1-3.a5-1-4,b3-1-3, b7-1-1

8. Network optimization models	12	12	----	----	a1-1-1, a1-1-2, a1-3-1,a1-3-2,bb7-1-1, c1-1-1, d7-1,
9. Project management with CPM	9	9			a1-1-1,a1-1-2,a1-3-1,a1-3-2,c1-1-1, d7-2, d7-3
10. Nonlinear programming	12	12			a1-1-1,a1-1-2,a1-3-1, a1-3-2, b3-1-1, b7-1-1
Total	90	90	---	---	

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) ,(a1-3), A5(a5-1)	B3(b3-1), B7 (b7-1)	C1(c1-1)	D7

5- <u>Course Subject Area:</u>

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- <u>Course Topics</u>

Topic No.	Topic	Weeks
1st	Nature of operation research	1 -3
2nd	Overview of modeling approach	4- 6

3rd	Linear programming model – graphical method	7 – 8
4th	Linear programming model – simplex method	9 – 11
5th	Linear programming model – duality and dual simplex method	12 – 13
6th	Transportation problem	14 -16
7th	Assignment problem	17 - 19
8th	Network optimization models	20 - 23
9th	Project management with CPM	24 - 26
10th	Nonlinear programming	27 - 30

7- <u>ILOs Matrix Topics</u>

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**
Course ILOs	**Knowledge & Understanding**									
a a1-1-1 Show the importance Operation Research	X						X	X	X	X
a1-1-2 Demonstrate the importance of formulating the problem correctly		X	X	X	X		X	X	X	X
a1-1-3 Identify mathematical models of Operation Research		X	X	X	X					
a1-1-4 Describe and interpret special cases of optimal solution.			X	X	X	X				
a1.1.5 Show what is an assignment problem							X			
a1.3.1. Show the methods to derive a solution of the model of Operation Research.			X	X		X	X	X	X	X
a1.3.2. Interpret the optimal solution which is in mathematical form for decision making			X	X		X	X	X	X	X
a5-1-1 Recognize different methods of finding Initial Basic Feasible solution to a Transportation problem						X				
a5-1-2 Distinguish among the different types of a Transportation Problem						X				
a5-1-3 Outline an assignment problem.							X			
a5-1-4 Identify different types of assignment problems.							X			

Course ILOs	**Intellectual skills**									
b3-1-1 Categorize graphical and simplex methods to find optimal solution to LP problems			X	X	X					X
b3-1-2 Choose different methods to find optimal solution to transportation problems.						X				
b3-1-3 choose different methods to find optimal solution to assignment problems.							X			
b7-1-1 Select the different previous methods to take optimal decisions		X	X	X	X	X	X	X		X
Course ILOs	**Professional and practical skills**									
c1-1-1 Use the concept of networks for the planning and management of projects								X	X	
Course ILOs	**General and transferrable skills**									
d7-1Use a network to display a Project	X							X		
d7-2 Schedule a Project with CPM (Time Controlling)									X	
d7-3 Schedule and Controlling Project Costs									X	

8- Teaching and Learning Method:

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X												
	a1-1-2	X		X					X					
	a1-1-3	X		X		X			X					
	a1-1-4	X		X		X								
	a1-1-5	X		X		X								
	a1-3-1	X		X		X								

	a1-3-2	X												
	a5-1-1	X												
	a5-1-2	X		X		X			X					
	a5-1-3	X		X		X								
	a5-1-4	X							X					
Intellectual Skills	b3-1-1	X		X		X								
	b3-1-2	X				X			X					
	b3-1-3	X		X					X					
	b7-1-1	X				X								
Professional Skills	c1-1-1	X		X		X			X					
General Skills	d5-1	X		X					X					
	d5-2	X				X								
	d5-3	X		X										

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for operations research.

11- <u>List of references:</u>

1. Frederick S. Hillier, Gerald J. Lieberman:"Introduction to Operations Research", McGraw-Hill, Seventh Edition, NY, 2001.
2. School of science and technology "Operations Research", National Open University of Nigeria, 2014.
3. Tommi Sottinen, "Operations Research with GNU Linear Programming Kit, University of Vaasa, 2009.
4. P. Rama Murthy,"Operation Research", New Age International (P) Ltd., Publishers, New Delhi, 2007.

- **Periodicals, Web sites, etc**

    1. Journal of Operations Research

- **Key words for Internet Search:**

  Operations Research,

12- <u>Program Coordination Committee:</u>

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 503
Ship Propulsion Systems
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Propulsion Systems	**Code Symbol**: NME 503	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course is useful and important to M. Sc. Degree students, where it aims to provide them with the wing section theory together with the pressure and loading distribution along the chord on face and back of wing sections. Efficient and safe ship propeller design. Powering of ships, propulsion efficiency, and cavitation. The course aims also to provide M. Sc. students with an understanding of linear lifting line, lifting surface theories, and panel method. Theory of operation and applications of different non-conventional propulsion devices are also included. Propeller/Engine compatibility, and how to improve propeller performance are studied. Propeller vibration and energy conservation are also considered.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1- Theories, basics and specialized knowledge in the field of learning, as well as other related subjects.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Recognize different theories of ship propeller. a1-1-2 Identify the interaction between ship's hull, propeller and rudder. a1-1-3 Demonstrate the propeller/engine compatibility, and propeller performance.
	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering..	a1-2-1 Identify the components of marine propulsion systems. a1-2-2 Recognize the principles of powering and efficiencies.
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	a6-1-1 Recognize the properties of optimum & safe propeller. a6-1-2 Categorize conventional & non-conventional propulsion devices. a6-1-3 Show how to design a marine propeller
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Choose the suitable propulsion configuration. b1-1-2 Investigate the ability to apply modern theories, methods and computer programs in propeller design.

B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Determine the powering requirements and efficiencies of a ship propeller.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Use the charts to design propeller according to ship operating conditions. c1-1-2 Demonstrate the interaction between hull, propeller and rudder, for least vibration.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for specific types of nonconventional Propellers.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills in career development.
D4- Set evaluation criteria and benchmarks for others.		D4-1 Outline model test and record the results.
D6- Lead a team in familiar professional context		d6-1 Prepare the laboratory and measurement devices to conduct the propeller tests.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Different Propeller Theories	9	9	--	--	a1-1-1, a6-1-3, b1-1-2
Conventional Propellers – Report on Types, Use, Components, …etc.	9	9	--	--	a1-2-1, a6-1-2 d2-1

Propeller Action, Arrangement, Configuration, …etc.	12	12	--	--	b1-1-1, d2-1
Powering of Ships and Interaction between Hull, Propeller, and Rudder	12	12	--	--	a1-1-2, a1-2-2, b2-1-1, c1-1-2
Open Water and Cavitation/ Wind Tunnel Propeller Model Tests	9	9	--	--	a6-1-1, d4-1, d6-1
Design of a Marine Screw Propeller Using Standard Series and Computer Applications	9	9	--	--	b1-1-2, c1-1-1, d6-1
Propeller Cavitation	6	6	--	--	a6-1-1, b2-1-1
Non-Conventional Propulsion Devices – Report on Types, Use, Components,…etc.	9	9	--	--	a1-2-1, a6-1-2, a6-1-3, c2-1-1
Propeller Performance and Propeller Caused Vibration	6	6	--	--	a1-1-3, a6-1-1, c1-1-2
Propeller/Engine Compatibility, and Ship Energy Conservation	9	9	--	--	a1-1-3, d6-1
Total	90				

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2) A6(a6-1)	B1(b1-1), B2(b2-1)	C1(c1-1), C2(c2-1)	D2, D4, D6

5- Course Subject Area:

Course Contents

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Discretionary subjects**	**Total**
-----	25%	25%	25%	15%	10%	---------	100%

6- Course Topics

Topic No.	Topic	Weeks
1st	Different Propeller Theories	1-3
2nd	Conventional Propellers – Report on Types, Use, Components, …etc.	4-6
3rd	Propeller Action, Arrangement, Configuration, …etc.	7-10
4th	Powering of Ships and Interaction between Hull, Propeller, and Rudder	11-14
5th	Open Water and Cavitation/ Wind Tunnel Propeller Model Tests	15-17
6th	Design of a Marine Screw Propeller Using Standard Series and Computer Applications	18-20
7th	Propeller Cavitation	21-22
8th	Non-Conventional Propulsion Devices – Report on Types, Use, Components,…etc.	23-25
9th	Propeller Performance and Propeller Caused Vibration	26-27
10th	Propeller/Engine Compatibility, and Ship Energy Conservation	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**
Course ILOs	**Knowledge & Understanding**									
a1-1-1	X									
a1-1-2				X						
a1-1-3									X	X
a1-2-1		X						X		
a1-2-2				X						
a6-1-1					X		X		X	

a6-1-2		X						X		
a6-1-3	X					X				
Course ILOs	**Intellectual skills**									
b1-1-1			X							
b1-1-2	X					x				
b2-1-1				X			X			
Course ILOs	**Professional and practical skills**									
c1-1-1						x				
c1-1-2				x					X	
c2-1-1								X		
Course ILOs	**General and transferrable skills**									
d2-1		X	X							
d4-1					x					
d6-1					X	X				X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x	x								
	a1-1-2	x			x	x								

	a1-1-3	x			x	x								
	a1-2-1	x			x	x								
	a1-2-2	x			x	x								
	a6-1-1	x			x	x								
	a6-1-2	x			x	x								
	a6-1-3	x			x	x								
Intellectual Skills	b1-1-1	x			x	x								
	b1-1-2	x			x	x								
	b2-1-1	x			x	x								
Professional Skills	c1-1-1	x			x	x								
	c1-1-2	x			x	x								
	c2-1-1	x			x	x								
General Skills	d2-1								x					
	d4-1								x					
	d6-1								x					

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- <u>List of references:</u>

11.1. Lecture Notes:

Prof. Dr. Mo’men Gaafary, "Marine Propulsion, Theory & Design" Department of Naval Architecture & Marine Engineering Faculty of Engineering, Port Said University, Egypt.

11.2 Recommended Books:

1. J.P. Comstock , "Principals of Naval Architecture", SNAME Publications , 2012.
2. K.J.Rawson , E.C. Tupper " Basic Ship Theory ", Vol. 2. Longman , London & New York , 2009.
3. Mo’men Gaafary, "Unsteady Forces Acting on Ship Propellers of Low-Aspect Ratio,” Ph.D. Dissertation, Stevens Institute of Technology, Hoboken, New Jersey, USA, 1987.
4. Mo’men Gaafary, “Some 12 Published International Research Papers on Marine Propulsion and Non-Conventional Propulsion Systems and Devices,” 1990-2010.

11.3 Key words for Internet Search:

Marine Propellers, Non-Conventional Propulsion, Ship Propulsion.

12- <u>Program Coordination Committee:</u>

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 504
Course Specification
Ship Hydrodynamic

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Hydrodynamic	**Code Symbol**: NME 504	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to show the mathematical aids used to describe the flow around ships. Irrotational and vortex flow is included. It presents the different methods which can be carried to find the field around an arbitrarily shaped solid body. The course is designed also to enable the student to calculate the stream around ship-shaped forms.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-3 Understand the theories, basics and specialized knowledge in the field of Ship Construction and production.	a1-3-1 Identify the Velocity Potential a1-3-2 Identify the Stream Function. a1-3-3 Describe mathematical models .
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 dentify Irrotational Flow a5-1-2 Describe the flow field a5-1-3 Identify volcity components.

<table>
<tr><th colspan="3">B. Intellectual skills</th></tr>
<tr><td rowspan="2">B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.</td><td>b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.</td><td>b1-1-1 Investigate Vortex Flow
b1-1-2 Describe the translation motion .
b1-1-3 Describe the rotation motion.</td></tr>
<tr><td>b1-2 Interpret, analyzes, and evaluates specific available information and relate it to the design of the required system.</td><td>b1-2-1 Analyze and evaluate Two Dimensional Sources and Sinks
b1-2-2 Analyze and evaluate Three Dimensional Sources and Sinks.</td></tr>
<tr><th colspan="3">C. Professional and practical skills</th></tr>
<tr><td>C2- Write and evaluate technical and professional reports.</td><td>c-1 Write and evaluate a professional report on the specific area of the marine industries.</td><td>c2-1-1 Prepare the Conformal Transformation of the fluid motion</td></tr>
<tr><th colspan="3">D. General and transferrable skills</th></tr>
<tr><td colspan="2">D5- Use different sources to obtain knowledge and information.</td><td>d5-1 Analyze and solve the two and three dimensional flow using Laplacs Equations</td></tr>
</table>

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1. Velocity Potential and Stream Function	12	12	---	---	a1-3-1, d5-1
2. Irrotational Flow	18	18	---	---	a5-1-4, b1-1-1 , b1-2-1, c2-1-1 , d5-1
3. Vortex Flow	15	15	---	---	a1-3-1 , a1-3-2 , c2-1-1, d5-1
4. Two and Three Dimentinal Sources and Sinks	15	15	---	---	a5-1-3 , b1-1-3, d5-1
5. Conformal Transformation	15	15	---	---	a1-3-2, a5-1-2, a5-1-4, b1-1-1, c2-1-1, d5-1

6. Laplacs Equations	15	15	---	---	a1-3-1, a1-3-3, a5-1-1, b1-2-2, c2-1-1, d5-1
Total	90	90	---	---	

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-3), A5(a5-1)	B1(b1-1),(b1-2)	C2(c2-1)	D5

5- <u>Course Subject Area:</u>

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

<u>Course Contents</u>

6- <u>Course Topics</u>

Topic No.	Topic	Weeks
1st	Velocity Potential and Stream Function	1 - 4
2nd	Irrotational Flow	5 - 10
3rd	Vortex Flow	11 – 15
4th	Two and Three Dimensional Sources and Sinks	16 – 20
5th	Conformal Transformation	21 – 25
6th	Laplacs Equations	26 - 30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-3-1	X		X			X
a1-3-2			X		X	
a1-3-3						X
a5-1-1						X
a5-1-2					X	
a5-1-3				X		
Course ILOs	**Intellectual skills**					
b1-1-1		X			X	
b1-1-3						X
b1-2-1				X		
b1-2-1		X				
b1-2-2						X
Course ILOs	**Professional and practical skills**					
c2-1-1		X	X		X	X
Course ILOs	**General and transferrable skills**					
d5-1	X	X	X	X	X	X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-3-1	X												
	a1-3-2	X	X						X					
	a1-3-3	X	X						X					
	a5-1-1	X												X
	a5-1-2	X												X
	a5-1-3	X												X
	a5-1-4	X												X
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X				X								
	b1-1-3	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d5-1								X	X				

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- List of references:

1. V. Bertram: “Practical Ship Hydrodynamics“, Butterworth-Heinemann, First published 2000.
2. Rawson, K. J., Tupper, E. C., “Basic Ship Theory”, Vol.2, 5th edition, Elsevier Ltd., 2001.
3. D. L. Blount : “ Performance by Design: Hydrodynamics for High-Speed Vessels”, 2014.
4. Mosaad,. M. A., Gafaary, M. M., Yehia, W. and Hassan, H.M. "On the Design of X-Bow for Energy Efficiency," Influence of EEDI on Ship Design & Operation, RINA, London, UK, September 2017.

Periodicals, Web sites, etc

5. Journal of Ship Research
6. SNAME, RINA

Key words for Internet Search:

Potential flow, stream function, ship-shaped stream forms.

12- Program Coordination Committee:

Course Coordinator: **Prof. Laila Kamar**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

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NME 505

Hydrodynamic of High Speed Small Units

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Hydrodynamic of High Speed Small Units	**Code Symbol**: NME 505	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course concerns with descriptions the form of high speed crafts and their types. The content of this course includes also the design feature of all these types. It presents the fundamental concepts of the high speed hull form resistance, and the subsequent standard series data to be used. This course is designed to enable the student to have a good idea about types of propulsion systems and devices used for high seed crafts.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-3 Understand the theories, basics and specialized knowledge in the field of Ship Construction and production.	a1-3-1 Describe the High-Speed Units, a1-3-2 Categorize the different types of High-Speed Units, and it's forms a1-3-3 Show the features of design of the high- speed units.

A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Identify High-Speed Hull Form Resistance a5-1-2 Identify the forces on a planing hull
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Discuss the component of Multi-Hull Resistance b1-1-2 Formulate the equation for its wave resistance
	b1-2 Interpret, analyzes, and evaluates specific available information and relate it to the design of the required system.	b1-2-1 Evaluate the Design of Unconventional Units. b1-2-2 Discuss the features of hybrid ships
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional report for Propulsion of High Speed Units using Propellers
D. General and transferrable skills		
D5- Use different sources to obtain knowledge and information.		d5-1 Use different information recourses to collect the available data for ship outfitting.

3- <u>Course Contents</u>

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1. High-Speed Units, Typesand Forms	12	12	---	---	a1-3-1, b1-2-1, d5-1
2. High-Speed Hull Form Resistance	18	18	---	---	a5-1-2, b1-1-1 , b1-2-2, c2-1-1 , d5-1
3. Mullti-Hull Resistance	15	15	---	---	a1-3-1 , a1-3-2 , c2-1-1,d5-1

4. Design of Unconvential Units	15	15	---	---	a5-1-1 , b1-2-1, d5-1
5. Propulsion of High Speed Units using Propellers	15	15	---	---	a1-3-2, a5-1-2, b1-1-1, c2-1-1, d5-1
6. Waterjet Propulsion for High Speed Units	15	15	---	---	a1-3-1, a1-3-3, a5-1-1, b1-1-2, c2-1-1, d5-1
Total	90	90	---	---	

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-3), A5(a5-1)	B1(b1-1), (b1-2)	C2(c2-1)	D5

5- <u>Course Subject Area:</u>

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- <u>Course Topics</u>

Topic No.	Topic	Weeks
1st	High-Speed Units, Types and Forms	1 - 4
2nd	High-Speed Hull Form Resistance	5 - 10
3rd	Multi-Hull Resistance	11 – 15
4th	Design of Unconventional Units	16 – 20
5th	Propulsion of High Speed Units using Propellers	21 – 25
6th	Water jet Propulsion for High Speed Units	26 - 30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-3-1 Describe the High-Speed Units,	X		X			X
a1-3-2 Categorize the different types of High-Speed Units, and it's forms			X		X	
a1-3-3 Show the features of design of the high- speed units.						X
a5-1-1 Identify High-Speed Hull Form Resistance				X		X
a5-1-2 Identify the forces on a planing hull		X			X	
Course ILOs	**Intellectual skills**					
b1-1-1 Discuss the component of Multi-Hull Resistance		X			X	
b1-1-2 Formulate the equation for its wave resistance						X
b1-2-1 Evaluate the Design of Unconventional Units.	X			X		
b1-2-2 Discuss the features of hybrid ships		X			X	
Course ILOs	**Professional and practical skills**					
c2-1-1 Prepare a professional report for Propulsion of High Speed Units using Propellers		X	X			X
Course ILOs	**General and transferrable skills**					
d5-1 Use different information recourses to collect the available data for ship outfitting.	X	X	X	X	X	X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-3-1	X												
	a1-3-2	X	X						X					
	a1-3-3	X	X						X					
	a5-1-1	X												X
	a5-1-2	X												X
	a5-1-3	X												X
	a5-1-4	X												X
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X				X								
	b1-1-3	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d5-1								X	X				

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination: to assess students’ knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- List of references:

1. V. Bertram: “Practical Ship Hydrodynamics“, Butterworth-Heinemann, First published 2000.
2. Rawson, K. J., Tupper, E. C., “Basic Ship Theory”, Vol.2, 5th edition, Elsevier Ltd., 2001.
3. D. L. Blount : “ Performance by Design: Hydrodynamics for High-Speed Vessels”, 2014.
4. Mosaad,. M. A., Gafaary, M. M., Yehia, W. and Hassan, H.M. "On the Design of X-Bow for Energy Efficiency," Influence of EEDI on Ship Design & Operation, RINA, London, UK, September 2017.

Periodicals, Web sites, etc

5. Journal of Ship Research
6. SNAME, RINA

Key words for Internet Search:

Mono hull, surface effect ship, hydro foil craft

12- Program Coordination Committee:

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME506
Ship Rescue
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship **Rescue**	**Code Symbol**: NME 506	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to provide students with basic knowledge and skills that are related to marine salvage of different ship casualties. The course overviews all the scientific background previously covered in naval architecture and ship structural analysis to help salvage engineers to identify the situation in strandings and collisions.The student is intended to carry out all preliminary calculations required to manage ship refloating and other slavage techniques.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Recognize the basic principles of naval architecture (flotation, trim and stability) and ship strength and recognize their importance to define a ship casualty.
A2- Mutual relation between professional aspects of professional practice and its effects on the environment.	a2-1 Recognize the social and economical aspects of marine industries	a2-1-1 Recognize the environmental impact of marine casualties a2-1-2 Show the regulations related to safety (SOLAS) and marine salvage practice .

	a2-2Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize the performance of different ship types during collisions and groundings.
A3- Fundamentals of ethical & legal professional practice in the field of specialization.	a3-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	a3-1-1 Recognize the basic steps of risk management. a3-1-2 Recognize the different actions required to ensure successful marine salvage.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and Marine Engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources
	b1-2 Interpret, analyze, and evaluate a given system specific information and relate it to ship design.	b1-2-1 Identify the main information required for salver engineers.
B2- Solve specialized problems with lack of some data and variables(incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Choose approximate methods and formula to be used during salvage operation (hydrostatic and strength data)
B3- Assess risks in professional practice in the field of specialization,	b3-1 Evaluate pros and cons of given methodologies for Naval Architecture and Marine Engineering systems development.	b3-1-1 Evaluate different possible approaches to manage a given casualty B3-1-2 Identify the risks involved during common salvage operations.
B4- Take professional decisions in different professional practical contexts.	b4-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development of Naval Architecture and Marine Engineering systems.	b4-1-1 Recognize the possible decisions of a salver in the most common casualties (with special focus on navigation in Suez Canal) b4-1-2 Apply risk management to the refloating operation of a grounded vessel.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Design a complete hypothetical salvage plan to a given casualty.

C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional casualty analysis report.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use of a recent commercial software (e.g., HECSALV)
D3- Apply self evaluation and define personal educational needs.		d3-1 Investigate a complete published recent salvage scenario.

3- Course Contents

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
Marine Casualties	6	6	-	--	a2-1-1, a2-2-1 C2-1-1
Salvage equipment and techniques	21	21	-	-	a2-1-2, a3-1-2, b1-2-1
Salvage Calculations	18	18	-	--	a1-1-1, b2-1-1, d2-1, d3-1,
Refloating and up righting of ships	18	18	-	--	a3-1-2, b3-1-1, b4-1-1, c1-1-1, c2-1-1, d3-1,
Risk assessment during salvage operations	18	18	-	--	a3-1-1, b1-1-1, b3-1-2, b4-1-1, b4-1-2
Wrecking and ship breaking	9	9	-	--	a1-1-1, a2-1-1, a2-1-2
Total	90	90	-	--	

4- Relationship between the course and the programme

Field	Academic Reference Standard(ARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1), (a2-2), A3(a3-1)	B1(b1-1), (b1-2), B2(b2-1), B3(b3-1), B4(b4-1)	C1(c1-1) C2(c2-1)	D2, D3

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
---	---	30%	50%	10%	10%	--	100%

6- Course Topics

Topic No.	Topic	Weeks
1st	Marine Casualties	1-2
2nd	Salvage equipment and techniques	3-9
3rd	Salvage Calculations	10-15
4th	Refloating and up righting of ships	16-21
5th	Risk assessment during salvage operations	22-27
6th	Wrecking and ship breaking	28-30

7- ILOs Matrix Topics

Course topics	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	6^{th}
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Recognize the basic principles of naval architecture (flotation, trim and stability) and ship strength and recognize their importance to define a ship casualty.			X			X
a2-1-1 Recognize the environmental impact of marine casualties	X					X
a2-1-2 Show the regulations related to safety (SOLAS) and marine salvage practice .		X				X
a2-2-1 Recognize the performance of different ship types during collisions and groundings.	X					
a3-1-1 Recognize the basic steps of risk management.					X	
a3-1-2 Recognize the different actions required to ensure successful marine salvage.		X		X		
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate an investigatory approach for detecting problems sources					X	

b1-2-1 Identify the main information required for salver engineers.		X				
b2-1-1 Choose approximate methods and formula to be used during salvage operation (hydrostatic and strength data)			X			
b3-1-1 Evaluate different possible approaches to manage a given casualty				X		
B3-1-2 Identify the risks involved during common salvage operations.					X	
b4-1-1 Recognize the possible decisions of a salver in the most common casualties (with special focus on navigation in Suez Canal)				X	X	
b4-1-2 Apply risk management to the refloating operation of a grounded vessel.					X	
Course ILOs	**Professional and practical skills**					
c1-1-1 Design a complete hypothetical salvage plan to a given casualty.				X		
c2-1-1 Prepare a professional casualty analysis report.	X			X		
Course ILOs	**General and transferrable skills**					
d2-1 Use of a recent commercial software (e.g., HECSALV)			X			
d3-1 Investigate a complete published recent salvage scenario.			X	x		

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X			X	X								
	a2-1-1	X	X				X							
	a2-1-2	X												

	a2-2-1	X			X	X								
	a3-1-1	X												
	a3-1-2		X	X										
Intellectual Skills	b1-1-1				X	X			X					
	b1-2-1	X							X					
	b2-1-1				X	X								
	b3-1-1			X			X							
	b3-1-2	X	X	X										
	b4-1-1	X		X										
	b4-1-2													
Professional Skills	c1-1-1													
	c2-1-1								X	X				
General skills	d2-1				X	X							X	
	d3-1				X	X							X	

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to use a commercial computer software for salvage assistance (HECSALV).

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

1- HECSALV (2005), Tanker Tutorial, Herbert Software Solutions, Inc.
2- Milwee, J., "Modern Marine Salvage ",Cornell Maritime Press; 1st edition (July 1996)
3- National Geographic, Salvage Code Red,DVD, release date: December 8, 2010
4- NAVSEA (S0300-A6-MAN-010), 2006: U.S. Navy Salvage Manual, Volume 1, Stranding and Harbor Clearance, Published By Direction of Commander, Naval Sea Systems Command, 412 pp
5- NAVSEA (S0300-A6-MAN-050), 2013 : U.S. Navy Ship Salvage Manual Volume 5 (Pol Offloading), Published by Direction of Commander, Naval Sea Systems Command, 212 pp

12- Program Coordination Committee:

Course Coordinator: **Dr. Heba El-Kilani**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 507
Ship Performance
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Performance	**Code Symbol**: NME 507	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

This course aims to tutor the students how to estimate ship propulsion powering, propeller design, predict ship performance in service. It also aims account for ship hull and propeller roughness during powering estimation. Moreover, it helps them to estimate powering, bollard pull, and performance of tugs. Keeping students familiar with Sea trails and measurements conducted during these trials. Students will be able to predict ship speed loss due to waves and wind in service. In additoin, Students will be able to Review of the application of natural gas in marine field .

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Categorize the different resistance and powering calculation methods. a1-2-2 Identify propeller design theories.

A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Categorize the different types and the procedures of conducting sea trials for ships. a5-1-2 Identify the power penalty due to hull and propeller roughness.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Determine ship resistance and powering. b1-2-2 Apply Measurements for typical replica of hull and propeller surfaces.
B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Design of B-type marine propellers. b2-1-2 Predict ship performance for ships in service.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c c2-1-1 Prepare technical report for the results of sea trials. c2-1-2 Prepare a scientific report on engine performance.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Conduct seminars on natural gas powered vessels.
D6- Lead a team in familiar professional context		d6-1Conduct of ship sea trials and awareness of related equipment.

3- <u>Course Contents</u>

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Introduction of ship performance	6	6	-	-	a1-2-1, b2-1-2, c2-1-2
Powering Estimation methods	6	6	-	-	a1-2-1, b1-2-1

Propeller Design and performance	12	12	-	-	a1-2-2, b2-1-1, b2-1-2
Hull and Propeller Roughness	12	12	-	-	a1-2-1, a1-2-2, a5-1-2, b1-2-1, b1-2-2
Power Penalty and speed loss	6	6	-	-	a1-2-1, a5-1-2
Modern propulsion Systems and sea trails	12	12	-	-	a5-1-1, c2-1-1, c2-1-2, d6-1
Speed loss due to wind and waves	12	12			d6-1
performance of Tug boats	6	6			b1-2-2, c2-1-2
Application of Natural Gas in marine field	12	12			d2-1
The effect shallow waters on ship performance	6	6			a5-1-1, b1-2-1, c2-1-2
Total	90	90			

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-2),A5(a5-1)	B1(b1-2), B2(b2-1),	C2(c2-1)	D2, D6

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disscretionry subjects	Total
---	10%	20%	50%	10%	10%	--	100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Introduction of ship performance	1-2
2nd	Powering Estimation methods	3-4
3rd	Propeller Design and performance	5-8
4th	Hull and Propeller Roughness	9-12
5th	Power Penalty and speed loss	13-14
6th	Modern propulsion Systems and sea trails	15-18
7th	Speed loss due to wind and waves	19-22
8th	performance of Tug boats	23-24
9th	Application of Natural Gas in marine field	25-28
10th	The effect shallow waters on ship performance	29-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**
Course ILOs	**Knowledge & Understanding**									
a1-2-1	X	X		X	X					
a1-2-2			X	X						
a5-1-1						X				X
a5-1-2				X	X					
Course ILOs	**Intellectual skills**									
b1-2-1		X		X						X
b1-2-2				X				X		
b2-1-1			X							
b2-1-2	X		X						X	
Course ILOs	**Professional and practical skills**									
c2-1-1						X				
c2-1-2	X					X		X		X
Course ILOs	**General and transferrable skills**									
d2-1									X	
d6-1						X	X			

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-2-1	x							x					
	a1-2-2	x												
	a5-1-1	x							x					
	a5-1-2	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b1-2-2	x		x		x	x							
	b2-1-1	x		x		x	x							
	b2-1-2	x												
Professional Skills	c2-1-1	x				x			x					
	c2-1-2	x												
General and transferrable skills	d2-1	x				x								
	d6-1	x												

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination	:	to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

Marine measurement laboratory.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

11.1 Course notes:

Professor notes

11.2 Recommended books:

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, 5^{th} edition, 2001.
3- Comstock, J. P., “Principals of Naval Architecture”, SNAME Publications, Vol. III, 1989.
4- Volker Bertram, H. Schneekluth, " Ship Design for Efficiency and Economy," Butterworth-Heinemann, 15th October 1998

11.3 Papers, Periodicals, Web sites, etc:

1- Mosaad, M. A., "Marine Propeller Roughness Penalties", Dept. of Marine Technology, University of Newcastle upon Tyne, England, Ph.D. Thesis, 1986.
2- 2- Mosaad, M. A., "Experiments and Application on the Effect of Propeller Surface Roughness", International Workshop on Drag and Roughness, RINA, England, March 1990.
3- 3- 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.
4- 4- Mosaad, M. A., “Ship-Model Surface Roughness Allowance” MEET MARIND’2002, Varna, Bulgaria, October 6-11, 2002.
5- 5- Mosaad, M. A., “Natural Gas Powered Ships”, Gulf Maritime Conference 2007, Sharjh, UAE, April 15-18, 2007.
6- Mosaad,. M. A., Gafaary, M. M., Yehia, W. and Hassan, H.M. "On the Design of X-Bow for Energy Efficiency," Influence of EEDI on Ship Design & Operation, RINA, London, UK, September 2017.

12- Program Coordination Committee:

Course Coordinator:	**Prof. Dr. M.A.Mosaad**
Programme coordinator:	**Assoc. Prof. Dr. Moustafa Mohamed**
Head of the Department:	**Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 508
Design of Small Units
Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Design of Small Units**	**Code Symbol**: NME 508	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to provide the students with non-conventional and most known small marine crafts, which are totally different from conventional ships. The aim is to let the students know the types, form, application, function and methods of propulsion and steering of these marine units. Also, students get specifically acquainted with the hydrodynamics and design of high speed marine crafts. Also they learn the aero- and hydro-dynamics of sailing boats.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Categorize small marine units types, forms and use. a1-1-2 Categorize propulsion & steering methods of small marine units. a1-1-3 Identify safety aspects of small marine units.

	a1-4 Understand the theories, basics and specialized knowledge in the field of Naval Architecture and Ship Design.	a1-4-1 Identify hydrodynamics, resistance and powering of small marine units.
A3- Main scientific advances in the field of specialization.	a3-1 Search new advances in analysis and design methodologies in the specific topic of research.	a3-1-1 Outline the design process of a sailing boat and its sail.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Solve problems on design and propulsion of small marine units. b1-1-2 Solve problems on the sailing yachts hydro- and aero-dynamics. b1-1-3 Identify the design process for a sailing boat and its sail.
	b1-2 Interpret, analyzes, and evaluates specific available information and relate it to the design of the required system.	b1-2-1 Assess & Evaluate the suitable propulsion method of small marine units. b1-2-2 Distinguish between different treatment methods for design of a sailing boat and its sail.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional report on design of small marine units and its propulsion methods.
D. General and transferrable skills		
D5- Use different sources to obtain knowledge and information.		d5-1 Use different information recourses to collect the available data for small marine units.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
-Introduction & Objectives -Types of small marine units	15	15	---	---	a1-1-1, d5-1
- Methods of propulsion & steering of small marine units. - Construction materials of small marine units.	21	21	---	---	a1-1-2, b1-1-1 , b1-2-1, c2-1-1 , d5-1
- Design of small marine units. - Hydrodynamics, resistance and powering of small marine units.	21	21	---	---	a1-1-1 , a1-4-1 , b1-1-1 , c2-1-1, d5-1
-Design of sailing boats - Sailing boats and yachts hydro- and aero-dynamics.	18	18	---	---	a1-1-1 , a1-4-1 , b3-1-1 , b1-1-2 , b1-1-3 , b1-2-2 , c2-1-1,d5-1
- Safety of small marine units.	15	15			a1-1-3, d5-1
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1), (a1-4) A3 (a3-1)	B1(b1-1),(b1-2)	C2(c2-1)	D5

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
5%	**10%**	**20%**	**35%**	**20%**	**10%**	**--**	**100%**

6.Course Topics

Topic No.	Topic	Weeks
1st	-Introduction & Objectives - Types of small marine units	1 -5
2nd	- Methods of propulsion& steering of small marine units. - Construction materials of small marine units.	6-12
3rd	- Design of small marine units. - Hydrodynamics, resistance and powering of small marine units.	13– 19
4th	- Design of sailing boats - Sailing boats and yachts hydro- and aero-dynamics.	20–25
5th	- Safety of small marine units.	26–30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**
Course ILOs	**Knowledge & Understanding**				
a1-1-1 Categorize small marine units types, forms and use.	X		X	X	
a1-1-2 Categorize propulsion & steering methods of small marine units.		X			
a1-1-3 Identify safety aspects of small marine units.					X
a1-4-1 Identify hydrodynamics, resistance and powering of small marine units.			X	X	
a3-1-1 Outline the design process of a sailing boat and its sail.				X	
Course ILOs	**Intellectual skills**				
b1-1-1 Solve problems on design and propulsion of small marine units.		X	X		
b1-1-2 Solve problems on the sailing yachts hydro- and aero-dynamics.				X	
b1-1-3 Identify the design process for a sailing boat and its sail.				X	
b1-2-1 Assess & Evaluate the suitable propulsion method of small marine units.		X			

b1-2-2 Distinguish between different treatment methods for design of a sailing boat and its sail.				X	
Course ILOs	**Professional and practical skills**				
c2-1-1 Prepare a professional report on design of small marine units and its propulsion methods.		X	X	X	
Course ILOs	**General and transferrable skills**				
d5-1 Use different information recourses to collect the available data for small marine units.	X	X	X	X	X

8- Teaching and Learning Method:

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X	X											
	a1-1-2	X	X											
	a1-1-3	X	X											
	a1-4-1	X	X											
	a3-1-1	X	X			X								
Intellectual Skills	b1-1-1	X	X			X								
	b1-1-2	X	X			X								
	b1-1-3	X	X											
	b1-2-1	X	X											
	b1-2-2	X	X											
Professional Skills	c2-1-1	X												
General Skills	d5-1	X												

9- Assessment

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- List of references:

1. J.P. Comstock:“ Principles of Naval Architecture“, The Society of Naval Architects and Marine Engineers (SNAME), USA, 2012.
2. V. Bertram: “Practical Ship Hydrodynamics“, Butterworth-Heinemann, First published 2000.
3. M. M. Gaafary, " Dynamic Loads and Response of SWATH Ship in Lateral Sea Waves,” Black Sea International Maritime Conference Varna, Bulgaria, 2010.
4. D. L. Blount : “ Performance by Design: Hydrodynamics for High-Speed Vessels”, 2014.

Periodicals, Web sites, etc

1. Journal of Ship Research
2. Marine Talk Newsletter

Key words for Internet Search:

Small marine units, High Speed Marine Crafts, Sailing Boats Hydro- and Aero-dynamics, Propulsion of Small Marine units.(Students may also use topics of the course as keywords)

12- Program Coordination Committee:

Course Coordinator: **Dr. Moustafa Mohammed Moustafa**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 509
Propeller Design Theories
Course Specifications

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Propeller Design Theories	**Code Symbol:** NME509	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**--------------**

C- Professional Information

1- Course Aims:

This course is very useful and important to the students of M.Sc. program, where it provides them with the importance of propeller design theories. The course starts with a review of basic hydrodynamic theory, principles of steady flow around thin sections.

Also, the course provides them with the study of pressure distribution, lifting force, design of airfoil sections. The course also includes wing theory, lifting line, and lifting surface theories. In this course propeller wake adaptation and unsteady flow applications. Non-Conventional propulsion, theory of operation, modeling, and marine vessels applications are studied.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Show the basic hydrodynamic theory. a1-1-2 Recognize the principles of steady flow around thin sections.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Identify the methods of the pressure distribution, and the design of airfoil sections.
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize wing theory, lifting line, and lifting surface theories. a2-2-2 Recognize propeller wake adaptation and unsteady flow applications. a2-2-3 Identify non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate basic hydrodynamic theory. b1-1-2 Demonstrate the principles of steady flow around thin sections. b1-1-3 analyze the methods of the pressure distribution, and the design of airfoil sections.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Interpret the wing theory, lifting line, and lifting surface theories. Also, understanding propeller wake adaptation and unsteady flow applications. b3-1-2 Categorize non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Analyze the principles of steady flow around thin sections.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for the pressure distribution on wing sections, and the design of airfoil sections. c2-1-2 Use methods to determine the performance of non-conventional marine propulsion, theory of operation, modeling, and

		marine vessels applications.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Solve problems on the pressure distribution on wing sections, and the design of airfoil sections. d2-2 Solve problems on wing lifting force, and propeller lifting line, and lifting surface for optimum diameter or RPM.
D6- Lead a team in familiar professional context		d6-1 Manage team research to reports the non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.

3-

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
1- Review of basic hydrodynamic theory	15	15	--	--	a1-1-1, b1-1-1, b1-1-3
2- Principles of steady flow around thin sections	15	15	--	--	a1-1-2, b1-1-2, b1-1-3, c1-1-1
3- Methods of the pressure distribution, and the design of airfoil sections	15	15	--	--	a2-1-1, b1-1-2, b1-1-3, c2-1-1, d2-1
4- Wing theory, lifting line, and lifting surface theories	15	15	--	--	a2-2-1, b3-1-1, d2-2
5- Propeller wake adaptation and unsteady flow applications	15	15	--	--	a2-2-2, b3-1-1
6- Non-Conventional marine propulsion, theory of operation, modeling, and marine vessels applications	15	15	--	--	a2-2-3, b3-1-2, c2-1-2, d6-1
Total	**90**	**90**	--	--	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-1),(a2-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D6

5- Course Subject Area:

Course Contents

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	15%	30%	35%	10	10		100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Review of basic hydrodynamic theory	**1-5**
2nd	Principles of steady flow around thin sections	**6-10**
3rd	Methods of the pressure distribution, and the design of airfoil sections	**11-15**
4th	Wing theory, lifting line, and lifting surface theories	**16-20**
5th	Propeller wake adaptation and unsteady flow applications	**21-25**
6th	Non-Conventional marine propulsion, theory of operation, modeling, and marine vessels applications	**26-30**
	Final Exam	**31**

7- <u>ILOs Matrix Topics</u>

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Show the basic hydrodynamic theory.	x	x				
a1-1-2 Recognize the principles of steady flow around thin sections.	x	x				
a2-1-1 Identify the methods of the pressure distribution, and the design of airfoil sections.			x			
a2-2-1 Recognize wing theory, lifting line, and lifting surface theories.				x	x	x
a2-2-2 Recognize propeller wake adaptation and unsteady flow applications.				x	x	x
a2-2-3 Identify non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.				x	x	x
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate basic hydrodynamic theory.	x	x	x			
b1-1-2 Demonstrate the principles of steady flow around thin sections.	x	x	x			
b1-1-3 analyze the methods of the pressure distribution, and the design of airfoil sections.	x	x	x			
b3-1-1 Interpret the wing theory, lifting line, and lifting surface theories. Also, understanding propeller wake adaptation and unsteady flow applications.				x	x	x
b3-1-2 Categorize non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Analyze the principles of steady flow around thin sections.		x			x	x
c2-1-1 Prepare search reports for the pressure distribution on wing sections, and the design of airfoil sections.			x			x
c2-1-2 Use methods to determine the performance of non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.			x			x
Course ILOs	**General and transferrable skills**					
d2-1 Solve problems on the pressure distribution on wing sections, and the design of airfoil sections.			x	x		
d2-2 Solve problems on wing lifting force, and propeller lifting line, and lifting surface for optimum diameter or RPM.			x	x		
d6-1 Manage team research to reports the non-conventional marine propulsion, theory of operation, modeling, and marine vessels applications.						x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				X								
	a1-1-2	x				X								
	a2-1-1	x				X								
	a2-2-1	X				X								
	a2-2-2	x				X								
	a2-2-3	x				X								
Intellectual Skills	b1-1-1		x											
	b1-1-2		x											
	b1-1-3		x											
	b3-1-1		x											
	b3-1-2		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										X	
	c2-1-2													
General and transferrable skills	d2-1		x							x				
	d2-2													
	d6-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	29
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- <u>List of References:</u>

- **Lecture Notes:**

1- Prof. Dr. Mo’men Gaafary, "Theory and Design of Marine Propellers", Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt.

- **Recommended Books:**

1- J.P. Comstock, "Principles of Naval Architecture", SNAME Publications, 2012

2- K.J.Rawson, E.C. Tupper, "Basic Ship Theory", Longman, 2009

3- Mo’men Gaafary, "Some 11 Published International Research Papers on Non-Conventional Marine Propulsion“ Published in IMAM Conferences during 1997-2010 & SNAME Propeller Symposium, USA 1991.

- **Key words for Internet Search: *Wing theory, Marine propulsion, Propeller Theories and modeling, Propeller Design, and Non-conventional propulsion.***

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 510

Ship Motion among Waves

Course Specifications

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Motion among Waves	**Code Symbol**: NME 510	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**--------------**

C- Professional Information

1- Course Aims:

This course is very useful and important to the postgraduate students of M.Sc. program, where it provides them with the advanced theory of ship motion among waves. Also, it provides them with the principles of Wave Theory, and Surface Wave Types, (Standing, progressive, regular and irregular waves).

Learning Linear Equations of Ship Motions, different methods applied to determine for aspecific ship form in 6-degrees of freedom, the Dynamic Ship Response to Wave Exciting Forces.

Also, the dynamics of ship coupled, damped motions, and phase angles are studied. Introducing concepts of ship design for less ship motions, and practical methods of reducing ship motions.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Demonstrate the Wave Theory, Ocean Waves, and Surface Wave Types. Also, regular and irregular waves. a1-1-2 Show the importance of ship motion among waves. Also, Study

		of Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Categorize different methods to determine the wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles. a2-2-2 Show how to develop the Dynamics of Ship Coupled and Damped Motions. a2-2-3 Demonstrate Ship Design to Reduce Ship Motions, and Practical Methods of Reducing Ship Motions.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Identify Wave Theory, Ocean Waves, and Surface Wave Types, (Standing and progressive waves). b1-2-2 Formulate Equations of Regular and Irregular Waves. b1-2-3 Demonstrate the Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Apply different methods to determine the wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles. b3-1-2 Identify how to develop the Dynamics of Ship Coupled and Damped Motions.

		b3-1-3 Ivestigate Ship Design to Reduce Ship Motions, and Practical Methods of Reducing Ship Motions.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Prepare reports about Equations of Regular and Irregular Waves. c1-1-2 Formulate Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces. C1-1-3 Create reports about wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles. c1-1-4 Develop technical reports about the Dynamics of Ship Coupled and Damped Motions. Also, about ship design for less ship motions and professional methods to reduce ship motions among waves.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Outline search reports for specific equations and types of surface waves.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills on surface waves generation, the Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.
D7- Manage time effectively		d7-1 Practice in a team to complete reports about reducing ship motions among waves.

3-

Topic	Total Hours	Contact hrs			Course ILOs Covered (By No.)
		Lec.	Tut.	Lab.	
Wave Theory, Ocean Waves, and Surface Wave Types	15	15	--	--	a1-1-1, b1-2-1, b1-2-2, b1-2-3, c1-1-1, c1-1-2, c1-1-3, c1-1-4
Equations of Regular and Irregular Waves	15	15	--	--	a1-1-1, b1-2-1, b1-2-2, b1-2-3, c2-1-1
Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces	15	15	--	--	a2-2-1, a2-2-2, a2-2-3, b1-2-1, b1-2-2, b1-2-3, c2-1-1, d2-1
Methods to Determine Wave Exciting Force, (Based on Wave Frequency and Ship Form), Ship Dynamic Response and Phase Angles	15	15	--	--	a2-2-1, a2-2-2, a2-2-3, b3-1-1, b3-1-2, b3-1-3, c2-1-1, d7-1
Dynamics of Ship Coupled and Damped Motions	15	12	--	--	a2-2-1, a2-2-2, a2-2-3, b3-1-1, b3-1-2, b3-1-3, c2-1-1, d7-1
Ship Design to Reduce Ship Motions, and Practical Methods to Reduce Ship Motions	15	12	--	--	a2-2-1, a2-2-2, a2-2-3, b3-1-1, b3-1-2, b3-1-3, c2-1-1, d7-1
Total	90	90	--	--	

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-11 A2(a2-1)	B1(b1-2 B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D7

5- Course Subjects Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	15%	30%	35%	10	10		100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Wave Theory, Ocean Waves, and Surface Wave Types	**1-5**
2nd	Equations of Regular and Irregular Waves	**6-10**
3rd	Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces	**11-15**
4th	Methods to Determine Wave Exciting Force, (Based on Wave Frequency and Ship Form), Ship Dynamic Response and Phase Angles	**16-20**
5th	Dynamics of Ship Coupled and Damped Motions	**21-25**
6th	Ship Design to Reduce Ship Motions, and Practical Methods to Reduce Ship Motions	**26-30**

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Demonstrate the Wave Theory, Ocean Waves, and Surface Wave Types. Also, regular and irregular waves.	x	x				
a1-1-2 Show the importance of ship motion among waves. Also, Study of Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.	x	x				

a2-2-1 Categorize different methods to determine the wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles.			x	x	x	x
a2-2-2 Show how to develop the Dynamics of Ship Coupled and Damped Motions.			x	x	x	x
a2-2-3 Demonstrate Ship Design to Reduce Ship Motions, and Practical Methods of Reducing Ship Motions.			x	x	x	x
Course ILOs	**Intellectual skills**					
b1-2-1 Identify Wave Theory, Ocean Waves, and Surface Wave Types, (Standing and progressive waves).	x	x	x			
b1-2-2 Formulate Equations of Regular and Irregular Waves.	x	x	x			
b1-2-3 Demonstrate the Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.	x	x	x			
b3-1-1 Apply different methods to determine the wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles.				x	x	x
b3-1-2 Identify how to develop the Dynamics of Ship Coupled and Damped Motions.				x	x	x
b3-1-3 Ivestigate Ship Design to Reduce Ship Motions, and Practical Methods of Reducing Ship Motions.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Prepare reports about Equations of Regular and Irregular Waves.	x					
c1-1-2 Formulate Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.	x					
C1-1-3 Create reports about wave exciting force, (Based on Wave Frequency and Ship Form in 6-Degrees of Freedom), Ship Dynamic Response and Phase Angles.	x					
c1-1-4 Develop technical reports about the Dynamics of Ship Coupled and Damped Motions. Also, about ship design for less ship motions and professional methods to reduce ship motions among waves.	x					
c2-1-1 Outline search reports for specific equations and types of surface waves.		x	x	x	x	x

Course ILOs	General and transferrable skills					
d2-1 Apply course skills on surface waves generation, the Linear Equations of Ship Motions, and the Dynamic Ship Response to Wave Exciting Forces.			x			
d7-1 Practice in a team to complete reports about reducing ship motions among waves.				x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				x								
	a1-1-2	x				x								
	a2-2-1	x				x								
	a2-2-2	x				x								
	a2-2-3	x				x								
Intellectual Skills	b1-2-1		x											
	b1-2-2		x											
	b1-2-3		x											
	b3-1-1		x											
	b3-1-2		x											
	b3-1-3		x											
Professional Skills	c1-1-1		x						x					
	c1-1-2		x						x					
	c1-1-3		x						x					
	c1-1-4		x						x					
	c2-1-1		x						x					
General and transferrable skills	d2-1		x						x	x				
	d7-1		x						x	x				

9- Assessment

9.1 Assessment Methods

Final- Written Exam. : To assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of References:

11.1 Lecture Notes:

Prof. Dr. Mo'men Gaafary, " Lecture Notes on Ship Motion Among Surface Waves",
Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt Updated 2012.

11.2 Recommended Books:

1 J.P. Comstock, "Principals of Naval Architecture", SNAME Publications, 2012.
2 K. J. Rawson, E. C. Tupper, "Basic Ship Theory," Vol. 2, Longman, 2009.

3 John Newman, “ Marine Hydrodynamics” Cambridge Press, 1980.
4 W. G. Price, R.E.D. Bishop, “Probabilistic Theory of Ship Dynamics” John Wiley & Sons, New York, NY, USA, 1974.
5 M. M. Gaafary, " Dynamic Loads and Response of SWATH Ship in Lateral Sea Waves,” Black Sea International Maritime Conference Varna, Bulgaria, 2010.
6 M. M. Gaafary, " Dynamic Effects of S inemi-Submersible Platform in Beam Sea Waves,” Black Sea International Maritime Conference Varna, Bulgaria, 2010.

11. 3 Keywords for Internet Search:

Ship Motion, Regular and irregular Waves, Ship Dynamics Among Sea Waves.

12- <u>Program Coordination Committee:</u>

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 511
Course Specification

Ship Steering and Maneuverability

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Steering and Maneuverability	**Code Symbol:** NME 511	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**-------------**

C- Professional Information

1- Course Aims:

This course is very useful and important to the students of M. Sc. program, where it provides them with advanced theory of ship steering and controllability. Also, it provides them with the principles of ship directional stability, course-keeping and maneuverability. The linear equations of planar ship motions are studied, together with the dynamic ship turning path simulation. The course aims also to study the influences of propeller, rudder, and ship form on effective ship steering and ship inherent stability. Also, the course introduces the types of ship maneuvers and location of ship pivoting point. In this course, ship steering in restricted waterways is included, together with the bank-, squat-, and blockage- effects act on ships that navigate in restricted waterways. Dynamics of two-way traffic simulation of ship navigation in restricted channels are studied.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering.	a1-1-1 Outline the different theories and linear equations of ship planar motions. a1-1-2 Recognize the factors that affect ship steering.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Identify the parameters of ship directional stability and its indices. a2-1-2 Recognize the concepts and types of ship maneuvers.
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize the dynamics of ship turning path and how to determine the ship pivot point location. a2-2-2 Recognize the dynamics of ship steering in restricted waterways, together with bank-, squat-, and blockage effects. a2-2-3 Show how to simulate the dynamics of ship steering in two-way traffic in restricted channel.
B. Intellectual skills		
B1- Define and analyze problems in the field of specialization and sorting them according to priorities.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and Marine Engineering.	b1-1-1 Demonstrate the ability to determine the parameters of ship directional stability and its indices.
B3- Analytical reading researches and subjects relevant to the field of specialization.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Choose the suitable parameters and factors that improve ship steering quality. Determine the rudder deflection and time required to achieve a specific ship turn to a new course. b3-1-2 Apply modern theories, methods and computer programs in ship steering. Analyze and investigate ship steering quality through model test results.
C. Professional and practical skills		
C1- Apply professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Choose specific ship's hull design configuration for better steering quality. And, Practicing the ability of rudder design for better steering quality.

C2- Write professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for specific types of ship maneuvers. c2-1-2 Use methods to determine the effects of bank-, squat-, and two- way traffic effects on ship steering in restricted waterways and channels.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills on ship steering in restricted waterways (bank– squat-effects and ships in two- way traffic) and in career development.
D5- Work in a team and apply time management.		d5-1 lead a team to complete report about types of maneuvers and an accurate rudder design.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Ship steering and linear equations of ship horizontal motions, stability indeces.	15	15	-	--	a1-1-1, b1-1-1
2. Ship maneuvers, and ship directional stability	15	15	-	--	a2-1-1, a2-1-2, b1-1-1, c1-1-1, c2-1-1
3. Ship parameters and configurations affecting ship steering	15	15	-	--	a2-1-1, b1-1-1
4. Dynamics of ship steering in restricted waterways (Bank-, Squat-, and Blockage Effects)	15	15	-	--	a2-2-2, a2-2-3, c2-1-2, d2-1
5. Two-way Traffic in Restricted Channels	15	15			a2-2-2, a2-2-3, c2-1-2, d2-1
6. Ship Rudder Hydrodynamic Design	15	15	-	--	b3-1-1, d5-1
Total	**90**	**90**	**-**	**--**	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-1), (a2-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D5

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Discretionry subjects**	**Total**
---	**15%**	**30%**	**35%**	**10**	**10**		**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	Ship steering and linear equations of ship horizontal motions, stability indeces	**1-5**
2nd	Ship maneuvers, and ship directional stability	**6-10**
3rd	Ship parameters and configurations affecting ship directional stability	**11-15**
4th	Dynamics of ship steering in restricted waterways (Bank-, Squat-, and Blockage Effects)	**16-20**
5th	Two-way Traffic in Restricted Channels	**21-25**
6th	Ship Rudder Hydrodynamic Design	**26-30**

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Outline the different theories and linear equations of ship planar motions.	x	x				
a1-1-2 Recognize the factors that affect ship steering.	x	x				
a2-1-1 Identify the parameters of ship directional stability and its indices.	x	x				
a2-1-2 Recognize the concepts and types of ship maneuvers.	x	x				
a2-2-1 Recognize the dynamics of ship turning path and how to determine the ship pivot point location.	x	x				
a2-2-2 Recognize the dynamics of ship steering in restricted waterways, together with bank-, squat-, and blockage effects.	x	x				
a2-2-3 Show how to simulate the dynamics of ship steering in two-way traffic in restricted channel.	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate the ability to determine the parameters of ship directional stability and its indices.			x	x		x
b3-1-1 Choose the suitable parameters and factors that improve ship steering quality. Determine the rudder deflection and time required to achieve a specific ship turn to a new course.				x	x	x
b3-1-2 Apply modern theories, methods and computer programs in ship steering. Analyze and investigate ship steering quality through model test results.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Choose specific ship's hull design configuration for better steering quality. And, Practicing the ability of rudder design for better steering quality.			x		x	x
c2-1-1 Prepare search reports for specific types of ship maneuvers.			x	x	x	x
c2-1-2 Use methods to determine the effects of bank-, squat-, and two- way traffic effects on ship steering in restricted waterways and channels.			x	x	x	x

Course ILOs	General and transferrable skills					
d2-1 Apply course skills on ship steering in restricted waterways (bank– squat- effects and ships in two- way traffic) and in career development.				x		x
d5-1 lead a team to complete report about types of maneuvers and an accurate rudder design.			x	x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				x								
	a1-1-2	x				x								
	a2-1-1	x				x								
	a2-1-2	x				x								
	a2-2-1					x								
	a2-2-2	x				x								
	a2-2-3	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
General Skills	d2-1		x							x				
	d5-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	29
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of References:

11.1. Lecture Notes:

1- Prof. Dr. Mo'men Gaafary, "Ship Steering and Maneuverability", Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt, updated 2012.

11.2. Recommended Books:

1. J.P. Comstock, "Principals of Naval Architecture", SNAME Publications, 2012
2. K.J.Rawson, E.C. Tupper, "Basic Ship Theory", Longman, 2009.
3. Mo'men Gaafary, and Mosaad Mosleh, "Hydrodynamics of Proposed Two-Way Traffic in Suez Canal with Steering Control," IMAM'07, Varna, Bulgaria, 2007.
4. Mo'men Gaafary, "Pitch and Heave Dynamic Stability of Submarines," IMAM'07, Varna, Bulgaria, 2007.
5. Mo'men Gaafary, "Dynamic Forces and Response of SWATH Ship in Lateral Waves" Black Sea International Maritime Engineering, Varna, Bulgaria, 2010.
6. Mo'men Gaafary, "Dynamic Effects of Semi-Submersible Platform in Beam Sea Waves" Black Sea International Maritime Engineering, Varna, Bulgaria, 2010.

11.3. Key words for Internet Search:

*Ship Steering, Ship Course-Keeping, Ship Maneuverability, Ship Directional Stability, Ship Steering in Restricted Waterways and Channels, Two-Way Traffic in Canals***.**

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME512
Marine Systems Economics
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Marine Systems Economics**	**Code Symbol**: NME 512	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to provide the students who - are graduated as marine engineers – with the principles of economics and the applications of economics in the fields of Naval Architecture & Marine Engineering .

The information given includes the economical terminology , interest relationships , Design and operation Criteria , Profitability of ships , Optimum speeds and economical life of ships , permissible price of ships , replacement of ships , and elements of marine transport , making feasibility studies of marine projects , putting specifications and contracting terms , also tabulating works and planning .

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Identify the economical abbreviations applicable to marine engineering fields. a1-1-2 State the elements of marine transport tasks and documentations, And containerization activities. a1-1-3 Identify the time value of cash flow .
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Identify the feasibility of engineering projects. a5-1-2 Outline a comparison between different alternatives in ship design and operation a5-1-3 Show how evaluating the optimum life, optimum speed, permissible price and operation constraints of ships .
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	a6-1-1Recognize the different approaches in ship design. a6-1-2 Recognize the elements of ship construction costs and overheads
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate the linkage between design and operation of ships, and to make the design which is to be the most profitable during operation .

	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Identify the time value of money. b1-2-2 Evaluate the feasibility of a ship design or operation project. b1-2-3 Determine the costs of building a ship.
B7- Take professional decisions in different professional practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	b7-1-1 Choose economic criteria and decision making considering different economical, technical and environmental issues .
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Design numerical flow chart to determine optimum ship characteristics. c1-1-2 Analyze cost and freight statistics
C3- Evaluate means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches concerning specified problem related to marine technology.	c3-1-1 Evaluate the economical utility c3-1-2 Investigate the effects of different economical and technical aspects on ship design
D. General and transferrable skills		
D1- Communicate effectively using all methods.		d1-1 Use Communicate skills to get the recent information related to ship economy.
D2- Use information technology to improve his/her professional practice.		d2-1 Use computers software to analyze statistical information about expenses of operating ships and rates of escalation

3-

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design , Interest Relationships	9	9	--	--	a1-1-1, a1-1-2 a1-1-3, a6-1-1, b7-1-1, d1-1, d2-1
Economic Criteria for Design and Operation Profitability of ships before and after Tax	9	9	--	--	a1-1-3, b1-1-1 b1-2-1, b7-1-1
Profitability of ships before and after Tax	6	6	--	--	a5-1-1, a5-1-2, d2-1
Computer Aided Ship Design Economics , Optimum Speeds ,Economical Life and Permissible Price of Ships	9	9	--	--	a5-1-3, a6-1-2, c1-1-1, c3-1-2
Estimation of Cost of Building and Operating Ships	6	6	--	--	a1-1-2, a5-1-2, b1-2-3
Optimum Life and Replacement Analyses, Optimum life in case of borrowed capitals.	9	9	--	--	a5-1-1, a5-1-3, b1-2-1,c3-1-1
Permissible Price of Ships , permissible price of ships in case of borrowed capitals	9	9	--	--	a5-1-3, a6-1-2
Relative costs of ship design parameters	6	6	--	--	b1-2-3, b7-1-1
Economy propellers for reduced power operation	3	3	--	--	c1-1-2, c3-1-2
Feasibility of larger diameter propellers in ballast trips	6	6	--	--	a5-1-1, b1-2-2, d1-1
Designing ships for fuel economy	6	6	--	--	a5-1-2, b1-1-1, c1-1-2
Priorities for reducing fuel bill	3	3	--	--	b1-1-1,b7-1-1
Chartering of Ships , Elements of Marine Transport , multipurpose ships, Stowage factors, Bill of Lading , Freight Rate , Containerization ,Contracting and planning	9	9	--	--	a1-1-2, a5-1-2, b1-1-1, d1-1, d2-1
Total	90				

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A5(a5-1), A6(a6-1)	B1(b1-1), (b1-2) B7(b7-1)	C1(c1-1) C3(c3-1)	D1, D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
20%	---	30%	30%	20%	-------	---------	100%

6- Course Topics

Topic No.	Topic	Weeks
1st	Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design , Interest Relationships	1-3
2nd	Economic Criteria for Design and Operation Profitability of ships before and after Tax	4-6
3rd	Profitability of ships before and after Tax	7-8
4th	Computer Aided Ship Design Economics , Optimum Speeds ,Economical Life and Permissible Price of Ships	9-11

5th	Estimation of Cost of Building and Operating Ships	12-13
6th	Optimum Life and Replacement Analyses , Optimum life in case of borrowed capitals	14-16
7th	Permissible Price of Ships , permissible price of ships in case of borrowed capitals	17-19
8th	Relative costs of ship design parameters	20-21
9th	Economy propellers for reduced power operation	22-22
10th	Feasibility of larger diameter propellers in ballast trips	23-24
11th	Designing ships for fuel economy	25-26
12th	Priorities for reducing fuel bill	27-27
13th	Chartering of Ships , Elements of Marine Transport , multipurpose ships, Stowage factors, Bill of Lading , Freight Rate , Containerization ,Contracting and planning	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**	**11th**	**12th**	**13th**
Course ILOs	**Knowledge & Understanding**												
a1-1-1	x												
a1-1-2	x				x								x
a1-1-3	x	x											
a5-1-1			x			x				x			
a5-1-2			x		x						x		x
a5-1-3				x		x	x						
a6-1-1	x			x									
a6-1-2					x		x						
Course ILOs	**Intellectual skills**												
b1-1-1		x									x	x	x

b1-2-1		x				x							
b1-2-2										x			
b1-2-3					x			X					
b7-1-1	x	x						X				x	
Course ILOs	**Professional and practical skills**												
c1-1-1				x									
c1-1-2									x		x		
c3-1-1						x							
c3-1-2				x					x				
Course ILOs	**General and transferrable skills**												
d1-1	x									x			x
d2-1	x		x										x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x	x								
	a1-1-2	x			x	x								
	a1-1-3	x			x	x								
	a5-1-1	x			x	x								
	a5-1-2	x			x	x								
	a5-1-3	x			x	x								

	a6-1-1	x			x	x								
	a6-1-2	x			x	x								
Intellectual Skills	b1-1-1	x			x	x								
	b1-2-1	x		x	x									
	b1-2-2	x		x	x									
	b1-2-3	x		x	x									
	b7-1-1	x		x	x									
Professional Skills	c1-1-1	x		x	x									
	c1-1-2	x		x	x									
	c3-1-1	x		x	x									
	c3-1-2	x		x	x									
General Skills	d1-1	x												
	d2-1	x												

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] Prof. Dr. Galal Younis" Lecture Notes on Ship Economy ", Department of Naval Architecture &Marine Engineering, Faculty of Engineering , Port said , 2003 www.gyounis.net/lectures/Ship Economy.

[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] Galal Younis: “The Permissible price of Ships in case of Borrowed Capitals”, IX Symposium of Theory and Practice of Shipbuilding Dubrovnik , Croatia 19-21 April 1990.

[5] Galal Younis: “A New Method for Predicting Optimal Life of Ships in Cases of Equity and Borrowed Capitals”, IX Symposium of Theory and Practice of Shipbuilding Dubrovnik , Croatia 19-21 April 1990.

[6] D.G.M. Watson: “ Designing Ships for Fuel Economy “ RINA Nov. 1981.

[7] R.F. Burnett: “Designing Ships for Fuel Economy”, Shipbuilding& Marine Engineering International, Dec. 1981.

[8] R.F. Burnett: “Priorities for Reducing the Fuel Bill”, Shipbuilding& Marine Engineering International , April 1982.

[9] SMM: “Economy Propellers for Reduced Power Operation”, Stone Manganeze Marine Technical Brief No.17 , Nov.1980.

[10] J. Carreyette: “ Preliminary Ship Cost Estimation”, RINA No.4, July 1978.

[11] G. Younis: “The Feasibility of Larger Diameter Propellers in Ballast Trips”, 3rd IMAM , Athens , Greece 1984 .

[12] R. Taggart: "Ship Design and Construction", SNAME Publications , 1980.

[13] L. Blank & Antony Tarquin: "Engineering Economy" McGraw-Hill, 1983

[14] Osama Ellian " Fuel and Energy saving Strategies on Ships" A Lloyd's Register Association Paper, 2015

[15] https://web.facebook.com/groups/1819292491715304/?ref=bookmarks

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Galal M. Younis**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 513

Design of Offshore Units

Course Specification

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Design of Offshore Units	**Code Symbol:** NME 513	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**-------------**

C- Professional Information

1- Course Aims:

This course is very useful and important to the students of M. Sc. program, where it provides them with the objectives and principles of design of offshore units. To learn the design methods of mooring lines and optimum system of mooring. To introduce the students to the different types of offshore unites. To illustrate the calculation of forces acting on structure, single column, multi-column and structure built on girders, tendering and applications.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering.	a1-1-1 Demonstrate the different theories of design of offshore unit. a1-1-2 Recognize the factors that affect the design of mooring lines.
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Identify the parameters of design of offshore unite. a2-1-2 Recognize the concepts and types of offshore unit.

	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize the dynamics of mooring system and how to determine the forces apply to the system. a2-2-2 Identify the dynamics of mooring system and how to predict the forces.. a2-2-3 Show how to determine the hydrodynamic force applied to offshore structure.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate the ability to determine the parameters affect the design of offshore units.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Choose the suitable parameters and factors that affect the design of mooring lines. b3-1-2 Apply modern theories, methods and computer programs in design of offshore units.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Choose specific offshore design configuration for better mooring lines.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for specific types of offshore units. c2-1-2 Use methods to determine the hydrodynamic and aerodynamic forces apply to offshore structure.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply of course skills on design of offshore unite and mooring system design.

D7- Manage time effectively	d7-1 Lead a team work to conduct report about types of offshore units.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Theoretical background of design of offshore units.	15	15	-	--	a1-1-1, a1-1-2, a2-1-1, a2-1-2, a2-2-1, a2-2-2, a2-2-3
2. Principles of design methods of mooring lines, both theory and calculations.	15	15	-	--	a1-1-1, a1-1-2, a2-1-1, a2-1-2, a2-2-1, a2-2-2, a2-2-3
3. illustrate the different types of offshore unites	15	15	-	--	b1-1-1, c1-1-1, c2-1-1, c2-1-2, d7-1
4. hydrodynamic and aerodynamic forces acting on structure	15	15	-	--	b1-1-1, b3-1-1, b3-1-2, c2-1-1, c2-1-2, d2-1, d7-1
5. modern methods of mooring	15	15			b3-1-1, b3-1-2, c1-1-1, c2-1-1, c2-1-2, d7-1
6. dynamic and static design of mooring lines	15	15	-	--	b1-1-1, b3-1-1, b3-1-2, c1-1-1, c2-1-1, c2-1-2, d2-1, d7-1
Total	**90**	**90**	**-**	**--**	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-1), (a2-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D7

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	15%	30%	35%	10	10		100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Theoretical background of design of offshore units	**1-5**
2nd	Principles of design methods of mooring lines, both theory and calculations.	**6-10**
3rd	illustrate the different types of offshore unites	**11-15**
4th	hydrodynamic and aerodynamic forces acting on structure	**16-20**
5th	modern methods of mooring	**21-25**
6th	dynamic and static design of mooring lines	**26-30**

7- ILOs Matrix Topics

Course topics	**1^{st}**	**2^{nd}**	**3^{rd}**	**4^{th}**	**5^{th}**	**6^{th}**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Demonstrate the different theories of design of offshore unit.	x	x				
a1-1-2 Recognize the factors that affect the design of mooring lines.	x	x				
a2-1-1 Identify the parameters of design of offshore unite.	x	x				

a2-1-2 Recognize the concepts and types of offshore unit.	x	x				
a2-2-1 Recognize the dynamics of mooring system and how to determine the forces apply to the system.	x	x				
a2-2-2 Identify the dynamics of mooring system and how to predict the forces.	x	x				
a2-2-3 Show how to determine the hydrodynamic force applied to offshore structure.	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate the ability to determine the parameters affect the design of offshore units.			x	x		x
b3-1-1 Choose the suitable parameters and factors that affect the design of mooring lines. .				x	x	x
b3-1-2 Apply modern theories, methods and computer programs in design of offshore units				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Choose specific offshore design configuration for better mooring lines.			x		x	x
c2-1-1 Prepare search reports for specific types of offshore units.			x	x	x	x
c2-1-2 Use methods to determine the hydrodynamic and aerodynamic forces apply to offshore structure.			x	x	x	x
Course ILOs	**General and transferrable skills**					
d2-1 Apply of course skills on design of offshore unite and mooring system design.				x		x
d7-1 Lead a team work to conduct report about types of offshore units.			x	x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				x								
	a1-1-2	x				x								
	a2-1-1	x				x								
	a2-1-2	x				x								
	a2-2-1					x								
	a2-2-2	x				x								
	a2-2-3	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
	b3-1-2		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
	c2-1-2		x										x	
General Skills	d2-1		x							x				
	d7-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of References:

11.1. Lecture Notes:

1- Dr. Ahmed Amin

11.2. Recommended Books:

1. N. Haritos: “Introduction to the Analysis and Design of Offshore Structures– An Overview”, EJSE Special Issue: Loading on Structures (2007), 2007.
2. Chakrabarti, S. K.: “Handbook of Offshore Engineering”, San Francisco, Elsevier, 2005.
3. Jeom Kee Paik & Anil Kumar Thayamballi : “Ship-Shaped Offshore Installations: Design, Building, and Operation”, First Edition, 2007.

11.3. Key words for Internet Search:

Offshore Units, Mooring Lines, structure force.

Course Coordinator: **Dr. Ahmed Amin**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 514
Course Specification
Ship Outfitting

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Outfitting**	**Code Symbol**: NME 514	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to instruct the students about all ship outfitting systems onboard any ship. It also aims to introduce them with the main differences between these systems. Moreover, it gives them a general idea about the job required from each system. Checking and inspection procedure done by the Maritime Inspection Organization is also introduced.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-3 Understand the theories, basics and specialized knowledge in the field of Ship Construction and production.	a1-2-1 Identify the requirements of Classification Societies for ship outfitting. a1-2-2 Identify the different types of deck machinery. a1-2-3 Identify the different types of life saving equipment.

<table>
<tr><td>A5- Basics and principles of quality in professional practice in the field of specialization.</td><td>a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.</td><td>a5-1-1 Recognize quality assurance concepts for wateright doors.
a5-1-2 Recognize quality assurance concepts for deck machinery.
a5-1-3 Recognize quality assurance concepts for ship piping systems.
a5-1-4 Recognize quality assurance concepts for life saving equipment.</td></tr>
<tr><td colspan="3">B. Intellectual skills</td></tr>
<tr><td rowspan="2">B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.</td><td>b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.</td><td>b1-1-1 Design a special type of Cargo Derricks
b1-1-2 Design of different piping systems.
b1-1-3 Design of a specified steering system</td></tr>
<tr><td>b1-2 Interpret, analyzes, and evaluates specific available information and relate it to the design of the required system.</td><td>b1-2-1 Evaluate stresses on the mast and boom of deck cargo derricks.
b1-2-2 Evaluate the adequacy of life saving equipment.</td></tr>
<tr><td colspan="3">C. Professional and practical skills</td></tr>
<tr><td>C2- Write and evaluate technical and professional reports.</td><td>c2-1 Write and evaluate a professional report on the specific area of the marine industries.</td><td>c2-1-1 Prepare a professional report for deck machinery and other equipment</td></tr>
<tr><td colspan="3">D. General and transferrable skills</td></tr>
<tr><td colspan="2">D5- Use different sources to obtain knowledge and information.</td><td>d5-1 Use different information recourses to collect the available data for ship outfitting.</td></tr>
</table>

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1. Requirements of Classification Societies	12	12	---	---	A1-3-1, D5-1
2. Design of Cargo Derricks	18	18	---	---	A5-1-4, B1-1-1 , B1-2-1, C2-1-1 , D5-1
3. Design of Anchors and Capstans	15	15	---	---	A1-3-1 , A1-3-2 , C2-1-1, D5-1
4. Design of Steering Piping systems	15	15	---	---	A5-1-3 , B1-1-3, D5-1
5. Deck Machinery	15	15	---	---	A1-3-2, A5-1-2, A5-1-4, B1-1-1, C2-1-1, D5-1
6. Safety Appliances	15	15	---	---	A1-3-1, A1-3-3, A5-1-1, B1-2-2, C2-1-1, D5-1
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-3), A5(a5-1)	B1(b1-1),(b1-2)	C2(c2-1)	D5

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6.Course Topics

Topic No.	Topic	Weeks
1st	Requirements of Classification Societies	1 - 4
2nd	Design of Cargo Derricks	5 - 10
3rd	Design of Anchors and Capstans	11 – 15
4th	Design of Steering Piping systems	16 – 20
5th	Deck Machinery	21 – 25
6th	Safety Appliances	26 - 30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-2-1 Identify the requirements of Classification Societies for ship outfitting.	X		X			X
a1-2-2 Identify the different types of deck machinery.			X		X	
a1-2-3 Identify the different types of life saving equipment.						X
a5-1-1 Recognize quality assurance concepts for wateright doors.						X
a5-1-2 Recognize quality assurance concepts for deck machinery.					X	
a5-1-3 Recognize quality assurance concepts for ship piping systems.				X		
a5-1-4 Recognize quality assurance concepts for life saving equipment.		X			X	
Course ILOs	**Intellectual skills**					
b1-1-1 Design a special type of Cargo Derricks		X			X	
b1-1-2 Design of different piping systems.						X
b1-1-3 Design of a specified steering system				X		

b1-2-1 Evaluate stresses on the mast and boom of deck cargo derricks.		X				
b1-2-2 Evaluate the adequacy of life saving equipment.						X
Course ILOs	**Professional and practical skills**					
C2-1-1 Prepare a professional report for deck machinery and other equipment		X	X		X	X
Course ILOs	**General and transferrable skills**					
D5-1 Use different information recourses to collect the available data for ship outfitting.	X	X	X	X	X	X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-3-1	X												
	a1-3-2	X	X						X					
	a1-3-3	X	X						X					
	a5-1-1	X												X
	a5-1-2	X												X
	a5-1-3	X												X
	a5-1-4	X												X
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X				X								
	b1-1-3	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d5-1								X	X				

9- Assessment

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- List of references:

1. David J. Eyres :"ShipConstruction", Sixth Edition, Butterworth-Heinemann, ELSEVIER, 2007.
2. The Society of Naval Architects of Korea: "Shipbuilding Technology", 2015.

Periodicals, Web sites, etc

1. Journal of Ship Research
2. Marine Talk Newsletter

Key words for Internet Search:

Deck machinery, Safety Appliances, Steering System, Ship Outfitting

12- Program Coordination Committee:

Course Coordinator: **Dr. Moustafa Mohammed Moustafa**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 515
Course Specification
Domestic Transport Units

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Domestic transport units**	**Code Symbol**: NME 515	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to introduce the students with the essential knowledge about the hydrodynamic of ship in restricted waterways as Suez Canal and River Nile. The course provides the students with the main factors ruling the design of inland ships and the choice of their types. It teaches the change of the different component of ship resistance, power and engine. It teaches also the features of push tows. The course includes also the necessary skills concerning the analysis of ship maneuvering and steering on inland waterways. This course provides also some information about the main propulsion systems used in inland navigation ship and the required equipments.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-3 Understand the theories, basics and specialized knowledge in the field of Ship Construction and production	a1-3-1 Identify functions of inland ships. a1-3-2 Categorize types of cargoes for inland units. a1-3-3 Show fairway condition and ship design.

A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline the coponent of resistance for inland units a5-1-2 Identify frictional resistance for inland units a5-1-3 Identify pressure resistance for inland units.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Categorize the types of propulsion b1-1-2 Demonstrate ship speed and power. b1-1-3 Select and demonstrate the engines types
	b1-2 Interpret, analyzes, and evaluates specific available information and relate it to the design of the required system..	b1-2-1 Choose type and number of rudders b1-2-2 Evaluate ship Maneuvering qualities
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional report for the basic aim of using of push towing transport system.
D. General and transferrable skills		
D5- Use different sources to obtain knowledge and information.		d5-1 Use computer to know the suitable equipment for Inland Ships

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1-Factors effecting the design of Inland Ship	12	12	---	---	a1-3-1, d5-1
2-Change of component of Ship Resistance and Power in Restricted Waterways	18	18	---	---	a5-1-4, b1-1-1 , b1-2-1, c2-1-1 , d5-1
3- Analysis Propulsion System	15	15	---	---	a1-3-1 , a1-3-2 , c2-1-1, d5-1
4-Maneuvering and Steering of ship in restricted waterways	15	15	---	---	a5-1-3 , b1-1-3, d5-1
5-Push tows versus motor barges	15	15	---	---	a1-3-2, a5-1-2, a5-1-4, b1-1-1, c2-1-1, d5-1
6-Equibment of Inland Ships	15	15	---	---	a1-3-1, a1-3-3, a5-1-1, b1-2-2, c2-1-1, d5-1
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-3), A5(a5-1)	B1(b1-1),(b1-2)	C2(c2-1)	D5

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- <u>Course Topics</u>

Topic No.	Topic	Weeks
1st	Factors effecting the design of Inland Ship	1 - 4
2nd	Change of component of Ship Resistance and Power in Restricted Waterways	5 - 10
3rd	Analysis Propulsion System	11 – 15
4th	Maneuvering and Steering of ship in restricted waterways	16 – 20
5th	Push tows versus motor barges	21 – 25
6th	Equibment of Inland Ships	26 - 30

7- <u>ILOs Matrix Topics</u>

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-3-1 Identify functions of inland ships.	X		X			X
a1-3-2 Categorize types of cargoes for inland units.			X		X	
a1-3-3 Show fairway condition and ship design.						X
a5-1-1 Outline the coponent of resistance for inland units						X
a5-1-2 Identify frictional resistance for inland units					X	
a5-1-3 Identify pressure resistance for inland units.				X		
Course ILOs	**Intellectual skills**					
b1-1-1 Categorize the types of propulsion		X			X	
b1-1-2 Demonstrate ship speed and power.						X
b1-1-3 Select and demonstrate the engines types				X		
b1-2-1 Choose type and number of rudders		X				
b1-2-2 Evaluate ship Maneuvering qualities						X
Course ILOs	**Professional and practical skills**					

c2-1-1 Prepare a professional report for the basic aim of using of push towing transport system.		X	X		X	X
Course ILOs	**General and transferrable skills**					
d5-1 Use computer to know the suitable equipment for Inland Ships	X	X	X	X	X	X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-3-1	X												
	a1-3-2	X	X						X					
	a1-3-3	X	X						X					
	a5-1-1	X												X
	a5-1-2	X												X
	a5-1-3	X												X
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X				X								
	b1-1-3	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d5-1								X	X				

9- <u>Assessment</u>

9.1 Assessment Methods

Final WrittenExamination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- <u>List of references:</u>

1- CI Capital Research Team: “Transport & Logistics - Water Still Key to Egyptian Economic Health”, CICR Egypt Book, December 2010.

2- K. K. King, H. Yasukawa, N. Hirata & K. K. Kose: “Maneuvering simulations of pusher-barge systems”, Journal of Marine Science and Technology, Volume 13, No. 2, May 2008.

3- K. Anuar: “Maneuvering Control for Pusher Barge in Inland Waterways”, M. Sc. Thesis, Faculty of Mechanical Engineering, Universiti of Teknologi, Malaysia, 2008.

4- K. K. King, H. Yasukawa & N. Hirata: “Shallow Water Effect on Turning Motion of a Pusher-Barge System”, the 4th Asia-Pacific Workshop on Marine Hydrodynamics (APHydro 2008), Taipei, June 2008.
J. P. Michalski: “A method of predicting Main Propulsion Power for Inland waterways push trains”, Polish Maritime Research, 2006.

5- A. Zoran, & J. Marija: “Improving Inland Waterway Transport Efficiency by a New Approach to Vessel Design”, European Inland Waterway Navigation Conference, Hungary, 2005.

6- M. M. Moustafa: “Optimization Procedure for Preliminary Design Stage of Cairo-Damietta Self-Propelled Grain Bulk Ships”, Brodogradnja, Volume 66, No. 4, Croatia, 2015.

7- A. Radonjić: “Strategy to Reduce Pollution from Serbian Pushboat”, International Journal for Traffic and Transport Engineering, Vol. 1, No. 2, 2011.

- **Periodicals, Web sites, etc**

1. Journal of Ship Research 2. Binnenschifffahrt

- **Key words for Internet Search:**

Shallow water, inland ships, motor barges, Push tows

12- <u>Program Coordination Committee:</u>

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME516
Ship Vibrations
Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Vibrations**	**Code Symbol**: NME 516	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to provide students with basic knowledge and skills that are required to carry out Vibration Analysis on Ships. the course gives students an advanced theoretical background in the fundamental vibration diagnoses and limitations. Familiarize students with shipboard vibration types and compatibility problem in design and in-service stages.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering	a1-1-1 Recognize vibration theories
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Define the limitation and vibration criteria
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Investigate vibration related problems onboard ships
A3- Fundamentals of ethical & legal	a3-1 Recognize ethnical and professional responsibility issues	a3-1-1Recognize theories used for vibration analysis

professional practice in the field of specialization.	arising in the practice of the engineering profession.	
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and Marine Engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Analyze vibration measurement data and technical raised problems
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify problem sources via measurements analysis
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 prepare a professional measurement report for torsional vibration
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Employ course skills in career development
D6- Lead a team in familiar professional context		d6-1 practice in a team to complete an accurate test/measurement

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Theory of vibration and monitoring equipments identifications	9	9	-	--	a1-1-1, a2-1-1 a2-2-1, a3-1-1
2. Hull structural Vibrations	9	9			a1-1-1, a2-1-1 a2-2-1, a3-1-1
3. Shafting and Propeller Vibrations	18	18	-	--	b1-1-1, c1-1-1, c2-1-1,d6-1
4. Hull- Propeller- Engine foundation compatibly	18	18	-	--	b1-1-1, b3-1-1, c2-1-1, d2-1, d6-1
5. Vibration monitoring analysis theory and its characteristics	18	18	-	--	b3-1-1, c1-1-1, c2-1-1,d6-1
6. Vibration limits and criteria	18	18	-	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1,d2-1, d6-1
Total	90	90	-	--	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1), (a2-2), A3(a3-1)	B1(b1-1), B3(b3-1),	C1(c1-1) C2(c2-1)	D2, D6

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6.Course Topics.

Topic No.	Topic	Weeks
1st	Theory of vibration and monitoring equipments identifications	1-3
2nd	Hull structural Vibrations	4-6
3rd	Shafting and Propeller Vibrations	7-12
4th	Hull- Propeller- Engine foundation compatibly	13-18
5th	Vibration monitoring analysis theory and its characteristics	19-24
6th	Vibration limits and criteria	25-30

7-ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Recognize vibration theories	x	x				
a2-1-1 Define the limitation and vibration criteria	x	x				
a2-2-1 Investigate vibration related problems onboard ships	x	x				
a3-1-1Recognize theories used for vibration analysis	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate an investigatory approach for detecting problems sources			x	x		x
b3-1-1 Analyze vibration measurement data and technical raised problems				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Identify problem sources via measurements analysis			x		x	x
c2-1-1 prepare a professional measurement report for torsional vibration			x	x	x	x
Course ILOs	**General and transferrable skills**					
d2-1 Employ course skills in career development				x		x

development						
d6-1 practice in a team to complete an accurate test/measurement			x	x	x	x

8-Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x												
	a2-1-1	x				x								
	a2-2-1	x				x								
	a3-1-1	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
	d2-1		x							x				
	d6-1		x							x				

9-Assessment

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10-Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] Daniel, J., “Engineering Vibration”, Prentice-Hall, Inc., Asimon & Schuster Company, Englwoodcliffs, New Jersey, 1994.

[2] Khurmi, R. S., Gupta, J.K., “Theory of Machines”, 11th Edition, Chapter 24, Eurasia Publishing house Ltd., New Delhi, 1994.

[3] Todd, F.H., “Ship Hull Vibration” Edward Arnold Publisher Ltd., London, 1961.

[4] Veritec, (Marine Technology Consultants), “Vibration Control in Ships,” VERITEC, Noise and

[5]Meirovitch, Leonard. Fundamentals of vibrations. Waveland Press, 2010.

[6]Thomson, William. Theory of vibration with applications.CRC Press, 2008.

[7]Ogata, Katsuhiko, and Yanjuan Yang. Modern control engineering. Vol. 4. India: Prentice hall, 2002.

[8]Feese, T., and Hill, C., “Guidelines for Preventing Torsional Vibration Problems in Reciprocating Machinery,” Gas Machinery Conference, Nashville, Tennessee, October 7, 2002

[9]Magazinvoić G. “Shafting Vibration Primer” technical report, CADEA, Split, Croatia, 2002.

[10]G.Rajko “Propeller Shaft Excitation in the Ship Design Evaluation Procedure”, Brodogradnja, Vol.53, 2005

[11]H. Tienhaara “Guidelines to engine dynamics and vibrations”, Värtsilä NSD Switzerland Ltd, 2004

12- Program Coordination Committee:

Course Coordinator: **Dr. Waleed Yehia**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME517

Ship Structural Design(1)

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Structural Design (1)**	**Code Symbol**: NME 517	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to improve the students knowledge and skills that are required to carry out a complete ship structural design, based on the principles of structural analysis of different levels of structural response and assess the ultimate strength of ship panels.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering	a1-1-1 Identify the role of different theories used in structural analysis in ship structural design. a1-1-2 Define the different cases of limit state design
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Recognize the appropriate acceptance criteria according to Rules

B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and Marine Engineering.	b1-1-1 Demonstrate different theories to assess the strength of ship modules (plates , stiffeners and stiffened panels) b1-1-2 Create idealization to solve structural problems by simplified formulae.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Investigate a detailed case study of a reported structural failure.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Use the different analytical and numerical tools to perform the design of some ship structural components.
D. General and transferrable skills		
D1- Communicate effectively using all methods.		d1-1 Use Communication skills to conduct casualties reports (Ship Structure Committee or other sources)

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1-Theory of plates and shells	15	15	-	--	a1-1-1, b1-1-1, c1-1-1
2- Theory of plasticity	12	12			a1-1-2, c1-1-1
3- Limit state analysis	12	12	-	--	a2-1-1, b1-1-1, b3-1-1, d1-1
4- Applications of the Finite element method	12	12	-	--	a1-1-1, c1-1-1
5- Dynamics of ship structures	15	15	-	--	a1-1-1, a2-1-1, b1-1-1, b1-1-2,c1-1-1
6- Applications of elastic stability	12	12	-	--	a1-1-2, c1-1-1

problems					
7- Introduction to structural optimization	12	12	-	--	a1-1-1, c1-1-1
Total	**90**	**90**			

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1)	B1(b1-1), B3(b3-1)	C1(c1-1)	D1

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**---**	**70%**	**20%**	**10%**	**---**	**100%**

6- Course Topics:

Topic No.	Topic	Weeks
1st	Theory of plates and shells	1-5
2nd	Theory of plasticity	6-9
3rd	Limit state analysis	10-13
4th	Applications of the Finite element method	14-17
5th	Dynamics of ship structures	18-22
6th	Applications of elastic stability problems	23-26
7th	Introduction to structural optimization	27-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th	7th
Course ILOs	**Knowledge & Understanding**						
a1-1-1	x			x	x		x
a1-1-2		x				x	
a2-1-1			x		x		
Course ILOs	**Intellectual skills**						
b1-1-1	x		x		x		
b1-1-2					x		
b3-1-1			x				
Course ILOs	**Professional and practical skills**						
c1-1-1	x	x		x	x	X	x
Course ILOs	**General and transferrable skills**						
d1-1			x				

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x									
	a1-1-2	x			x	x								
	a2-1-1	x			x	x								
Intellectual Skills	b1-1-1	x	x		x									
	b1-1-2	x	x		x									
	b3-1-1	x			x									
Professional Skills	c1-1-1	x			x			x					x	
General Skills	d1-1	x			x									

9- Assessment

9.1 Assessment Methods

Final Written : Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] Paik, J., Thaymballi, A., "Ultimate limit state design of steel plated structures", J.Wiley, 2003.

[2] O. F. Hughes & J. Paik et al., 'Ship structural analysis and design', SNAME, 2010

[3]Timoshenko, S., Woinowsky-Krieger, S., "Theory of plates and shells", Textbook publishers, 2003

[4]http://www.shipstructure.org/

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Heba S. El-Kilani**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME518

Ship Machinery

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Machinery**	**Code Symbol**: NME 518	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to acquire the student with the essential knowledge and necessary practical concerning the classification of the internal combustion engines, gas turbine, marine steam boilers and turbines. The principles operation of the internal combustion engines are among the main aims of the course. Also, the course provides the students with the necessary professional skills concerning the calculations of the clean energy (wind, solar, tide and waves).

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Show the requirements of Classification Societies. a1-1-2 Categorize the different types of marine engine. a1-1-3 Categorize the different types of gas turbine and steam turbines.

A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Identify the safety instructions for steam boilers. a5-1-2 Identify the maintenance procedure for internal combustion engines, steam and gas turbines. a5-1-3 Identify the required measures to increase the obtained energy from wind, solar, tide and waves.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Design a hybrid propulsion system using the obtained energy from solar, wind or waves. b1-1-2 Design a maintenance schedules for ship machineries.
	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Analyze information about the weather forecasts during the year.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional report for the maintenance and operation of ship machinery.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d4-1-1 Use different information recourses to collect the available data for ship machinery.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
General considerations for the choice of marine engines	12	12	---	---	a1-1-2, a5-1-1, d2-1
Requirements of Classification Societies	18	18	---	---	a1-1-1, d2-1
Marine steam boilers and turbines	15	15	---	---	a1-1-3 , a5-1-1,a5-1-2, b1-1-2 , c2-1-1, d2-1
Internal combustion engines	15	15	---	---	a1-1-2 , b1-1-1, b1-1-2, c2-1-1, d2-1
Gas turbines	15	15	---	---	a1-1-3, a5-1-2, b1-1-2, c2-1-1, d2-1
Clean energy (wind, solar, tide and waves)	15	15	---	---	a5-1-3, b1-1-1 , b1-2-1, d2-1
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-2) A5(a5-1)	B1(b1-1),(b1-2)	C2(c2-1)	D2

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	General considerations for the choice of marine engines	1 - 4
2nd	Requirements of Classification Societies	5 - 10
3rd	Marine steam boilers and turbines	11 – 15
4th	Internal combustion engines	16 – 20
5th	Gas turbines	21 – 25
6th	Clean energy (wind, solar, tide and waves)	26 - 30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1		X				
a1-1-2	X			X		
a1-1-3			X		X	
a5-1-1			X			
a5-1-2	X		X		X	
a5-1-3						X
Course ILOs	**Intellectual skills**					
b1-1-1				X		X
b1-1-2			X	X	X	
b1-2-1						X
Course ILOs	**Professional and practical skills**					
c2-1-1			X	X	X	
Course ILOs	**General and transferrable skills**					
d2-1	X	X	X	X	X	X

8- Teaching and Learning Method:

Course Intended learning outcomes(ILOs)		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X	X											
	a1-1-2	X	X											
	a1-1-3	X	X											
	a5-1-1	X	X											
	a5-1-2	X	X											
	a5-1-3	X	X											
Intellectual Skills	b1-1-1	X	X			X								
	b1-1-2	X	X			X								
	b1-2-1	X	X			X								
Professional Skills	c2-1-1	X	X											
General Skills	d2-1													

(Teaching and Learning Method)

9- Assessment

9.1 Assessment Methods

Final Written Examination: to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for ship outfitting and prepare technical reports.

11- <u>List of references:</u>

1- Harrington R.Y., Marine Engineering, 2^{nd} edition, SNAME, USA 1992.

2- Mina Morgan, "Marine Technology Reference book", first edition Butterworth Ltd., Uk 1995.

3- Mc-George H.D., Marine Auxiliary Machinery, 7th edition, Butterworth, London 1995.

4- LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2016.

5- D.A. Taylor: " Introduction to Marine Engineering", Elsevier Science, 2014.

12- <u>Program Coordination Committee:</u>

Course Coordinator:	**Dr. Moustafa Mohammed Moustafa**
Programme coordinator:	**Assoc. Prof. Dr. Moustafa Mohamed**
Head of the Department:	**Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

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NME519
Ship Machinery Performance
Course Specification

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Machinery performance**	**Code Symbol**: NME 519	
Lecture	3 hours	
Tutorial /Laboratory	---	
Total	3hours	Bylaw 2000

B- Professional Information

1- Course Aims:

The aims of this course are to provide the Student, upon completing the Naval Architecture and Marine Engineering master Program, with the advanced knowledge and skills of how to deal with different ship propulsion machinery and auxiliary equipments on shipboard. This course will also provide students with the ability to be familiar with the main principles of electric power generators for ship activities. The students have to know the different parameters and variables affecting the machinery performance and overall power plant efficiency. The students have to be families how to design, select and arrange the deck machinery and engine room equipments. They have to be capable of install, design and laying the machinery and ship hull piping systems.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-2 Understand the theories, basics and specialized knowledgein the field ofMarine Engineering..	a1-2-1 Identify the different types of ship machinery. a1-2-2 Identify the properites and specification of the elements.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 identify the differnt source of marine pollution a2-2-2 Recognize the mothedology applide to reduce the ship emission.
B. Intellectual skills		
B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b-2-1-1 Evaluate the ability to estimate the missed date to solve the problems. b-2-1-2 Predict the required element and components of the system by applying the modern computational methods b2-1-3 Solve the engineering problems related to Marine engineering and Engine performance.
B4- Conduct a research study and/or writing systematic scientific study about the research topic.	b4-1 Conduct a research study and/or writing systematic scientific study about the research topic.	b-4-1-1 Conduct a research regarding the ship machinery and propulsion systems. b4-1-2 Use the standards and international regulation to get the suitable design data and installation.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Improve and add new ideas to marine disciplines c1-1-2 Evaluate the ability to transfer the new ideas to the others c1-1-3 Manage the job requirements using latest engineering techniques.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare and evaluate a professional report of the specific marine engineering topics. c2-1-2 Design the repair and maintenance programs sheets and plan.

D. General and transferrable skills	
D2- Use information technology to improve his/her professional practice.	d2-1 Use computer program to calculate all the marine index.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Control and control device	18	18	-	-	a1-1-1, a1-2-1, a2-1-1, c1-1-1
Performance factor for reduction gears and part loads	12	12	-	-	a1-1-1, c1-1-1, c2-1-1
Interconnection between main and auxiliary machinery	12	12	-	-	b1-1-1, c2-1-1,
Load and weather effects on engine performance.	12	12	-	-	a1-1-1, a1-2-1, d2-1
Engine efficiency and performance after accidents	15	15	-	-	a1-2-1, b4-1-1, c2-1-1
Effects of maintenance and repair	12	12	-	-	b1-1-1, b4-1-1,d2-1
Reliability of marine engines	9	9			b1-1-1, b4-1-1,d2-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A2(a2-1)	B1(b1-1), B4(b4-1),	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---		**40%**	**40%**	**20%**	**--**		**100%**

Course Contents

6- Course Topics.

Topic No.	Topic	Weeks
1st	Control and control device	1-6
2nd	Performance factor for reduction gears and part loads	7-10
3rd	Interconnection between main and auxiliary machinery	11-14
4th	Load and weather effects on engine performance.	15-18
5th	Engine efficiency and performance after accidents	19-23
6th	Effects of maintenance and repair	24-27
7th	Reliability of marine engines	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Course ILOs	**Knowledge & Understanding**						
a1-1-1	x	x		x			
a1-2-1	x			x	x		
A2-1-1	x						
Course ILOs	**Intellectual skills**						
b1-1-1			x			x	x
B4-1-1					x	x	x
Course ILOs	**Professional and practical skills**						
c1-1-1	x	x					
C2-1-1		x	X		x		
Course ILOs	**General and transferrable skills**						
d2-1				x		x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	A2-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	B4-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	C2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992.
2. Mina Morgan, "Marine Technology Reference book, 3rd edition Butterworth Ltd., Uk 2005.
3. P. Breeze, Power Generation Technologies, Elsevier Science, 2014.
4. Mc-George H.D., Marine Auxiliary Machinery, 10th edition, Butterworth, London 2008.
5. LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2017.
6. D.A. Taylor, Introduction to marine engineering, Elsevier, 2nd edition 2003.
7. SNAME and RINA periodicals- 2016-2017

12- Program Coordination Committee:

Course Coordinator: **Prof. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME520

Marine Measuring Tools

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Marine Measuring Tools**	**Code Symbol**: NME 520	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

Familiarize students with main principles of measurements, Definition of instrumentation, description of measuring instruments and statistical analysis of experimental data and calculating errors. The students should be aware of measurement procedures during sea trails and diagnostic investigation of problems sources throughout measurements. The course covers the basic control and measurements of propulsion and auxiliary machineries. Ultrasonic testing and investigation skills are also presented by this course.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering	a1-1-1 Recognize theories used for diferent parameters measuremnts. a1-1-2 Identify the normal and limitations for various paremeters to satisfy functional performance

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Recognize the crew and passengers habitability ranges and human errors
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize the performance related problems through measurements
A4- Fundamentals of ethical & legal professional practice in the field of specialization.	a4-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	a4-1-1 Outline quality assurance concept to new built/running ships structure and equipment
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Analyze measurement data and technical raised problems
B4- Conduct a research study and/or writing systematic scientific study about the research topic.	b4-1 Perform applied research on industrial and societal concerns problems related to marine industries (thesis).	b4-1-1 Assess the possible decisions of repair or renewal of marine systems.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	C1-1-1 Indentify any engineering problem via measurements.
C2- Write and evaluate technical and professional reports .	c.2-1 Write a professional report on specialized systems related to Naval Architecture and Marine Engineering technical matters.	c2-1-1 Prepare a professional measurement report for sea trails or investigation reports

D. General and transferrable skills	
D1- Communicate effectively using all methods Effectively using all methods.	d1-1 Use Communication skills to perform tests both onboard and in shipyards
D2- Use information technology to improve his/her professional practice.	d2-1 Apply course skills in career development
D3- Apply self evaluation and define personal educational needs.	d3-1 Use different information recourses in measurements analysis and investigations

3-

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
1. Basic principles of measurements and instrumentation	9	9	-	--	a1-1-1, a1-1-2, a2-1-1, a2-2-1, a4-1-1
2. Measurements analysis and error calculations	9	9			a1-1-1, a1-1-2, a2-1-1, a2-2-1, a4-1-1
3. Sea Trials Measurements	18	18	-	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1, d1-1
4. Main propulsion and Auxiliary Engines Measurements and Control	18	18	-	--	b1-1-1, b3-1-1, c2-1-1, d2-1, d3-1
5. Vibration Measurement Analysis and Condition Monitoring	18	18	-	--	b3-1-1, c1-1-1, c2-1-1
6. Ultrasonic Testing and Investigations	18	18	-	--	b1-1-1, b3-1-1, b4-1-1, c1-1-1, c2-1-1, d1-1, d2-1, 3-1
Total	90	90	-	--	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1), (a2-2), A4(a4-1)	B1(b1-1), B3(b3-1) B4(b4-1),	C1(c1-1) C2(c2-1)	D1, D2, D3

5- Course Subject Area:

Course Contents

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	Basic principles of measurements and instrumentation	1-3
2nd	Measurements analysis and error calculations	4-7
3rd	Sea Trials Measurements	8-13
4th	Main propulsion and Auxiliary Engines Measurements and Control	14-19
5th	Vibration Measurement Analysis and Condition Monitoring	20-25
6th	Ultrasonic Testing and Investigations	26-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-1-1	x	x				
a1-1-2	x	x				
a2-1-1	x	x				
a2-2-1	x	x				
a4-1-1	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1			x	x		x
b3-1-1			x	x	x	x
b4-1-1						x
Course ILOs	**Professional and practical skills**					
c1-1-1			x		x	x
c2-1-1			x	x	x	x
Course ILOs	**General and transferrable skills**					
d1-1			x			x
d2-1				x		x
d3-1				x		x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge &understanding	a1-1-1	x												
	a1-1-2	x				x								

	a2-1-1	x				x								
	a2-2-1	x				x								
	a4-1-1	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
	b4-1-1		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
General Skills	d1-1		x							x				
	d2-1		x							x				
	d3-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

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. 2- Holman, "Experimental Methods for Engineering", McGraw Hill 1984.
4. ITTC Recommended procedures “Speed/Power Trial preparation”, 7.5-04-0101.1, 23rd ITTC 2002;
5. International standard ISO 15016 and ISO 19019 “Ship and marine technology – Guidelines for the assessment of speed and power performance by analysis of speed trial data”, First edition 2002-06-15;
6. The Specialist Committee on Speed and Powering Trials. Final report and recommendations to the 23rd ITTC, page 314-367;
7. Meirovitch, Leonard. Fundamentals of vibrations. Waveland Press, 2010
8. G.Rajko “Propeller Shaft Excitation in the Ship Design Evaluation Procedure”, Brodogradnja, Vol.53, 2005

12- Program Coordination Committee:

Course Coordinator: **Dr. Waleed Yehia**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME521
International Conventions and Ship Safety

Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **International Conventions and Ship safety**	**Code Symbol**: NME 521	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to provide students with awareness of different conventions imposed to maritime industry and its impact on design and operations of ships, and the professional and ethical responsibilities of engineers, law and regulations, environmental science and the impact of engineering solutions in a global and societal context.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1Recognize the social and economical aspects of marine industries.	a2-1-1 Identify different threats arising from maritime industry.
	a2-2 Recognize the different effects of marine industries on the environment.	a2-1-2 Recognize the role of legislations in the main evolution in ship design .

A4- Fundamentals of ethical & legal professional practice in the field of specialization.	a4-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	a4-1-1Recognize the role of different regulations and conventions during the process of ship design and operation.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate a given system specific information and relate it to ship design.	b1-2-1 Identify the main features and actions controlled by conventions and/or regulations in a given project, e.g., ship conversion or ship repair.
B4- Conduct a research study and/or writing systematic scientific study about the research topic.	b4-1 Perform applied research on industrial and societal concerns related to Naval Architecture and Marine Engineering field (Project).	b4-1-1 Analyze the requirements of formal safety assessment of bulk carriers
B5- Assess risks in professional practice in the field of specialization.	b5-1 Evaluate pros and cons of given methodologies for Naval Architecture and Marine Engineering systems development	b5-1-1 Apply Risk assessment in offshore industry
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare professional reports to show the compliance of a given ship with SOLAS and /or MARPOL, or other IMO conventions.
		c2-1-2 Design specific checklists to facilitate inspection tasks related to regulations.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use internet network to collect the required conventions and regulations and their updates.
D3- Apply self evaluation and define personal educational needs.		d3-1 Apply self evaluation to assess the acquired awareness of the legislations related to a specific unit (e.g. harbor tug)

D5- Use different resources to obtain knowledge and information.	d5-1 conduct visits and personal contacts to discuss the responsibilities of inspectors in Port State, classification societies and different national authorities.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1-Marine activities	9	9	-	--	a2-1-1, d5-1
2- Marine accidents	9	9	--	--	a2-1-1, b4-1-1
3- Environmental pollution	9	9	-	--	a2-1-1, a2-1-2
4- Conventions for pollution control	9	9	-	--	a2-1-2, a4-1-1,b5-1-1 c2-1-1
5- Navigation conventions	9	9	-	--	a4-1-1, c2-1-2, d5-1
6- Safety and rescue equipment	21	21	-	--	a4-1-1, b4-1-1
7- Certifications and classification	24	24	-	--	b1-2-1, b5-1-1, d2-1, d3-1
Total	90	90			

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A2(a2-1), (a2-2) A4(a4-1)	B1(b1-2), B4(b4-1);B5(b5-1)	C2(c2-1)	D2, D3, D5

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
70%	**---**	**----**	**15%**	**--**	**15%**	**---**	**100%**

Course Contents

6- Course Topics.

Topic No.	Topic	Weeks
1st	Marine activities	1-3
2nd	Marine accidents	4-6
3rd	Environmental pollution	7-9
4th	Conventions for pollution control	10-12
5th	Navigation conventions	13-15
6th	Safety and rescue equipment	16-22
7th	Certifications and classification	23-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Course ILOs	**Knowledge & Understanding**						
a2-1-1 Identify different threats arising from maritime industry.	x	x	x				
a2-1-2 Recognize the role of legislations in the main evolution in ship design .			x	x			
a4-1-1Recognize the role of different regulations and conventions during the process of ship design and operation.				x	x	x	

Course ILOs	Intellectual skills						
b1-2-1 Identify the main features and actions controlled by conventions and/or regulations in a given project, e.g., ship conversion or ship repair.							x
b4-1-1 Analyze the requirements of formal safety assessment of bulk carriers		x				x	
b5-1-1 Apply Risk assessment in offshore industry				x			x
Course ILOs	**Professional and practical skills**						
c2-1-1 Prepare professional reports to show the compliance of a given ship with SOLAS and /or MARPOL, or other IMO conventions.				x			
c2-1-2 Design specific checklists to facilitate inspection tasks related to regulations.					x		
Course ILOs	**General and transferrable skills**						
d2-1 Use internet network to collect the required conventions and regulations and their updates.							x
d3-1 Apply self evaluation to assess the acquired awareness of the legislations related to a specific unit (e.g. harbor tug)							x
d5-1 conduct visits and personal contacts to discuss the responsibilities of inspectors in Port State, classification societies and different national authorities.	x				x		

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a2-1-1	x	x				x							
	a2-1-2		x							x				
	a4-1-1	x		x										
Intellectual Skills	b1-2-1	x							x					
	b4-1-1	x	x											
	b5-1-1	x								x				
Professional Skills	c2-1-1								X					
	c2-1-2								x	x				
	d2-1									x				
	d3-1									x				
	d5-1			x						x	x			

9- Assessment

9.1 Assessment Methods

Final Written Examination To assess students' knowledge.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector -Library.

A. laboratory Usage:

None

B. Library Usage:

Students should be encouraged to use library technical resources .

11- List of references:

1- MARPOL conventions "International Convention for the Prevention of Pollution from Ships, 73/78", www.imo.org
2- International Convention for the Safety of Life at Sea (SOLAS)
3- IMO Vega computer package, version 2.1
4- Marine Pollution (4th Edition) R.B. Clark, C. Frid and M Attrill, Oxford Science Publications, 1997,
5- Oil Spill Response in the Marine Environment J.W. Doerffer, Pergamon Press, 1992
6- www.eagle.org
7- www.imo.org

12- Program Coordination Committee:

Course Coordinator: **Dr. Heba S. El-Kilani**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME522

Heat Applications in Marine Engineering

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc. degrees
Date of specification approval	August 2019

A- Basic Information

Title: Heat Application in Marine Engineering	**Code Symbol**: NME 522	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the students to be familiar with the heat applications in marine engineering . The students have to know how to select and arrange the different heat insulation in cargo compartments, engine room, and accommodation. They have to be capable of install, inspect and laying the air conditioning systems and cooling equipment in ships. The student should be familiar with different methods using for water desalination and heat treatment of oil and fuel.

After finishing the course, the student will have good knowledge and understanding to deal with the modern power stations and advanced methods for air conditioning and cooling applicatios on board ships. They should know how to calculate the cooling and heating load in propelling machinery. After completion of this course, the student should be able to:

- Configure all the heating and cooling machinery and component onboard ships.
- Understand and discuss the different concepts of heat transfer laws.
- Critically evaluate and compare various concepts of marine power stations
- Determine the concept and functions of the most heating and cooling operation in ship board.
- Design and install the various heat exchangers and air condition systems.
- Carry on the required calculations to determine cooling load and insulation.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Outline a comparative study of marine power stations.
	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Show basic information about marine heat exchangers, heating and cooling loads.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different heating and cooling processes and operation of marine systems.	a5-1-1 Outline a comparsion between the different heating and cooling components.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to heat applications marine engineering.	b1-1-1 Predict and define the suitable systems of heating and cooling aboard ship.
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Categorize different safety equipment and insulation devices.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.

C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Select the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use computer program to calculate all the marine index.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
General review of heat transfer laws	12	12	-	-	a1-1-1, a1-2-1, a5-1-1, c1-1-1
Heat insulation in machinery spaces.	12	12	-	-	a1-1-1, c1-1-1, c2-1-1
Heat insulation in cargo compartments	12	12	-	-	b1-1-1, c2-1-1,
Application of air condition in ships	12	12	-	-	a1-1-1, a1-2-1, d2-1
Cooling processes in ships	12	12	-	-	a1-2-1, b6-1-1, c2-1-1
Efficiency of cooling and heating loads	12	12	-	-	b1-1-1, b6-1-1,d2-1
Relationship of cooling and heating rates in propulsion machinery	9	9			b1-1-1, b6-1-1,d2-1
Effect of operation functions on engine performance.	9	9			a1-2-1, b6-1-1, c2-1-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A5(a5-1)	B1(b1-1), B6(b6-1),	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---		**40%**	**50%**	**10%**	**--**		**100%**

Course Contents

6- Course Topics.

Topic No.	Topic	Weeks
1st	General review of heat transfer laws	1-4
2nd	Heat insulation in machinery spaces.	5-8
3rd	Heat insulation in cargo compartments	9-12
4th	Application of air condition in ships	13-16
5th	Cooling processes in ships	17-20
6th	Efficiency of cooling and heating loads	21-24
7th	Relationship of cooling and heating rates in propulsion machinery	25-27
8th	Effect of operation functions on engine performance.	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**		
Course ILOs	**Knowledge & Understanding**							
a1-1-1	x	x		x				
a1-2-1	x			x	x			x
A5-1-1	x							
Course ILOs	**Intellectual skills**							
b1-1-1			x			x	x	
b6-1-1					x	x	x	x
Course ILOs	**Professional and practical skills**							
c1-1-1	x	x						
C2-1-1		x	X		x			x
Course ILOs	**General and transferrable skills**							
d2-1				x		x	x	

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	A5-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b6-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	C2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. Mina Morgan, "Marine Technology Reference book",3rd st edition Butterworth Ltd., Uk 2008.
2. LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2016.
3. Jan F. Kreider, handbook of heating, ventilation and air condition, CRC press, 2001.
4. D.A. Taylor, Introduction to Marine Engineering, Elsevier Science, 2014.
5. P. Breeze, Power Generation Technologies, Elsevier Science, 2014.
6. SNAME and RINA periodicals- 2016-2017

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME523

Marine Power Stations

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc. degrees
Date of specification approval	August 2019

A- Basic Information

Title: Marine Power Station	**Code Symbol**: NME 523	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the students to be familiar with the modern marine power stations. The students have to know how to design, select and arrange the optimum marine engines, heat exchangers, safety equipment and piping systems. They have to be capable of install, design and laying the piping systems and components for ship hull and machinery. The student should be familiar with different methods using to reduce the pollution and calculate the machinery power.

After finishing the course, the student will have good knowledge and understanding to deal with the modern power stations and advanced methodsd to reduce the marine pollution and design the piping systems and there components. After completion of this course, the student should be able to:

- Configure and descript the equipments and components of modern marine power plants.
- Understand and discuss the different methods using to reduce marine pollution.
- Critically evaluate and compare various concepts of marine power stations
- Determine the concept and functions of the most safety and oil treatment equipment.
- Design and install the various heat exchangers and piping systems.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Outline a comparative study of marine power stations.
	a1-2 Understand the theories, basics and specialized knowledge in the field of **Marine Engineering.**	a1-2-1 Outline the precedures to calculate and design the marine heat exchangers, piping systems and engine output power.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline a comparsion between the different power stations and components.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Predict and define the suitable systems of marine power stations and piping systems.
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Use the different safety equipment pollution control devices.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.

C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Choose the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to enhance his professional practice		d2-1 Use Internet network to collect information about marine index.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Study of modern trend in marine power stations	18	18	-	-	a1-1-1, a1-2-1, a5-1-1, c1-1-1
Waste heat recovery	12	12	-	-	a1-1-1, c1-1-1, c2-1-1
Calculation of machinery power and energy	12	12	-	-	B1-1-1, C2-1-1,
Design of heat exchangers	12	12	-	-	a1-1-1, a1-2-1, d2-1
Design of marine piping systems and materials	15	15	-	-	a1-2-1, b6-1-1, c2-1-1
Safety equipment onboard ship	12	12	-	-	b1-1-1, b6-1-1,d2-1
Purifiers and pollution control in power stations	9	9			b1-1-1, b6-1-1,d2-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A5(a5-1)	B1(b1-1), B6(b6-1),	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---		**20%**	**20%**	**60%**	**--**		**100%**

6- Course Contents ~~Course Topics:~~

Topic No.	Topic	Weeks
1st	Study of modern trend in marine power stations	1-6
2nd	Waste heat recovery	7-10
3rd	Calculation of machinery power and energy	11-14
4th	Design of heat exchangers	15-18
5th	Design of marine piping systems and materials	19-23
6th	Safety equipment onboard ship	24-27
7th	Purifiers and pollution control in power stations	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Course ILOs	**Knowledge & Understanding**						
a1-1-1	x	x		x			
a1-2-1	x			x	x		
A5-1-1	x						
Course ILOs	**Intellectual skills**						
b1-1-1			x			x	x
b6-1-1					x	x	x
Course ILOs	**Professional and practical skills**						
c1-1-1	x	x					
C2-1-1		x	X		x		
Course ILOs	**General and transferrable skills**						
d2-1				x		x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	A5-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b6-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	C2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992.
2. Mina Morgan, "Marine Technology Reference book",1 st edition Butterworth Ltd., Uk 1995.
3. Mc-George H.D., Marine Auxiliary Machinery, 11th edition, Butterworth, London 2014.
4. LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2016.
5. D.A. Taylor, Introduction to marine engineering, Elsevier, 2nd edition 2003.
6. D.A. Taylor, Introduction to Marine Engineering, Elsevier Science, 2014.
7. Breeze, Power Generation Technologies, Elsevier Science, 2014.
8. Frank Kreith, Raj M. Manglik, and Mark S. Bohn, Principles of Heat Transfer, 7th ed., Cengage Learning, Inc., 2011.

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME524

Marine Auxiliary Machinery

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc. degrees
Date of specification approval	August 2019

A- Basic Information

Title: Marine Auxiliary Machinery	**Code Symbol**: NME 524	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the students to be familiar with the ship auxiliary machinery. The students have to know how to select and arrange the different auxiliary machinery such as pumps, electric generators, mooring equipments and cargo handling machinery. They have to be capable of install, inspect and laying the piping systems and auxiliary components for ship loading and unloading machinery. The student should be familiar with different methods using for water desalination and treatment equipment for sewage and sanitary water.

After finishing the course, the student will have good knowledge and understanding to deal with the modern power stations and advanced methodsd to reduce the marine pollution and design the piping systems and there components. After completion of this course, the student should be able to:

- Configure all the auxiliary machinery and component onboard ships.
- Understand and discuss the different methods using to generate the electric power , moor and load the ship.
- Critically evaluate and compare various concepts of marine power stations
- Determine the concept and functions of the most safety and oil treatment equipment.
- Design and install the various heat exchangers and piping systems.
- Carry on the required calculations to determine piping and pumping systems.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Outline a comparative study of marine power stations.
	a1-2 Understand the theories, basics and specialized knowledge in the field of **Marine Engineering.**	a1-2-1 Outline the precedure to calculate and design the marine heat exchangers, piping systems and engine output power.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline a comparsion between the different power stations and components.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Predict and define the suitable systems of marine power stations and piping systems.
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Identify how to use the different safety equipment pollution control devices.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.

C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	C2-1-1 Choose the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to enhance his professional practice.		d2-1 Use computer program to calculate all the marine index.

3-

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
Standard specification of auxiliary engines	12	12	-	-	a1-1-1, a1-2-1, a5-1-1, c1-1-1
Classification societies requirements	12	12	-	-	a1-1-1, c1-1-1, c2-1-1
Auxiliary engines (steam- gas- hydraulic- electric- diesel)	12	12	-	-	B1-1-1, C2-1-1,
Electric generation onboard ships	12	12	-	-	a1-1-1, a1-2-1, d2-1
Pipes, valves and pumps	12	12	-	-	a1-2-1, b6-1-1, c2-1-1
Safety and firefighting equipment onboard ship	12	12	-	-	b1-1-1, b6-1-1,d2-1
Mooring and Loading and unloading equipment	9	9			b1-1-1, b6-1-1,d2-1
Desalination and sewage treatment stations.	9	9			a1-2-1, b6-1-1, c2-1-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A5(a5-1)	B1(b1-1), B6(b6-1),	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---		**20%**	**20%**	**60%**	**--**		**100%**

Course Contents

6- Course Topics.

Topic No.	Topic	Weeks
1st	Standard specification of auxiliary engines	1-4
2nd	Classification societies requirements	5-8
3rd	Auxiliary engines (steam- gas- hydraulic- electric-diesel)	9-12
4th	Electric generation onboard ships	13-16
5th	Pipes, valves and pumps	17-20
6th	Safety and firefighting equipment onboard ship	21-24
7th	Mooring and Loading and unloading equipment	25-27
8th	Desalination and sewage treatment stations.	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Course ILOs	**Knowledge & Understanding**							
a1-1-1	x	x		x				
a1-2-1	x			x	x			x
A5-1-1	x							
Course ILOs	**Intellectual skills**							
b1-1-1			x			x	x	
b6-1-1					x	x	x	x
Course ILOs	**Professional and practical skills**							
c1-1-1	x	x						
C2-1-1		x	X		x			x
Course ILOs	**General and transferrable skills**							
d2-1				x		x	x	

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	A5-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b6-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	C2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. Mc-George H.D., Marine Auxiliary Machinery, 7th edition, Butterworth, London 1995.
2. LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2016.
3. D.A. Taylor, Introduction to Marine Engineering, Elsevier Science, 2014.
4. Breeze, Power Generation Technologies, Elsevier Science, 2014.
5. Bruce R. Munson and Donald F. Young, Fundamentals of fluid mechanics, 6th ed., John Wiley & sons, 2009.
6. Frank Kreith, Raj M. Manglik, and Mark S. Bohn, Principles of Heat Transfer, 7th ed., Cengage Learning, Inc., 2011.

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME525

Automatic Control Application in Marine Engineering

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc. Degrees
Date of specification approval	August 2019

A- Basic Information

Title: Automatic control application in marine engineering	**Code Symbol**: NME 525	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the students to be familiar with the modern automatic control methods and processes in marine power stations. The students have to know how to design, select and arrange the digital control circuits, air control circuits, hydraulic control circuits and simulation. They have to be capable of install, design and laying the control systems of marine propulsion machinery and adjustment. The student should be familiar with different methods using to control the mooring systems, cargo handling systems, steering systems and control the performance sensitivity of ship operation.After finishing the course, the student will have good knowledge and understanding to deal with the modern automatic control circuits to umprove the ship performance and increase the overall operationg efficience.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Outline a comparative study of marine power stations.
	a1-2 Understand the theories, basics and specialized knowledge in the field of **Marine Engineering.**	a1-2-1 Outline the steps to calculate and design the marine heat exchangers, piping systems and engine output power.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline a comparsion between the different power stations and components.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Predict and define the suitable systems of marine power stations and piping systems.
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Show how to use the different safety equipment pollution control devices.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.

C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Choose the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to enhance his professional practice		d2-1 Use computer program to calculate all the marine index.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Modeling and simulation	18	18	-	-	a1-1-1, a1-2-1, a5-1-1, c1-1-1
Digital control circuits	12	12	-	-	a1-1-1, c1-1-1, c2-1-1
Air control circuits, hydraulic control circuits, pneumatic control circuits.	12	12	-	-	b1-1-1, c2-1-1,
Optimum control systems and filters	12	12	-	-	a1-1-1, a1-2-1, d2-1
Control system of marine engines and adjustment	15	15	-	-	a1-2-1, b6-1-1, c2-1-1
Control circuits of ship maneuvering and cargo handling systems	12	12	-	-	b1-1-1, b6-1-1,d2-1
Performance sensitivity of control systems and estimation of efficiency	9	9			b1-1-1, b6-1-1,d2-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A5(a5-1)	B1(b1-1), B6(b6-1),	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
---		30%	50%	20%	--		100%

6- Course Contents Course Topics:

Topic No.	Topic	Weeks
1st	Modeling and simulation	1-6
2nd	Digital control circuits	7-10
3rd	Air control circuits, hydraulic control circuits, pneumatic control circuits.	11-14
4th	Optimum control systems and filters	15-18
5th	Control system of marine engines and adjustment	19-23
6th	Control circuits of ship maneuvering and cargo handling systems	24-27
7th	Performance sensitivity of control systems and estimation of efficiency	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Course ILOs	**Knowledge & Understanding**						
a1-1-1	x	x		x			
a1-2-1	x			x	x		
a5-1-1	x						
Course ILOs	**Intellectual skills**						
b1-1-1			x			x	x
b6-1-1					x	x	x
Course ILOs	**Professional and practical skills**						
c1-1-1	x	x					
C2-1-1		x	X		x		
Course ILOs	**General and transferrable skills**						
d2-1				x		x	x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	a5-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b6-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	c2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. S. Barnett, Polynomials and Linear Control Systems, Marcel Dekker, New York, NY, 1983.
2. Carlos A. Smith and Armando B. Corripio, Principles and Practice of Automatic Process Control, 2nd edition, John Wiley& Sons, Inc. 1979.
3. B. D. O. Anderson and J. B. Moore, Optimal Control Linear Quadratic Methods, Dover Publica tions, 2007.
4. R. C. Dorf and R. H. Bishop, Modern Control Systems , Prentice Hall, tenth edition, 2004
5. LR, 'Rules and Regulations for the classification of ships', part 5 Main and Auxiliary Machinery, 2009.

12- Program Coordination Committee:

Course Coordinator: **Dr. Waleed Yehia**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME526

Underwater Technology

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	(Master Degree)
Date of specification approval	August 2019

A- Basic Information

Title: **Underwater Technology**	**Code Symbol**: NME 526	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

This course aims to introduce graduates familiar with the technological processes that are associated with underwater naval architecture and marine engineering specialization, and the tools used in, taking into account the procedures and requirements of the Occupational Safety and security to be observed

After finishing the course, the student:

1. **Should be able to learn techniques of underwater cutting and welding**
2. **Is prepared to be familiar with equipment and tools used in underwater cutting and welding**
3. **Should be aware of the importance of the requirements of the Occupational Safety and Health to work underwater**
4. **Should understand the meaning and importance of underwater dredging**
5. **Should learn the types, techniques, and equipment underwater dredging**

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his / her professional practice.	a1.3. Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field **Ship Construction and production.**	a1.3.1 Show the basics and technology of welding and cutting.
A5. Basics and principles of quality in professional practice in the field of specialization.	a5.1. Explain Quality Assurance concepts of different Naval Architecture and Marine Engineering disciplines	a5.1.1.Demonstrate good understanding of the requirments of the quality of cutting and welding operations
B. Intellectual skills		
B2. Solve specialized problems in the field of practice..	b2.1. Apply broad knowledge of modern computational methods and think critically to solve unstructured problems related to Naval Architecture and Marine Engineering	b2.1.1. Predict and define the suitable amperage and voltage for underwater cutting or welding machines
B5. Assess risks in professional practice in the field of specialization,	b5.1. Evaluate pros and cons of given methodologies for Naval Architecture and Marine Engineering systems development	b5.1.1. Define how to safely use the different welding, cutting and dredging b5.1.2. Identify the procedures of obtaining a certified diving certificate and have good knowledge of needed equipment and site processing
B7.Take professional decisions in different professional practical contexts.	b7.1.Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	b7.1.1. Evaluate the ability to make the right and quick decision in an emergency condition.
C. Professional and practical skills		
C1. Master the basic as well as the latest professional skills in the field of specialization.	c1.1. Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1.1.1. Define the limit state function.

C2.Write and evaluate technical and professional reports.	c2.1.Write and evaluate a professional report on the specific area of the marine industries.	c2.1.1. Choose the topics and headlines to write a report for a limited task and have the ability to logical order of subjects
D. General and transferrable skills		
D3. Apply self-evaluation and define personal educational needs.		d3.1. Apply self-evaluation and specify his educational needs related to Naval Architecture and Marine Engineering aspects.
D5. Use different resources to obtain knowledge and information.		d5.1. Use different resources of information like libraries, internet access facilities, etc. to upgrade and enhance their conceptual knowledge.
D6. Work in a team and apply time management.		d6.1. Practice in a team to perform a specified professional jobs.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. UNDERWATER CUTTING **1.1. OXYGEN-ARC CUTTING** **1.2. EXOTHERMIC ELECTRODES** 1.3. SEELER ENTERPRISES LU-001 EXOTHERMIC CUTTING TOOL (KERIE CABLE 1.4. SHIELDED METAL ARC CUTTING 1.5 CONCLUSION	21	21	-	-	a1.3.1, b5.1.1, b7.1.1, c1.1.1, c2.1.1, d5.1
2. UNDERWATER WELDING 2.1 MECHANICAL BARRIERS 2.2SHIELDEDMETAL-ARC WELDING 2.3 WET WELDING 2.4 SHIPBUILDING MATERIALS **2.5MATERIALS USED IN UNDERWATER SHIELDED METAL-ARC WELDING** **2.6UNDERWATER WELDING ARCS**	21	21	-	-	a1.3.1, b2.1.1, b7.1.1, c2.1.1, d5.1, d6.1

2.7CONDITIONS ADVERSE TO UNDERWATER WELDING **2.8.STRENGTH OF UNDERWATER FILLET WELDS** **2.9, SURFACE CLEANING** **2.10. JOINT FIT-UP** **2.11UNDERWATER SHIELDED METAL-ARCWELDING TECHNIQUES** **2.12 PROCEDURE FOR REPAIRING SMALL CRACKS** **2.13 POST-DIVE MAINTENANCE**					
3.UNDERWATER ARC CUTTING AND WELDING EQUIPMENT **3.1.EQUIPMENT USED FOR UNDERWATER ARC CUTTING AND WELDING** **3.2EQUIPMENTFOR NDERWATER SHIELDED METAL-ARC WELDING** **3.3 WELDING ACCESSORIES**	15	15	-	-	b5.1.1, b7.1.1, c1.1.1, c2.1.1, d3.1, d5.1
4. SAFETY IN UNDERWATER CUTTING AND WELDING **4.1 PURPOSE** **4.2 GENERAL** **4.3 EXPLOSIVE GASES** **4.4 ELECTRICITY UNDERWATER** **Course Contents** **4.5.GENERAL PRECAUTIONS FOR UNDERWATER CUTTING AND WELDING** **4.6 POWER SUPPLY** **4.7.ELECTRODE HOLDERS AND CUTTING TORCHES** **4.8.POWER CABLES AND CONNECTORS** **4.9 SAFETY SWITCH** **4.10.FIRE AND EXPLOSION PREVENTION** **4.11 COMPRESSED GAS SUPPLIES** **4.12PERSONAL SAFETY IN DIVING** **4.13 CONCLUSION**	15	15	-	-	b5.1.2, b7.1.1, c2.1.1, d3.1, d6.1
.INTRODUCTION TO DREDGING EQUIPMENT **5.1TYPES OF DREDGING EQUIPMENTS** **5.2. MECHANICALDREDGING** **5.3. HYDRALUIC DREDGING** **5.4. CONCLUSION**	18	18	-	-	a1.3.1, b2.1.1, b7.1.1, c1.1.1, d6.1
Total	90	90			

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1.3), A.5(a5.1),	B2(b2.1), B5(b5.1), B7(b7.1)	C1(c1.1), C2(c2.1)	D3, D5, D7

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
20%	**10%**	**40%**	**30%**	**----**	**-----**	**-----**	**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	**UNDERWATER CUTTING**	1-7
2nd	**UNDERWATER WELDING**	8-14
3rd	**UNDERWATER ARC CUTTING AND WELDING EQUIPMENT**	15-19
4th	**SAFETY IN UNDERWATER CUTTING AND WELDING**	20-24
5th	**INTRODUCTION TO DREDGING EQUIPMENT**	25-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th
Course ILOs	**Knowledge & Understanding**				
a1.3.1	x	x			x
a5.1.1			x		
Course ILOs	**Intellectual skills**				
b2.1.1		x			x
b5.1.1	x		x		
b5.1.2				x	
b7.1.1	x	x	x	x	x
Course ILOs	**Professional and practical skills**				
c1.1.1	x		x		x
c2.1.1	x	x	x	x	
Course ILOs	**General and transferrable skills**				
d3.1			x	x	
d5.1		x	x		
d6.1	x	x		x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & Understanding	a1.2.1	x	x	x										
	a5.1.1	x	x	x										
Intellectual Skills	b2.1.1	x	x											
	b5.1.1	x	x	x										
	b5.1.2	x		x										
	b7.1.1	x		x										
Professional Skills	c1.1.1	x	x	x										
	c2.1.1	x	x											
General and transferrable skills	d3.1	x		x										
	d5.1	x	x	x										
	d6.1	x		x										

9- Assessment

9.1 Assessment Methods

Final Written Examination :	to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Videos for underwater cutting and welding operations.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

a) U.S. Navy Underwater Cutting & Welding Manual, June, 2002.

b) Underwater repair procedures for ship hulls (Fatigue and ductility of underwater wet welds), Ship Structure Committee, 1993.

c) A Handbook For Underwater Inspectors, Offshore Technology Information 88 539, Health and Safety Executive, 1994.

d) Lecture Notes on Dredging Equipment and Technology, Central Dredging Association, W. J. Vlasblom, (May 2003 - May 2007).

e) A Review on Underwater Welding Process, C. Sundara pandiyan, A. Balamurugan and M. Mohan, International Journal of Innovation in Engineering and Technology (IJIET), Vol. 8, February 2017.

f) Effect of Underwater Wet Welding Conditions on the Diffusible Hydrogen Content in Deposited Metal, D. Fydrych, A. Swlerczynska and G. Rogalski, La Metallurgia Italiana, 2015.

g) Fundamental Difficulties Associated With Underwater Wet Welding, Joshua E. Omajene et al., International Journal of Engineering Research and Applications, Vol. 4, Issue 6, (Version 4), June 2014.

h) Fundamental study of Underwater Welding, S. Kiran Sai Kumar, V. Pavan Kumar Reddy and C. Bharath Chowdary, Journal of Advanced Technology and Innovative Research, Vol. 07, Issue. 11, August 2015

i) Underwater Cutting and Welding Equipments – Safety and Operating Instructions – Arcair an ESAB Brand, April 2016.

j) Underwater Remote Welding Technology for Offshore Structures, Joshua Emuejevoke Omajene, Ph.D. Thesis, Lappeenranta University of Technology, Finland, November 2015.

Recommended books

a) Rules for Classification and Construction Ship Technology, Underwater Technology, Germanischer Lloyd, 2009

Periodicals, Web sites, etc

a) www.underwatermunitions.org.

12- Program Coordination Committee:

Course Coordinator: **Dr. Mohammed Mansour**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME527
Ship Construction (1)
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Construction (1)**	**Code Symbol**: NME 527	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to provide students with basic knowledge and skills that are required to carry out a study on the construction of special units ofships. The course provides the students with an advanced background on the fundamental construction materials, construction criteria, the design of structural connections. It alsofamiliarizes the students with the requirements of the classification societies concerning special and inland navigation units.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1Demonstrate sufficient essential knowledge and a deep understanding of the theories, basics and specialized knowledge in the field of Naval Architecture and Marine Engineering.	a1-1-1 Recognize the construction materials used.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1Recognize the social and economical aspects of marine industries.	a2-1-1 Define the construction criteria.
	a2-2Recognize the different effects of marine industries on the environment.	a2-2-1 Investigate structural connections related problems onboard ships
A4- Fundamentals of ethical & legal professional practice in the field of specialization.	a4-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	a4-1-1 Recognize the classification societies rules set for building and maintaining ships.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Analyze and manipulate distortion measures data and technical raised problems.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify problem sources via field search for actual construction failure problems.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional technical report for construction of a special vessel.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills in career development.
D6- Lead a team in familiar professional context		d6-1 Practice in a team to complete an accurate proposed project.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Theory of vibration and monitoring equipments identifications	9	9	-	--	a1-1-1, a2-1-1 a2-2-1, a4-1-1
2. Hull structural Vibrations	9	9	-	--	a1-1-1, a2-1-1 a2-2-1, a4-1-1
3. Shafting and Propeller Vibrations	18	18	-	--	b1-1-1, c1-1-1, c2-1-1,d6-1
4. Hull- Propeller- Engine foundation compatibly	18	18	-	--	b1-1-1, b3-1-1, c2-1-1, d2-1, d6-1
5. Vibration monitoring analysis theory and its characteristics	18	18	-	--	b3-1-1, c1-1-1, c2-1-1,d6-1
6. Vibration limits and criteria	18	18	-	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1,d2-1,d6-1
Total	90	90	-	--	

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1), (a2-2) A4(a4-1)	B1(b1-1), B3(b3-1)	C1(c1-1) C2(c2-1)	D2, D6

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
---	---	30%	70%	--			100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Ship Construction Materials.	1-3
2nd	Construction Criteria.	4-7
3rd	Design of Structural Connections.	8-13
4th	Construction of Special Units.	14-19
5th	Special Considerations in the Ship's Hull to Avoid Distortions.	20-25
6th	Requirements of the Classification Societies for Building & Maintaining Ships.	26-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Recognize the construction materials used.	x	x				
a2-1-1 Define the construction criteria.	x	x				
a2-2-1 Investigate structural connections related problems onboard ships	x	x				
a4-1-1 Recognize the classification societies rules set for building and maintaining ships.	x	x				
Course ILOs	**Intellectual skills**					

b1-1-1 Demonstrate an investigatory approach for detecting problems sources.			x	x		X
b3-1-1 Analyze and manipulate distortion measures data and technical raised problems.				x	x	X
Course ILOs	**Professional and practical skills**					
c1-1-1 Identify problem sources via field search for actual construction failure problems.			x		x	X
c2-1-1 Prepare a professional technical report for construction of a special vessel.			x	x	x	x
Course ILOs	**General and transferrable skills**					
d2-1 Apply course skills in career development.				x		x
d6-1 Practice in a team to complete an accurate proposed project.			x	x	x	x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x												
	a2-1-1	x				x								
	a2-2-1	x				x								
	a4-1-1	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
General Skills	d2-1		x							x				
	d6-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination	:	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] Eyres, D.J., "Ship Construction", Butterworth-Heinemann, 6th edition,2006.

[2] Yasuhisa Okumoto, Yu Takeda, Masaki Mano, Tetsuo Okada, "Design of Ship Hull Structures – A Practical Guide for Engineers", Springer, 2009.

[3] Robert Taggart, "Ship Design & Construction", SNAME, 1980.

[4] IACS, "Shipbuilding & Repair Quality Standards", IACS, 2006.

[5] "FSC certification". Nrdc.org. Retrieved 2012-06-14.

[6] "Boat building lumber". Glen-l.com. Retrieved 2012-06-14.

[7] "Carvel Planking for Boats, Sailboats - Richard Joyce Montana Tech". Notablemath.weebly.com. Retrieved 2012-06-14

12- Program Coordination Committee:

Course Coordinator: **Dr. Randa Ramadan**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 528
Ship Production and Quality Assurance

Course Specifications

Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: ship production and quality assurance	**Code Symbol**: NME528
Lecture	3 hours
Tutorial/ Laboratory	---------
Total	3 hours

B- Professional Information

1- Course Aims :

The course aims to instruct the students about methods of production control in shipyards and methods of material handling. Also production planning using (Bert and CPM). Moreover to give them a general idea about criteria of production, operation quality and application on numerical control.

2- Intended Learning Outcomes (ILOs)

Knowledge & Understanding		
NAQAAE Academic Reference Standards (ARS)	**ILOs**	**Course ILOs**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Demonstrate the requirements of Classification Societies for ship outfitting. a1-1-2 Categorize different types of life saving equipment.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline quality assurance concepts for life saving equipment.

<table>
<tr><th colspan="3">B- Intellectual skills</th></tr>
<tr><td rowspan="2">B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.</td><td>b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.</td><td>b1-1-1 Demonstrate production control methods
b1-1-2 Investigate the criteria of production</td></tr>
<tr><td>b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.</td><td>b1-2-1 Analyze planning using (Bert and CPM)
b1-2-2 Evaluate the adequacy of life saving equipment.</td></tr>
<tr><th colspan="3">C- Professional and practical skills</th></tr>
<tr><td>C2- Write and evaluate technical and professional reports.</td><td>c2-1 Write and evaluate a professional report on the specific area of the marine industries.</td><td>c2-1-1 Prepare a professional report for material and other</td></tr>
<tr><th colspan="3">D- General and Transferable skills</th></tr>
<tr><td colspan="2">D2- Use information technology to improve his/her professional practice.</td><td>d2-1 Use different information recourses to collect the available data for ship outfitting</td></tr>
</table>

3- <u>Course Contents</u>

Topic	Total Hours	Contacthrs			Course ILOs Covered (By No.)
		Lec.	*Tut.*	*Lab.*	
1. Production control methods	15	15	...	...	a1-1-1, b1-2-2
2. Material handling methods	15	15	...	...	a1-1-2,d2-1
3. Production planning using (Bert and CPM)	15	15	...	...	a 1 -1-1 , b1-1-1 ,c2-1-1
4. Criteria of production	15	15	...	...	b1-2-1,d2-1
5. Operation quality	15	15	...	...	bl-1-1, b1-2-1, c2-1-1

6. Application on numerical control in production operation	15	15	...	...	a1-1-1 , a1-1-2 , a5-1-1 , b1-1-2 , b1-2-2
Total	90	90	...	...	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A5(a5-1)	B1 (b 1 -1),(b1-2)	C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Discretionary Subjects**	**Total**
...	**...**	**...**	**100%**	**...**	**...**	**...**	**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	Production control methods	1-5
2nd	Material handling methods	6-10
3rd	Production planning using (Bert and CPM)	11-15
4th	Criteria of production	16-20
5th	Operation quality	21-25
6th	Application on numerical control in production operation	26-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-1-1	X		X			X
a1-1-2		X				X
a5-1-1						X
Course ILOs	**Intellectual skills**					
b1-1-1			X		X	
b1-1-2						X
b1-2-1				X	X	
b1-2-2	X					X
Course ILOs	**Professional and practical skills**					
c2-1-1			X		X	
Course ILOs	**General and transferrable skills**					
d2-1		X		X		

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X												
	a1-1-2	X	X						X					
	a5-1-1	X												
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d2-1								X					

9- Assessment

9-1 Assessment Methods

Final Written: to assess students' knowledge, understanding, analysis, Examination Creativity, problem solving, and problem identification.

9-2Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources to collect The required data for ship technology and quality control and prepare technical reports.

11- List of references:

1. Eyres, D., Ship Construction, 5th Edition, Butterworth-Heinmann, Oxford, UK, 2001.
2. Taylor, D., Merchant Ship Construction, 4th Edition, Institute of Marine Engineers, London,UK, 1998.
3. Taggart, R., Ship Design and Construction, SNAME, New Jersey, USA, 1980. Storch, R., Hammon, C., Bunch H., and Moore R., Ship Production, 2nd Edition, SNAMENew Jersey, USA, 1995.
4. Lamb, T., Ship Design and Construction I & II, SNAME, New Jersey, USA, 2003.
5. Lewis, E., Ed. Principles of Naval Architecture: Volume I - Stability and Strength, SNAME,New Jersey, USA, 2012.

12- Program Coordination Committee:

Course Coordinator: **Dr. Randa Ramadan**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 529
Course Specification
Marine Environment Pollution (1)

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Marine Environment Pollution (1)	**Code** : NME 529	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to instruct the students about all regulations of IMO concerned with marine pollutions it also aims to introduce them the different sources of marine pollution. This course gives also the essential knowledge about the cleanup methods of pollution due to oil spill. Equipment and marine units for treatment of marine pollution take a recognized portion of this course. This course provides also a study about the different structural ship design for minimum pollution and the other sources of pollution due to ship.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their	a1-1-1 Show the regulations of IMO concerned with marine pollutions a1-1-2 Categorize the different types of marine pollutions a1-1-3 Categorize the cleanup methods of pollution due to oil spill.

	areas of specialization in Naval Architecture and/or Marine Engineering.	
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Identify the ways of buring of oil at sea. a5-1-2 Define the methods of oil sinking a4-1-3 Identify the different types of chemical dispersants.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate treatment methods using aircraft b1-1-2 Demonstrate equipment adapted for helicopter b1-1-3 Demonstrate equipment adapted for airplanes
	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system	b1-2-1 Identify air blast sprayers. b1-2-2 Identify spray unit system.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries	c2-1-1 Prepare a professional report for double hull tanker legislation
D. General and transferrable skills		
D5- Use different sources to obtain knowledge and information.	D5-1 Using different information recourses to collect the available data for ship outfitting.	d5-1-1 Use different information recourses to collect the available data for marine's air pollution concerns.

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	*Tut.*	*Lab.*	
1. IMO Regulations concerned with Marine Pollution	12	12	---	---	a1-1-1, d5-1
2. Sources of Marine Pollution	18	18	---	---	a5-1-4, b1-1-1 , b1-2-1, c2-1-1 , d5-1
3. Cleanup Methods of Oil Spill	15	15	---	---	a1-1-1 , a1-1-2 , c2-1-1, d5-1
4. Equipment used for treatment ofMarine Pollution	15	15	---	---	a5-1-3 , b1-1-3, d5-1
5. New Ship Design for minimum Pollution	15	15	---	---	a1-1-2, a5-1-2, a5-1-4, b1-1-1,c2-1-1, d5-1
6. Other Sources of Pollution due to Ships	15	15	---	---	a1-1-1, a1-1-3, a5-1-1, b1-2-2,c2-1-1, d5-1
Total	90	90	---	---	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-3), A5(a5-1)	B1(b1-1),(b1-2)	C2(c2-1)	D5

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Topics

Topic No.	Topic	Weeks
1st	IMO Regulations concerned with Marine Pollution	1 - 4
2nd	Sources of Marine Pollution	5 - 10
3rd	Cleanup Methods of Oil Spill	11 – 15
4th	Equipment used for treatment ofMarine Pollution	16 – 20
5th	New Ship Design for minimum Pollution	21 – 25
6th	Other Sources of Pollution due to Ships	26 - 30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Show the regulations of IMO concerned with marine pollutions	X		X			X
a1-1-2 Categorize the different types of marine pollutions			X		X	
a1-1-3 Categorize the cleanup methods of pollution due to oil spill.						X
a5-1-1 Identify the ways of buring of oil at sea.						X
a5-1-2 Define the methods of oil sinking					X	
a5-1-3 Identify the different types of chemical dispersants.				X		
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate treatment methods using aircraft		X			X	
b1-1-2 Demonstrate equipment adapted for helicopter		X			X	
b1-1-3 Demonstrate equipment adapted for airplanes						X
b1-2-1 Identify air blast sprayers.				X		

b1-2-2 Identify spray unit system.		X				
Course ILOs	**Professional and practical skills**					
c2-1-1 Prepare a professional report for double hull tanker legislation		X	X		X	X
Course ILOs	**General and transferrable skills**					
d5-1 Use different information recourses to collect the available data for marine's air pollution concerns.	X	X	X	X	X	X

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes(ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	X												
	a1-1-2	X	X						X					
	a1-1-3	X	X						X					
	a5-1-1	X												X
	a5-1-2	X												X
	a5-1-3	X												X
	a5-1-4	X												X
Intellectual Skills	b1-1-1	X				X								
	b1-1-2	X				X								
	b1-1-3	X	X						X					
	b1-2-1	X				X								
	b1-2-2	X	X											
Professional Skills	c2-1-1	X							X					
General Skills	d5-1								X	X				

9- Assessment

9.1 Assessment Methods

Final Examination:	Written	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. Library Usage:

Students should be encouraged to use library technical resources to collect the required data for marine pollution and prepare technical reports.

11- List of references:

1 Prof. Dr.- Ing. Laila Kamar":"Marine Pollution and Protection of the Marine Environment"Department of Naval Architecture and Marine Engineering (prepared by the course coordinator)

2 12.2 Essential books (text books)

- **Recommended books**

1 International Tanker Owners Pollution Federation, Effects of Oil Spills, http://www.itopf.com/marine-spills/effects, accessed July 2010.

2 National Research Council. Oil in the Sea III: Inputs, Fates, and Effects. Washington, DC:National Academies Press; 2003.

3 Boyd J. N., Scholz D. & Hayward Walker A. :" Effects of Oil and Chemically Dispersed Oil in the Environment", IOSC 2001.

4 Landis WG. The Exxon Valdez Oil Spill Revisited and the Dangers of Normative Science.Integ Environ Assess Manag 2007.

5 Exxon Valdez Oil Spill Trustee Council. Legacy of an Oil Spill, 20 Years after Exxon Valdez:Exxon Valdez Oil Spill Trustee Council, 2009 status report. Anchorage, AK: Exxon Valdez OilSpill Trustee Council; 2009.

- **Periodicals, Web sites, etc**

  _Periodical & Web sites of RINA & SNAME

12- Program Coordination Committee:

Course Coordinator:	**Prof. Laila Kamar**
Programme coordinator:	**Assoc. Prof. Dr. Moustafa Mohamed**
Head of the Department:	**Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME601
Marine Systems Economics
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Marine Systems Economics**	**Code Symbol**: NME 601	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course aims to provide the students who - are graduated as marine engineers – with the principles of economics and the applications of economics in the fields of Naval Architecture & Marine Engineering .

The information given includes the economical terminology , interest relationships , Design and operation Criteria , Profitability of ships , Optimum speeds and economical life of ships , permissible price of ships , replacement of ships , and elements of marine transport , making feasibility studies of marine projects , putting specifications and contracting terms , also tabulating works and planning .

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Define the economical abbreviations applicable to marine engineering fields. a1-1-2 Categorize the elements of marine transport tasks and documentations, and containerization activities. a1-1-3 Identify the time value of cash flow .
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Identify the feasibility of engineering projects. a5-1-2 Investigate different alternatives in ship design and operation a5-1-3 Define the optimum life, optimum speed, permissible price and operation constraints of ships .
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	a6-1-1 Recognize the different approaches in ship design. a6-1-2 Recognize the elements of ship construction costs and overheads
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate the linkage between design and operation of ships, and to make the design which is to be the most profitable during operation .

	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Evaluate time addition of money. b1-2-2 Evaluate the feasibility of any marine design or operation project. b1-2-3 Determine the costs of building a ship.
B7- Take professional decisions in different professional practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	b7-1-1 Combine economic criteria and decision making considering different economical, technical and environmental issues .
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Design numerical flow chart to determine optimum ship characteristics. c1-1-2 Analyze the cost and freight statistics
C3- Evaluate means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches concerning specified problem related to marine technology.	c3-1-1 Apply decision making for the evaluation of economical utility c3-1-2 Evaluate the effects of different economical and technical aspects on ship design
D. General and transferrable skills		
D1- Communicate effectively using all methods.		d1-1Use Communication skills to get the recent information related to ship economy.
D2- Use information technology to improve his/her professional practice.		d2-1 Use internet to collect information about expenses of operating ships and rates of escalation

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design , Interest Relationships	9	9	--	--	a1-1-1, a1-1-2 a1-1-3, a6-1-1, b7-1-1, d1-1, d2-1
Economic Criteria for Design and Operation Profitability of ships before and after Tax	9	9	--	--	a1-1-3, b1-1-1 b1-2-1, b7-1-1
Profitability of ships before and after Tax	6	6	--	--	a5-1-1, a5-1-2, d2-1
Computer Aided Ship Design Economics , Optimum Speeds ,Economical Life and Permissible Price of Ships	9	9	--	--	a5-1-3, a6-1-2, c1-1-1, c3-1-2
Estimation of Cost of Building and Operating Ships	6	6	--	--	a1-1-2, a5-1-2, b1-2-3
Optimum Life and Replacement Analyses, Optimum life in case of borrowed capitals.	9	9	--	--	a5-1-1, a5-1-3, b1-2-1,c3-1-1
Permissible Price of Ships , permissible price of ships in case of borrowed capitals	9	9	--	--	a5-1-3, a6-1-2
Relative costs of ship design parameters	6	6	--	--	b1-2-3, b7-1-1
Economy propellers for reduced power operation	3	3	--	--	c1-1-2, c3-1-2
Feasibility of larger diameter propellers in ballast trips	6	6	--	--	a5-1-1, b1-2-2, d1-1
Designing ships for fuel economy	6	6	--	--	a5-1-2, b1-1-1, c1-1-2
Priorities for reducing fuel bill	3	3	--	--	b1-1-1,b7-1-1
Chartering of Ships , Elements of Marine Transport , multipurpose ships, Stowage factors, Bill of Lading , Freight Rate , Containerization ,Contracting and planning	9	9	--	--	a1-1-2, a5-1-2, b1-1-1, d1-1, d2-1
Total	90				

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A5(a5-1), A6(a6-1)	B1(b1-1), (b1-2) B7(b7-1)	C1(c1-1) C3(c3-1)	D1, D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
20%	---	30%	30%	20%	-------	---------	100%

6- Course Topics

Topic No.	Topic	Weeks
1st	Introduction to Engineering Economics , Definitions , Ship design Economics , Traditional and Modern Approaches of Ship Design , Interest Relationships	1-3
2nd	Economic Criteria for Design and Operation Profitability of ships before and after Tax	4-6
3rd	Profitability of ships before and after Tax	7-8
4th	Computer Aided Ship Design Economics , Optimum Speeds ,Economical Life and Permissible Price of Ships	9-11

5th	Estimation of Cost of Building and Operating Ships	12-13
6th	Optimum Life and Replacement Analyses , Optimum life in case of borrowed capitals	14-16
7th	Permissible Price of Ships , permissible price of ships in case of borrowed capitals	17-19
8th	Relative costs of ship design parameters	20-21
9th	Economy propellers for reduced power operation	22-22
10th	Feasibility of larger diameter propellers in ballast trips	23-24
11th	Designing ships for fuel economy	25-26
12th	Priorities for reducing fuel bill	27-27
13th	Chartering of Ships , Elements of Marine Transport , multipurpose ships, Stowage factors, Bill of Lading , Freight Rate , Containerization ,Contracting and planning	28-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**	**11th**	**12th**	**13th**
Course ILOs	**Knowledge & Understanding**												
a1-1-1	x												
a1-1-2	x				x								x
a1-1-3	x	x											
a5-1-1			x			x				x			
a5-1-2			x		x						x		x
a5-1-3				x		x	x						
a6-1-1	x			x									
a6-1-2					x		x						
Course ILOs	**Intellectual skills**												
b1-1-1		x									x	x	x

b1-2-1		x				x							
b1-2-2										x			
b1-2-3					x			X					
b7-1-1	x	x						X				x	
Course ILOs	**Professional and practical skills**												
c1-1-1				x									
c1-1-2									x		x		
c3-1-1						x							
c3-1-2				x					x				
Course ILOs	**General and transferrable skills**												
d1-1	x									x			x
d2-1	x		x										x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x	x								
	a1-1-2	x			x	x								
	a1-1-3	x			x	x								
	a5-1-1	x			x	x								
	a5-1-2	x			x	x								
	a5-1-3	x			x	x								

	a6-1-1	x			x	x								
	a6-1-2	x			x	x								
Intellectual Skills	b1-1-1	x			x	x								
	b1-2-1	x		x	x									
	b1-2-2	x		x	x									
	b1-2-3	x		x	x									
	b7-1-1	x		x	x									
Professional Skills	c1-1-1	x		x	x									
	c1-1-2	x		x	x									
	c3-1-1	x		x	x									
	c3-1-2	x		x	x									
General Skills	d1-1	x												
	d2-1	x												

9- Assessment

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] Prof.Dr. GalalYounis" Lecture Notes on Ship Economy ", Department of Naval Architecture &MarineEngineering, Faculty ofEngineering , Port said , 2003 www.gyounis.net/lectures/Ship Economy.

[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] GalalYounis: "The Permissible price of Ships in case of Borrowed Capitals", IX Symposium of Theory and Practice of Shipbuilding Dubrovnik , Croatia 19-21 April 1990.

[5] GalalYounis: "A New Method for Predicting Optimal Life of Ships in Cases of Equity and Borrowed Capitals", IX Symposium of Theory and Practice of Shipbuilding Dubrovnik , Croatia 19-21 April 1990.

[6] D.G.M. Watson: " Designing Ships for Fuel Economy " RINA Nov. 1981.

[7] R.F. Burnett: "Designing Ships for Fuel Economy", Shipbuilding& Marine Engineering International, Dec. 1981.

[8] R.F. Burnett: "Priorities for Reducing the Fuel Bill", Shipbuilding& Marine Engineering International , April 1982.

[9] SMM: "Economy Propellers for Reduced Power Operation", Stone Manganeze Marine Technical Brief No.17 , Nov.1980.

[10] J. Carreyette: " Preliminary Ship Cost Estimation", RINA No.4, July 1978.

[11] G.Younis: "The Feasibility of Larger Diameter Propellers in Ballast Trips", 3rd IMAM , Athens , Greece 1984 .

[12] R. Taggart: "Ship Design and Construction", SNAME Publications , 1980.

[13] L. Blank & Antony Tarquin: "Engineering Economy" McGraw-Hill, 1983

[14] Osama Ellian " Fuel and Energy saving Strategies on Ships" A Lloyd's Register Association Paper, 2015

[15] https://web.facebook.com/groups/1819292491715304/?ref=bookmarks

12- <u>Program Coordination Committee:</u>

Course Coordinator: **Prof. Dr. Galal M. Younis**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 602
Ship Propulsion Systems
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Ship Propulsion Systems	**Code Symbol**: NME 602	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course is useful and important to Ph. D. students, where it aims to provide them with the principles of efficient and safe ship propeller design. A study of wing theory. Also it provides them with information about powering of ships, propulsion efficiency, and cavitation of ship propeller. The course aims also to provide Ph.D. students with an understanding of linear lifting line and lifting surface theories, and panel method. Applications on mathematical modeling of ship propeller action and also how to construct compuer programs to represent these mathematical models. Theory of operation and applications of different non-conventional propulsion devices are also considered. Also, propeller/engine compatibility, and how to improve propeller performance are studied. Propeller vibration and energy conservation are also considered.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1- Theories, basics and specialized knowledge in the field of learning, as well as other related subjects.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Identify the different theories of ship propeller. a1-1-2 Identify the interaction between ship's hull, propeller and rudder. a1-1-3 Identify the propeller/engine compatibility, and propeller performance.
	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering..	a1-2-1 Identify the components of marine propulsion systems. a1-2-2 Recognize the principles of powering and efficiencies.
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	a6-1-1 Recognize the properties of optimum & safe propeller. a6-1-2 Categorize conventional & non-conventional propulsion devices. a6-1-3 Outline how to design a marine propeller
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Choose the suitable propulsion configuration. b1-1-2 Demonstrate the ability to apply modern theories, methods and computer programs in propeller design.

B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Determine the powering requirements and efficiencies of a ship propeller.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Use charts to design propeller according to ship operating conditions. c1-1-2 Identify interaction between hull, propeller and rudder, for least vibration.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for specific types of nonconventional Propellers.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills in career development.
D4- Set evaluation criteria and benchmarks for others.		d4-1 Apply evaluation criteria when carrying out model test and record the results.
D6- Lead a team in familiar professional context		d6-1 Prepare the laboratory and measurement devices to conduct the propeller tests.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Different Propeller Theories	9	9	--	--	a1-1-1, a6-1-3, b1-1-2
Conventional Propellers – Report on Types, Use, Components, …etc.	9	9	--	--	a1-2-1, a6-1-2 d2-1
Propeller Action, Arrangement, Configuration, …etc.	12	12	--	--	b1-1-1, d2-1
Powering of Ships and Interaction between Hull, Propeller, and Rudder	12	12	--	--	a1-1-2, a1-2-2, b2-1-1, c1-1-2
Open Water and Cavitation/ Wind Tunnel Propeller Model Tests	9	9	--	--	a6-1-1, d4-1, d6-1
Design of a Marine Screw Propeller Using Standard Series and Computer Applications	9	9	--	--	b1-1-2, c1-1-1, d6-1
Propeller Cavitation	6	6	--	--	a6-1-1, b2-1-1
Non-Conventional Propulsion Devices – Report on Types, Use, Components,…etc.	9	9	--	--	a1-2-1, a6-1-2, a6-1-3, c2-1-1
Propeller Performance and Propeller Caused Vibration	6	6	--	--	a1-1-3, a6-1-1, c1-1-2
Propeller/Engine Compatibility, and Ship Energy Conservation	9	9	--	--	a1-1-3, d6-1
Total	90				

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2) A6(a6-1)	B1(b1-1), B2(b2-1)	C1(c1-1), C2(c2-1)	D2, D4, D6

5- Course Subjects Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
-----	25%	25%	25%	15%	10%	---------	100%

6- Course Topics

Topic No.	Topic	Weeks
1st	Different Propeller Theories	1-3
2nd	Conventional Propellers – Report on Types, Use, Components, …etc.	4-6
3rd	Propeller Action, Arrangement, Configuration, …etc.	7-10
4th	Powering of Ships and Interaction between Hull, Propeller, and Rudder	11-14
5th	Open Water and Cavitation/ Wind Tunnel Propeller Model Tests	15-17
6th	Design of a Marine Screw Propeller Using Standard Series and Computer Applications	18-20
7th	Propeller Cavitation	21-22
8th	Non-Conventional Propulsion Devices – Report on Types, Use, Components,…etc.	23-25
9th	Propeller Performance and Propeller Caused Vibration	26-27
10th	Propeller/Engine Compatibility, and Ship Energy Conservation	28-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Course ILOs	**Knowledge & Understanding**									
a1-1-1	X									
a1-1-2				X						
a1-1-3									X	X
a1-2-1		X						X		
a1-2-2				X						
a6-1-1					X		X		X	
a6-1-2		X						X		
a6-1-3	X					X				
Course ILOs	**Intellectual skills**									
b1-1-1			X							
b1-1-2	X					X				
b2-1-1				X			X			
Course ILOs	**Professional and practical skills**									
c1-1-1						X				
c1-1-2				X					X	
c2-1-1								X		
Course ILOs	**General and transferrable skills**									
d2-1		X	X							
d4-1					X					
d6-1					X	X				X

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x	x								
	a1-1-2	x			x	x								
	a1-1-3	x			x	x								
	a1-2-1	x			x	x								
	a1-2-2	x			x	x								
	a6-1-1	x			x	x								
	a6-1-2	x			x	x								
	a6-1-3	x			x	x								
Intellectual Skills	b1-1-1	x			x	x								
	b1-1-2	x			x	x								
	b2-1-1	x			x	x								
Professional Skills	c1-1-1	x			x	x								
	c1-1-2	x			x	x								
	c2-1-1	x			x	x								
General Skills	d2-1								x					
	d4-1								x					
	d6-1								x					

9- Assessment

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

11.1. Lecture Notes:

Prof. Dr. Mo'men Gaafary, "Marine Propulsion, Theory & Design" Department of Naval Architecture & Marine Engineering,Faculty of Engineering, Port Said University, Egypt. Updated 2014.

11.2 Recommended Books:

1. J.P. Comstock , "Principals of Naval Architecture", SNAME Publications , 2012.
2. K.J.Rawson , E.C. Tupper " Basic Ship Theory ", Longman , London & New York , 2009.
3. Mo'men Gaafary, "Unsteady Forces Acting on Ship Propellers of Low-Aspect Ratio," Ph.D. Dissertation, Stevens Institute of Technology, Hoboken, New Jersey, USA, 1987.

4. Mo’men Gaafary, “Some 12 Published International Research Papers on Marine Propulsion and Non-Conventional Propulsion Systems and Devices,” 1991-2010.

11.3 Key words for Internet Search:

Marine Propellers, Non-Conventional Propulsion, Ship Propulsion.

12- <u>Program Coordination Committee:</u>

Course Coordinator:	**Prof. Dr. Mo'men Gaafary**
Programme coordinator:	**Assoc. Prof. Dr. Moustafa Mohamed**
Head of the Department:	**Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 603
Ship Performance
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc
Date of specification approval	August 2019

A- Basic Information

Title: Ship Performance	**Code Symbol**: NME 603	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

This course aims to tutor the students how to estimate ship propulsion powering, propeller design, predict ship performance in service. It also aims account for ship hull and propeller roughness during powering estimation. Moreover, it helps them to estimate powering, bollard pull, and performance of tugs. Keeping students familiar with Sea trails and measurements conducted during these trials. Students will be able to predict ship speed loss due to waves and wind in service. In additoin, Students will be able to Review of the application of natural gas in marine field .

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Outline the different resistance and powering calculation methods. a1-2-2 Outline propeller design theories.

A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline Quality Assurance instructions at the procedures of conducting sea trials for ships. a5-1-2 Identify the power penalty due to hull and propeller roughness.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Evaluate ship resistance and powering. b1-2-2 Analyze Measuring of typical replica of hull and propeller surfaces.
B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Design B-type marine propellers. b2-1-2 Predict ship performance for ships in service.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare technical report for the results of sea trials. c2-1-2 Prepare a scientific report on engine performance.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Conduct seminars on natural gas powered vessels.
D6- Lead a team in familiar professional context		d6-1 Conduct of ship sea trials and awareness of related equipment.

3- <u>Course Contents</u>

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Introduction of ship performance	6	6	-	-	a1-2-1, b2-1-2, c2-1-2
Powering Estimation methods	6	6	-	-	a1-2-1, b1-2-1

Propeller Design and performance	12	12	-	-	a1-2-2, b2-1-1, b2-1-2
Hull and Propeller Roughness	12	12	-	-	a1-2-1, a1-2-2, a5-1-2, b1-2-1, b1-2-2
Power Penalty and speed loss	6	6	-	-	a1-2-1, a5-1-2
Modern propulsion Systems and sea trails	12	12	-	-	a5-1-1, c2-1-1, c2-1-2, d6-1
Speed loss due to wind and waves	12	12			d6-1
performance of Tug boats	6	6			b1-2-2, c2-1-2
Application of Natural Gas in marine field	12	12			d2-1
The effect shallow waters on ship performance	6	6			a5-1-1, b1-2-1, c2-1-2
Total	90	90			

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-2),A5(a5-1)	B1(b1-2), B2(b2-1),	C2(c2-1)	D2, D6

5- <u>Course Subject Area:</u>

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
---	10%	20%	50%	10%	10%	--	100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Introduction of ship performance	1-2
2nd	Powering Estimation methods	3-4
3rd	Propeller Design and performance	5-8
4th	Hull and Propeller Roughness	9-12
5th	Power Penalty and speed loss	13-14
6th	Modern propulsion Systems and sea trails	15-18
7th	Speed loss due to wind and waves	19-22
8th	performance of Tug boats	23-24
9th	Application of Natural Gas in marine field	25-28
10th	The effect shallow waters on ship performance	29-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**
Course ILOs	**Knowledge & Understanding**									
a1-2-1	X	X		X	X					
a1-2-2			X	X						
a5-1-1						X				X
a5-1-2				X	X					
Course ILOs	**Intellectual skills**									
b1-2-1		X		X						X
b1-2-2				X				X		
b2-1-1			X							
b2-1-2	X		X						X	
Course ILOs	**Professional and practical skills**									
c2-1-1						X				
c2-1-2	X					X		X		X
Course ILOs	**General and transferrable skills**									
d2-1									X	
d6-1						X	X			

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-2-1	x							x					
	a1-2-2	x												
	a5-1-1	x							x					
	a5-1-2	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b1-2-2	x		x		x	x							
	b2-1-1	x		x		x	x							
	b2-1-2	x												
Professional Skills	c2-1-1	x				x			x					
	c2-1-2	x												
General and transferrable skills	d2-1	x				x								
	d6-1	x												

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	Week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

Marine measurement laboratory.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

11.1 Course notes:

Professor notes

11.2 Recommended books:

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- Volker Bertram, H. Schneekluth, " Ship Design for Efficiency and Economy," Butterworth-Heinemann, 15th October 1998

11.3 Papers, Periodicals, Web sites, etc:

1- Mosaad, M. A., "Marine Propeller Roughness Penalties", Dept. of Marine Technology, University of Newcastle upon Tyne, England, Ph.D. Thesis, 1986.

2- Mosaad, M. A., "Experiments and Application on the Effect of Propeller Surface Roughness", International Workshop on Drag and Roughness, RINA, England, March 1990.

3- 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.

4- Mosaad, M. A., “Ship-Model Surface Roughness Allowance” MEET MARIND’2002, Varna, Bulgaria, October 6-11, 2002.

5- Mosaad, M. A., “Natural Gas Powered Ships”, Gulf Maritime Conference 2007, Sharjh, UAE, April 15-18, 2007.

6- Mosaad,. M. A., Gafaary, M. M., Yehia, W. and Hassan, H.M. "On the Design of X-Bow for Energy Efficiency," Influence of EEDI on Ship Design & Operation, RINA, London, UK, September 2017.

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. M. A. Mosaad**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME604
Ship Construction (2)
Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Construction (2)**	**Code Symbol**: NME 604	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to provide students with basic knowledge and skills that are required to carry out a study on the construction of special units ofships. The course provides the students with an advanced background on the fundamental construction materials, construction criteria, the design of structural connections. It alsofamiliarizes the students with the requirements of the classification societies concerning special and inland navigation units.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-3 Understand the theories, basics and specialized knowledge in the field of Ship Construction and production.	a1-3-1 Recognize the construction materials used, e.g. steel, aluminum, GRP, HTS and differentiate between their applications.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Define the construction criteria related to different types of marine vessels.
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Investigate of structural connections related problems onboard ships.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-2 Use integrated approaches to solve scientific problem.	b3-2-1 Use the manipulated distortion measures data to solve technical raised problems.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify problem sources via field search for actual construction failure problems.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a professional technical report for construction of a special vessel.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills in career development.
D6- Lead a team in familiar professional context		d6-1 Lead a team to complete an accurate proposed project.

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Theory of vibration and monitoring equipments identifications	12	12	--	--	a1-3-1, a2-1-1 a2-2-1
2. Hull structural Vibrations	12	12	--	--	a1-3-1, a2-1-1 a2-2-1
3. Shafting and Propeller Vibrations	15	15	--	--	b1-1-1, c1-1-1, c2-1-1, d6-1
4. Hull- Propeller- Engine foundation compatibly	15	15	--	--	b1-1-1, b3-1-1, c2-1-1, d2-1, d6-1
5. Vibration monitoring analysis theory and its characteristics	18	18	--	--	b3-1-1, c1-1-1, c2-1-1, d6-1
6. Vibration limits and criteria	18	18	--	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1, d2-1, d6-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-3), A2(a2-1), (a2-2)	B1(b1-1), B3(b3-2)	C1(c1-1) C2(c2-1)	D2 D6

5- <u>Course Subject Area:</u>

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Discretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Contents

Topic No.	Topic	Weeks
1st	Ship Construction Materials.	1-4
2nd	Construction Criteria.	5-8
3rd	Design of Structural Connections.	9-13
4th	Construction of Special Units.	14-18
5th	Special Considerations in the Ship's Hull to Avoid Distortions.	19-24
6th	Requirements of the Classification Societies for Building & Maintaining Ships.	25-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-3-1 Recognize the construction materials used, e.g. steel, aluminum, GRP, HTS and differentiate between their applications.	x	x				
a2-1-1 Define the construction criteria related to different types of marine vessels.	x	x				
a2-2-1 Investigate of structural connections related problems onboard ships.	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate an investigatory approach for detecting problems sources.			x	x		x
b3-2-1 Use the manipulated distortion measures data to solve technical raised problems.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Identify problem sources via field search for actual construction failure problems.			x		x	x

c2-1-1 Prepare a professional technical report for construction of a special vessel.			x	x	x	x
Course ILOs	**General and transferrable skills**					
d2-1 Apply course skills in career development.				x		x
d6-1 Lead a team to complete an accurate proposed project.			x	x	x	x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-3-1	X												
	a2-1-1	X				x								
	a2-2-1	X				x								
Intellectual Skills	b1-1-1		x											
	b3-2-1		x											
Professional Skills	c1-1-1		x											
	c2-1-1		x										x	
General Skills	d2-1		x							x				
	d6-1		x							x				

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some Internet research assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

[1] E.C. Tupper & K.J. Rawson., “Basic Ship Theory”, Butterworth-Heinemann,2001.

[2] Robert M. Steward, “Boatbuilding Manual”, International Marine Publishing Company, 1980.

[3] Robert Taggart, “Ship Design & Construction”, SNAME, 1980.

[4] IACS, “Shipbuilding & Repair Quality Standards”, IACS, 2006.

[5] Chien Ming Wang, Eiichi Watanabe, Tomoaki Utsunomiya, " Very Large Floating Structures", Taylor & Francis, 2008.

[6] Don Butler, "Guide to Ship Repair Estimates", Butterworth-Heinemann, 2000.

12- Program Coordination Committee:

Course Coordinator: **Dr. Randa Ramadan**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 605

Ship Structural Design(2)

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ship Structural Design (2)**	**Code Symbol**: NME 605	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

The course aims to improve the students knowledge and skills that are required to carry out a complete ship structural design, based on the principles of structural analysis of different levels of structural response and assess the ultimate strength of ship panels.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Outline the role of different theories used in structural analysis in ship structural design. a1-1-2 Define the different cases of limit state design
A2. Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize the appropriate acceptance criteria according to Rules

B. Intellectual skills		
B1. Define and analyze information in the field of specialization, and relate to them to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate different theories to assess the strength of ship modules (plates , stiffeners and stiffened panels) b1-1-2 Create idealization to solve structural problems by simplified formulae.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Investigate a detailed case study of a reported structural failure.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Use the different analytical and numerical tools to perform the design of some ship structural components.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Collect casualties reports (Ship Structure Committee or other sources)

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1-Theory of plates and shells	15	15	-	--	a1-1-1, b1-1-1, c1-1-1
2- Theory of plasticity	12	12			a1-1-2, c1-1-1
3- Limit state analysis	12	12	-	--	a2-2-1, b1-1-1, b3-1-1, d2-1
4- Applications of the Finite element method	12	12	-	--	a1-1-1, c1-1-1
5- Dynamics of ship structures	12	12	-	--	a1-1-1, a2-2-1,b1-1-1, b1-1-2,c1-1-1
6- Applications of elastic stability problems	12	12	-	--	a1-1-2, c1-1-1
7- Introduction to structural optimization	15	15	-	--	a1-1-1, c1-1-1
Total	**90**				

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1 (a1-1), A2 (a2-2)	B1 (b1-1), B3 (b3-1)	C1 (c1-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**---**	**70%**	**20%**	**10%**	**---**	**100%**

6.Course Topics.

Topic No.	Topic	Weeks
1st	Theory of plates and shells	1-5
2nd	Theory of plasticity	6-9
3rd	Limit state analysis	10-13
4th	Applications of the Finite element method	14-17
5th	Dynamics of ship structures	18-21
6th	Applications of elastic stability problems	22-25
7th	Introduction to structural optimization	26-30

6- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Course ILOs	**Knowledge & Understanding**						
a1-1-1 Outline the role of different theories used in structural analysis in ship structural design.	x			x	x		x
a1-1-2 Define the different cases of limit state design		x				x	
a2-2-1 Recognize the appropriate acceptance criteria according to Rules			x		x		

Course ILOs	Intellectual skills						
b1-1-1 Demonstrate different theories to assess the strength of ship modules (plates , stiffeners and stiffened panels)	x		x		x		
b1-1-2 Create idealization to solve structural problems by simplified formulae.					x		
b3-1-1 Investigate a detailed case study of a reported structural failure.			x				
Course ILOs	**Professional and practical skills**						
c1-1-1 Use the different analytical and numerical tools to perform the design of some ship structural components.	x	x		x	x	x	x
Course ILOs	**General and transferrable skills**						
d2-1 Collect casualties reports (Ship Structure Committee or other sources)			x				

7- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x												
	a1-1-2	x				x								
	a2-2-1	x				x								
Intellectual Skills	b1-1-1		x											
	b1-1-2		x											
	b3-1-1													
Professional Skills	c1-1-1							x					x	
General skills	d2-1-1	x			x	x		x						

8- Assessment

8.1 Assessment Methods

Final Written : Examination	to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

8.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

9- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

10- List of references:

[1] Paik, J., Thaymballi, A., "Ultimate limit state design of steel plated structures", J.Wiley, 2003.

[2] Hughes, O., "Ship Structural Design: a rationally computer-based approach", SNAME publications, 1988

[3]Timoshenko, S., Woinowsky-Krieger, S., "Theory of plates and shells", Textbook publishers, 2003

[4]http://www.shipstructure.org/

11- Program Coordination Committee:

Course Coordinator: **Dr. Heba S. El-Kilani**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 606

Marine Environment Pollution (2)

Course Specifications

Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major.
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Marine Environment pollution (2)	**Code Symbol**: NME 606	
Lecture	3 hours	
Tutorial	**---------**	
Laboratory	**---------**	
Total	3 hours	
Full academic year	prerequisite	--------------

C- Professional Information

1- Course Aims:

This course aims to provide the Ph.D. & M.Sc. students the essential knowledge about the marine pollution. The course provides the students with 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. Pollution due to ship accidents and treatments of pollution due to oil take a recognized portion of this course. This course provides also a study about the different structural ship design for minimum pollution. Equipment and marine units for treatment of marine pollution are also among the main aims of this course

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Identify sources of marine pollution and search for all the marine pollution hazards from the available references.

practice.		a1-2-2 Show information about the available methods for treatment of marine pollution. a1-2-3 Outline the required procedures to present marine pollution accidents.
A4- Fundamentals of ethical & legal professional practice in the field of specialization.	a4-1 Recognize ethical and professional responsibility issues arising in the practice of the engineering profession.	a4-1-1 Show how to write a report for marine pollution accident. a4-1-2 List the most important requirement form the IMO and classification societies for preventing marine pollution.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline how to calculate the cost of removing pollution after an accident and the required penalties.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Analyze the results of marine accidents. b1-2-2 Evaluate the application of some modification in ship structure to minimize the environment impact during collision. b1-2-3 Combine with some classification societies to obtain the last requirement for minimize marine pollution
B2- Solve specialized problems with lack of some data and variables (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-2-1 Predict the safety equipment and control methods for different marine pollution accidents.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare a technical report to define the source of pollution , responsibility, method of control, treatment methods, the cost of treatment and the effect of this accident on the environment.

D. General and transferrable skills	
D2- Use information technology to improve his/her professional practice.	d2-1 Use computer program to calculate all the amount of spilled oil and the economical cost of treatment.
D5- Use different sources to obtain knowledge and information.	d5-1 Use internet network to collect the most important information related to marine pollution .

3- Course Contents

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
The ship as a source of marine pollution	12	12	-	-	a1-2-1, a1-2-3, a4-1-2, a5-1-1, d2-1, d5-1
IMO requirements regarding marine environment protection	6	6	-	-	a1-2-1, a1-2-2, a4-1-1, b1-2-1, b1-2-1, d2-1
Requirements of classification societies	9	9	-	-	a1-2-3, a4-1-2, a5-1-1, b1-2-2, b2-2-1, d5-1
Marine pollution fighting	12	12	-	-	a1-2-2, b1-2-2, b1-2-3, d5-1
Skimming units	9	9	-	-	a4-1-1, d2-1, d5-1
Chemical and mechanical methods of fighting pollution	9	9	-	-	b1-2-1, b2-2-1,d5-1
Collision of ships as a source of pollution	12	12	-	-	a1-2-1, c2-1-1
Grounding of ships and rescue	9	9	-	-	d2-1, d5-1
Ship stability due grounding	12	12	-	-	b2-2-1, c2-1-1
Total	90	-	-	-	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Profession al Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-2), A4(a4-1), A5(a5-1)	B1(b1-2), B2(b2-1),	C2(c2-1),	D2, D5

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
10%	------	50%	40%	--------	------	---------	100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	The ship as a source of marine pollution	1- 4
2nd	IMO requirements regarding marine environment protection	5 - 6
3rd	Requirements of classification societies	7 - 9
4th	Marine pollution fighting	10 - 13
5th	Skimming units	14 - 16
6th	Chemical and mechanical methods of fighting pollution	17 - 19
7th	Collision of ships as a source of pollution	20 – 23
8th	Grounding of ships and rescue	24 – 26
9th	Ship stability due grounding	27 - 30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Course ILOs	**Knowledge & Understanding**								
a1-2-1	x	x					x		
a1-2-2		x		x					
a1-2-3	x		x						
a4-1-1		x			x				
a4-1-2	x		x						
a5-1-1	x		x						
Course ILOs	**Intellectual skills**								
b1-2-1		x				x			
b1-2-2			x	x					
b1-2-3				x					
b2-2-1			x			x			x
Course ILOs	**Professional and practical skills**								
c2-1-1							x		x
Course ILOs	**General and transferrable skills**								
d2-1	x	x			x			x	
d5-1	x		x	x	x	x		x	

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-2-1	x		x					x					
	a1-2-2	x		x					x					
	a1-2-3	x		x										
	a4-1-1	x		x										
	a4-1-2	x		x					x					
	a5-1-1	x		x										

Intellectual Skills	b1-2-1	x		x		x	x							
	b1-2-2	x		x		x	x							
	b1-2-3	x		x		x	x							
	b2-2-1	x		x										
Professional Skills	c2-1-1	x		x		x			x					
General and transferrable skills	d2-1					x								
	d5-1													

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

- **Lecture Notes:**

  1. Lecture notes prepared by Prof. El-Sayed Hegaz

- **Recommended books**

1 International Tanker Owners Pollution Federation, Effects of Oil Spills, http://www.itopf.com/marine-spills/effects, accessed July 2010.

2 National Research Council. Oil in the Sea III: Inputs, Fates, and Effects. Washington, DC: National Academies Press; 2003.

3 Boyd J. N., Scholz D. & Hayward Walker A. :“ Effects of Oil and Chemically Dispersed Oil in the Environment“, IOSC 2001.

4 Landis WG. The Exxon Valdez Oil Spill Revisited and the Dangers of Normative Science. Integ Environ Assess Manag 2007.

5 Exxon Valdez Oil Spill Trustee Council. Legacy of an Oil Spill, 20 Years after Exxon Valdez: Exxon Valdez Oil Spill Trustee Council, 2009 status report. Anchorage, AK: Exxon Valdez Oil Spill Trustee Council; 2009.

- **Key words for Internet Search:**

1. Marine Pollution, Marine pollution treatment

12- Program Coordination Committee:

Course Coordinator: **Prof. El-Sayed Hussein Hegazy**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME607

Advanced Marine Engineering

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Advanced marine engineering	**Code Symbol**: NME 607	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the students to be familiar with the modern marine power stations. The students have to know how to design, select and arrange the optimum marine rigs, marine transmission, shafting systems. They have to be capable of install, design and laying the piping systems and components for ship hull and machinery. The student should be familiar with inspection of anti pollution and control equipment.

After finishing the course, the student will have good knowledge and understanding to deal with the modern and advanced marine power plants and there components. After completion of this course, the student should be able to:

- Configure and descript the equipments and components of advanced marine power plants.
- Understand and discuss the advantages and limitations of unti-pollutions and inspection tools.
- Critically evaluate and compare various concepts of marine power plants.
- Determine the concept and functions of the most anti pollution, drilling and rescue requirement.
- Plane and install the various power transmission and shafting systems.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Classify different types of marine power stations.
	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Show the required steps to calculate and design the marine transmission parameters and shaft alignment.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Outline the charcteristics of power transmission systems.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Predict and define the suitable systems of marine power plants and inspections.
B6- Plan for performance development in the field of practice .	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Identify how to use the different inspection and control tools.
B7- Take professional decisions in different professional practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	b7-1-1 Analyze the problem to get the proper decisions.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Discuss and describe the limit state function.

C3- Evaluate means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches concerning specified problem related to marine technology.	c3-1-1 Determine the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use computer program to calculate all the marine index.

3-

Topic	***Total Hours***	***Contact hrs***			***Course ILOs Covered (By No.)***
		Lec.	**Tut.**	**Lab.**	
Comparative study of marine power stations.	18	18	-	-	a1-1-1, a1-2-1, c1-1-1
Anti pollution equipment	12	12	-	-	a1-1-1, c1-1-1, c3-1-1
Drilling and rescue equipment.	15	15	-	-	b6-1-1, C3-1-1,
Marine rigs.	15	15	-	-	a1-1-1, a1-2-1, a5-1-1, d2-1
Marine transmission and shaft alignment	15	15	-	-	a1-2-1, a5-1 -1, b1-2-1, b7-1-1
Inspection and control in marine equipment	15	15	-	-	b1-2-1, b6-1-1, b7-1-1, d2-1
Total	90				

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-2), A5(a5-1)	B1(b1-2), B6(b6-1), B7(b7-1)	C1(c1-1), C3(c3-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**20%**	**20%**	**60%**	**--**			**100%**

6- Course Contents

Topic No.	Topic	Weeks
1st	Comparative study of marine power stations.	1-6
2nd	Anti pollution equipment	7-10
3rd	Drilling and rescue equipment.	11-15
4th	Marine rigs.	16-20
5th	Marine transmission and shaft alignment	20-25
6th	Inspection and control in marine equipment	26-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1	x	x		x		
a1-2-1	x			x	x	
a5-1-1				x	x	
Course ILOs	**Intellectual skills**					
b1-2-1					x	x
b6-1-1			x			x
b7-1-1					x	x
Course ILOs	**Professional and practical skills**					
c1-1-1	x	x				
c3-1-1		x	x			
Course ILOs	**General and transferrable skills**					
d2-1				x		x

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-2-1	x							x					
	a5-1-1	x							x					
Intellectual Skills	b1-2-1	x		x		x	x							
	b6-1-1	x		x		x	x							
	b7-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x			x					
	c3-1-1	x												
General and transferrable skills	d2-1	x				x								

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- <u>Facilities required for teaching and learning</u>

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1. Harrington R.Y., Marine Engineering, 2nd edition, SNAME, USA 1992.
2. R. Taggart, "ship Design and Construction", SNAME, USA 1980
3. Mc-George H.D., Marine Auxiliary Machinery, 7th edition, Butterworth, London 1995.
4. D.A. Taylor, Introduction to Marine Engineering, Elsevier Science, 2014.
5. Breeze, Power Generation Technologies, Elsevier Science, 2014.
6. Frank Kreith, Raj M. Manglik, and Mark S. Bohn, Principles of Heat Transfer, 7th ed., Cengage Learning, Inc., 2011.
7. MAN diesel & turbo LTD. 2011. MAN Diesel & Turbo Technology Boosts Efficiency, Copenhagen SV DENMARK; June 2011.
8. Wilbur, C.T. & Wight D.A., (2012): “Pounder's Marine Diesel Engines”, 9th ed. Butterworth- Heinemann Ltd., Oxford

12- Program Coordination Committee:

Course Coordinator: **Prof. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME608

Marine power systems

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Marine power systems	**Code Symbol**: NME 608	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

Prepare the student to be familiar by the modern trends in marine power systems. The students have to know all sources of energy and power calculations. They have to be capable of all auxiliary items, machinery, piping systems, and safety equipment. The students should know the design processes and calculation steps to determine the marine systems requirements. The students have to know all the processes required to control the pollution and recover the waste heat energy.

After finishing the course, the student will have good knowledge and understanding to deal with the modern and advanced marine systems and components. After completion of this course, the student should be able to:

- Classify all power sources and heat exchangers.
- Design the piping systems and classify the piping materials.
- Evaluate the operating items and safety equipment in marine power systems
- Identify the modern marine power stations.
- Evaluate the pollution control methods and applications
- Identify and choose the operating items and safety equipment.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Classify different types of marine power stations. a1-1-2 Outline the design process of the heat exchanger and piping systems
	a1-2 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-2-1 Show how to calculate the energy and power of marine systems.
A5- Basics and principles of quality in professional practice in the field of specialization.	a5-1 Explain Quality Assurance and control concepts of different ship building processes and operation of marine systems.	a5-1-1 Show the charcteristics and fuction of different safety equipment systems.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Predict and define the marine power systems and install the suitable pollution control tools.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-2 Use integrated approaches to solve scientific problem.	b3-2-1 predict the safety equipment and control methods for different marine systems. b3-2-2 Choose the piping materials and predict the recovered energy.
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	b6-1-1 Identify how to use all the marine systems and components.

C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Choose the topics and headlines to write a report for a limited task
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Use computer program to calculate all the marine index

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
Study of modern trend in marine power stations	12	12	-	-	a1-1-1, b1-2-1, b6-1-1, c1-1-1, d2-1
Retaining wasted energy	12	12	-	-	a1-2-1, b6-1-1
Calculation of energy and power	12	12	-	-	b3-2-2
Design of heat exchangers	12	12	-	-	a1-1-2, b6-1-1, d2-1
Design of piping systems and materials	12	12	-	-	b3-2-2, b6-1-1, c2-1-1, d2-1
Safety equipment	9	9	-	-	a5-1-1, b3-2-1, c1-1-1
Purifiers and purification	12	12	-	-	b6-1-1
Pollution control in power stations	9	9	-	-	b1-2-1, b3-2-1, c2-1-1
Total	90	-	-		

4- <u>Relationship between the course and the programme</u>

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Profession al Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1 (a1-1), (a1-2) A5 (a5-1)	B1(b1-2), B3(b3-2), B6(b6-1)	C1(c1-1), C2(c2-1)	D2

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	20%	20%	60%	--			100%

6- Course Topics.

Course Contents

Topic No.	Topic	Weeks
1st	Study of modern trend in marine power stations	1-5
2nd	Retaining wasted energy	6-10
3rd	Calculation of energy and power	11-14
4th	Design of heat exchangers	15-17
5th	Design of piping systems and materials	18-22
6th	Safety equipment	23-25
7th	Purifiers and purification	26-27
8th	Pollution control in power stations	28-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th	7th	8th
Course ILOs	**Knowledge & Understanding**							
a1-1-1	X							
a1-1-2				X				
a1-2-1		X						
a5-1-1						X		
Course ILOs	**Intellectual skills**							
b1-2-1	X							X
b3-2-1						X		X
b3-2-2			X		X			
b6-1-1	X	X		X	X		X	
Course ILOs	**Professional and practical skills**							
c1-1-1			X			X		
c2-1-1					X			X
Course ILOs	**General and transferrable skills**							
d2-1	X			X	X			

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-1-1	x							x					
	a1-1-2	x							x					
	a1-2-1	x							x					
	a5-1-1	x												
Intellectual Skills	b1-2-1	x		x		x	x							
	b3-2-1	x		x		x	x							
	b3-2-2	x		x		x	x							
	b6-1-1	x												
Professional Skills	c1-1-1	x				x			x					
	c2-1-1	x												
General and transferrable skills	d2-1	x				x								

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

1- M. M. El-Wakil, "Power Plant Technology", McGraw-Hill, New York,1985.
2- S. Rao and B. B. Parulekar, "Energy Technology", Khanna Pub, 3rd edition, 2005.
3-P. Breeze, "Power Generation Technologies", 1st edition, Elsevier 2005.

12- Program Coordination Committee:

Course Coordinator: **Prof. Dr. Adel A. Tawfik**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 609

Boundary Layer Theory and Viscous Flow

Course Specifications

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc. Degree
Date of specification approval	August 2019

A- Basic Information

Title: Boundary Layer Theory and Viscous Flow	**Code Symbol:** NME 609	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims

This course aims to acquire the student learn the features of the boundary layer theory and viscous flow characteristics, the momentum integral equation and the velocity profile of 2-dimensional flow, the study of the hydrodynamic roughness function for engineering surfaces, the equations of boundary layer for laminar and turbulent flow on smooth and rough surfaces, application of the solution of boundary layer equations for ships and propellers.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of **mathematics and computer science** appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 how the features of the boundary layer theory and viscous flow characteristics. a1-1-2 Show the solution of boundary layer equations and its application on ships and propellers.

A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Recognize the solution of boundary layer equations and its application on ships and propellers.
A6- Basics and ethics of scientific research	a6-1 Recognize Basics and ethics of scientific research.	A6-1-1 Identify the momentum integral equation and the velocity profile of 2-dimensional flow.
B. Intellectual skills		
B2- Solve specialized problems with lack of some data and variables(incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Apply the boundary layer equations on ships and propellers.
B7- Take professional decisions in different professional practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to the specific sub-field under consideration.	b7-1-1 Identify the boundary layer characteristics.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c 1-1-1 Predict drag force for flat plate by using boundary theory, applicable to ship. c 1-1-2 Predict drag force for flat plate by using boundary theory, applicable to propeller
D. General and transferrable skills		
D1- Communicate effectively using all methods.		d1-1 Apply the gained knowledge to determine the hydrodynamic characteristic of boundary layer.
D6- Lead a team in familiar professional context		d5-1Conduct a seminar to collect data about boundary layer for laminar and turbulent flow on smooth and rough surfaces.
D8- Learn independently and seek continuous learning.	d8-1 Express a strong foundation of continuous learning so they can maintain their technical competency.	d8-1-1 Prepare reports & presentation for relevent subject

3-

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
the features of the boundary layer theory and viscous flow characteristics	12	12	-	-	a1-1-1, a1-1-2
Study the momentum integral equation and the velocity profile of 2-dimensional flow	12	12	-	-	a1-1-1, a1-1-2, b2-1-1
flow function definition, flow around floating bodies	12	12	-	-	a6-1-1
Study of the hydrodynamic roughness function for engineering surfaces	12	12	-	-	b2-1-1, b7-1-1
Estimate drag force for flat plate by using boundary theory	12	12	-	-	a1-1-2, c1-1-2
Estimate drag force for flat plate by using boundary theory, applicable to ship.	12	12	-	-	a2-1-1, c 1-1-1, c1-1-2, d6-1, d8-1-1
Estimate drag force for flat plate by using boundary theory, applicable to propeller	12	12	-	-	d1-1, d6-1, d8-1-1
application on ships and propellers	6	6	-	-	b7-1-1, d1-1

4- <u>Relationship between the course and the programme</u>

Field	**National Academic Reference Standard(NARS)**			
	Knowledge & Understanding	**Intellectual Skills**	**Professional Skills**	**General Skills**
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2 (a2-1) A6(a6-1)	B2 (b2-1) B7(b7-1)	C1(c1-1)	D1 D6 D8(d8-1)

5- Course Subjects Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disccretionry subjects	Total
---	10%	20%	50%	10%	10%	--	100%

6- Course Topics.

Topic No.	Topic	Weeks
1	the features of the boundary layer theory and viscous flow characteristics	**1-4**
2	Study the momentum integral equation and the velocity profile of 2-dimensional flow	**5-8**
3	flow function definition, flow around floating bodies	**9-12**
4	Study of the hydrodynamic roughness function for engineering surfaces	**13-16**
5	Estimate drag force for flat plate by using boundary theory	**17-20**
6	Estimate drag force for flat plate by using boundary theory, applicable to ship.	**21-24**
7	Estimate drag force for flat plate by using boundary theory, applicable to propeller	**25-28**
8	application on ships and propellers	**29-30**

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Course ILOs	**Knowledge & Understanding**							
a 1-1-1	X	X						
a1-1-2	X	X			X			
a2-1-1						X		
a6-1-1			x					
Course ILOs	**Intellectual skills**							
b 2-1-1		X		X				
b 7-1-1				X				X

Course ILOs	Professional and practical skills							
c 1-1-1						X		
c1-1-2					X	X		
Course ILOs	**General and transferrable skills**							
d 1-1							X	X
d6-1						X	X	
d8-1-1						X	X	

8- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	**a 1-1-1**	x												
	a 1-1-2	x												
	a2-1-1	x												
	a6-1-1	x												
Intellectual Skills	**b 2-1-1**	x		x										
	b 7-1-1	x		x										
Professional Skills	**c 1-1-1**	x												
	c 1-1-2	x												
General and transferrable skills	**d 1-1**	x												
	d6-1	x												
	d8-1-1	x												

9- <u>Assessment</u>

9.1 Assessment Methods

Final Written Examination — to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

- Teaching aids such as overhead projector, data show and computer.
- Regular visit to the Shipyard and power plant sites.

A. laboratory Usage:

Marine measurement laboratory.

B. Library Usage:

Students should be encouraged to use library.

11- List of references:

11.1- Course notes

- Handout of the teacher's papers related to the course specifications.
- Mosaad, M.A. ,"Marine propeller roughness penalties",PHD Thesis, Newcastle University,1986

11.2- Essential books (text books)

- Schilichting, H., "Boundary layers theory", Mc Graw-Hill, 1979.
- Abbott, H., Von Doenhoff, A.E., "Theory of win section", Dover, 1959

11.3- Recommended books

- Schetz, J.A., "Foundation of Boundary layers theory for momentum, heat, mass transfer, Prentice- Hall, Englewood, 1984.
- White, F.M., "Fluid mechanics ", 1979.
- Blevins, R.P., "Applied fluid dynamics handbook", Van Nostrand reinhold Co., 1984.

Course Coordinator: **Prof. Dr. M. A. Mosaad**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 610

Ocean Engineering Dynamics

Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: **Ocean Engineering Dynamics – (Dynamic Oceanography)**	**Code Symbol**: NME 610	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	By law 2000

B- Professional Information

1- Course Aims:

This course is interesting and useful to Ph.D. degree students. It provides them with the knowledge of sea water properties such as equilibrium of (pressure, salinity, and temperature), and balance of air and water. Also, it provides them with the physical laws in Dynamic Oceanography together with the classification of current forces and motions. The equations of fluid continuity and equations of current stability and diffusion are considered. The course also studies the equilibrium of (sea water pressure, salinity, and temperature), and the linear equations of fluid motions. The course aims also to introduce the physical and theoretical representation of Geostrophic current flows. The course presents the understanding of friction and frictionless current motions. The course presents the physics and equations of tides together with applications on tide forces and effects.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Define the equations of fluid motion. a1-1-2 Define the equations of fluid continuity, stability, and diffusion.
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-1 Recognize the social and economical aspects of marine industries.	a2-1-1 Identify the properties of sea water, and balance of air and sea water. And categorize current forces and motion.
	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Describe the dynamics of friction and frictionless current motion.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Demonstrate the ability to determine the equations of fluid motion also, recognize the equations of fluid continuity, stability, and diffusion. Identify the properties of sea water.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Evaluate the ability to understand the dynamics of friction and frictionless current motions. Also, learning the Geostrophic current flows.

C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify specific properties of sea water, and balance of air and sea water. Also, classify the sea water current forces and motion. Practice the ability to distinguish between friction and frictionless current motions.

D. General and transferrable skills	
D2- Use information technology to improve his/her professional practice.	d2-1 Apply course skills in career development.
D5- Use different sources to obtain knowledge and information.	d5-1 lead a team to complete an accurate design.

3- <u>Course Contents</u>

Topic	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
		Lec.	**Tut.**	**Lab.**	
1. Sea Water Properties	9	9	-	--	a1-1-1, a1-1-2, a2-1-1, a2-2-1
2. Equations of Fluid Continuity, and Current Stability and Diffusion	12	12			a1-1-1, a1-1-2, a2-1-1, a2-2-1
3. Linear Equations of Fluid Motion	15	15	-	--	b1-1-1, c1-1-1, d5-1
4. Physical and Theoretical Representation of Geostrophic Current Flows	18	18	-	--	b1-1-1, b3-1-1, d2-1, d5-1
5. Friction and Frictionless Current Motions	18	18	-	--	b3-1-1, c1-1-1, d5-1
6. Physics and Theory of Tides	18	18	-	--	b1-1-1, b3-1-1, c1-1-1, d2-1, d5-1
Total	90	90	-	--	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), A2(a2-1), (a2-2)	B1(b1-1), B3(b3-1),	C1(c1-1)	D2 D5

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	1. Sea Water Properties	1-3
2nd	2. Equations of Fluid Continuity, and Current Stability and Diffusion	4-7
3rd	3. Linear Equations of Fluid Motion	8-12
4th	4. Physical and Theoretical Representation of Geostrophic Current Flows	13-18
5th	5. Friction and Frictionless Current Motions	19-24
6th	6. Physics and Theory of Tides	25-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Define the equations of fluid motion.	x	x				
a1-1-2 Define the equations of fluid continuity, stability, and diffusion.	x	x				
a2-1-1 Identify the properties of sea water, and balance of air and sea water. And categorize current forces and motion.	x	x				
a2-2-1 Describe the dynamics of friction and frictionless current motion.	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Demonstrate the ability to determine the equations of fluid motion also, recognize the equations of fluid continuity, stability, and diffusion. Identify the properties of sea water.			x	x		x
b3-1-1 Evaluate the ability to understand the dynamics of friction and frictionless current motions. Also, learning the Geostrophic current flows.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 Identify specific properties of sea water, and balance of air and sea water. Also, classify the sea water current forces and motion. Practice the ability to distinguish between friction and frictionless current motions.			x		x	x
Course ILOs	**General and transferrable skills**					
d2-1 Apply course skills in career development.				x		x
d5-1 lead a team to complete an accurate design.			x	x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x												
	a1-1-2	x				x								
	a2-1-1	x				x								
	a2-2-1	x				x								
Intellectual Skills	b1-1-1		x											
	b3-1-1		x											
Professional Skills	c1-1-1		x											
General Skills	d2-1		x							x				
	d5-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of references:

11.1. Lecture Notes:

Prof. Dr. Mo'men Gaafary, "Dynamic Oceanography," Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt.

11.2. Recommended Books:

1. J.P. Comstock, "Principals of Naval Architecture", SNAME Publications, USA, 3rd Edition 1967, and 4th Edition 1989.

2. Robert H. Stewart, "Introduction to Physical Oceanography", Orange Grove Books Publications, USA, 2009.

Key words for Internet Search:

Dynamic Oceanography, Sea Water Geostrophic Currents, Sea Water Properties, Tides, Sea Water Continuity and Diffusivity.

12- Program Coordination Committee:

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 611
Sea Wave Dynamics and Wave Theory

Course Specifications

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Sea Wave Dynamics and Wave Theory	**Code Symbol:** NME611	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**-------------**

C- Professional Information

1- Course Aims:

This course is very important to some students of M.Sc. programs, where it provides advanced knowledge about the wave theory. Studying surface and internal sea waves is important since this is the media where a marine vehicle is navigating. Also, the course provides knowledge of how surface waves get formulated. Different types of surface waves are introduced. Standing, progressing, pulsating surface waves are explained with the equations of profile, potential, pressure, boundary conditions and other necessary equations. Introducing surface waves that are generated by singularity distributions. Wave motion due to pressure dipoles distributions and 3-Dimensional source distributions.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Identify the wave types. a1-1-2 Identify the surface wave theory.

<table>
<tr><td>A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.</td><td>a2-2 Recognize the different effects of marine industries on the environment.</td><td>a2-2-1 Recognize how to simulate the dynamics of surface wave generation.
a2-2-2 Identify the parameters that affect surface waves.
a2-2-3 Investigate the dynamics of progressing and standing waves.
a2-2-4 Describe the wave motion.</td></tr>
<tr><td colspan="3">B. Intellectual skills</td></tr>
<tr><td>B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.</td><td>b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.</td><td>b1-1-1 Investigate modern theories, and methods wave types and wave theory.
b1-1-2 Investigate and manipulate data from experiments and real see on surface wave generation.</td></tr>
<tr><td>B3- Link and integrate diverse knowledge to solve professional problems.</td><td>b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.</td><td>b3-1-1 Evaluate the ability to analyze and solve problems on surface progressing waves.</td></tr>
<tr><td colspan="3">C. Professional and practical skills</td></tr>
<tr><td>C1- Master the basic as well as the latest professional skills in the field of specialization.</td><td>c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.</td><td>c1-1-1 prepare search reports for specific types of wave types.</td></tr>
<tr><td>C2- Write and evaluate technical and professional reports.</td><td>c2-1 Write and evaluate a professional report on the specific area of the marine industries.</td><td>c2-1-1 Prepare reports about surface waves generation.
c2-1-2 Practice the ability to distinguish between standing and progressing waves.</td></tr>
<tr><td colspan="3">D. General and transferrable skills</td></tr>
<tr><td colspan="2">D2- Use information technology to improve his/her professional practice.</td><td>d2-1 Apply course skills on surface waves generation and in career development.</td></tr>
</table>

D6- Lead a team in familiar professional context	d6-1 Practice in a team to complete report about surface wave.

3- Course Contents

No.	*Topic*	*Total Hours*	*Contact hrs*			*Course ILOs Covered (By No.)*
			Lec.	**Tut.**	**Lab.**	
1	Wave Types, (surface and internal waves)	15	15	--	--	a1-1-1, a1-1-2, a2-2-1, a2-2-2, a2-2-3, a2-2-4
2	Wave Theory, (deep, moderate, and shallow water waves)	15	15	--	--	a1-1-1, a1-1-2, a2-2-1, a2-2-2, a2-2-3, a2-2-4
3	Surface Waves Generation	15	15	--	--	b1-1-1, b1-1-2, c1-1-1, c2-1-1 c2-1-2, d6-1
4	Standing, and Progressing Surface Waves	15	15	--	--	b1-1-1, b1-1-2, b3-1-1, c2-1-1 c2-1-2, d2-1, d6-1
5	Progressing Waves Equations of Profile, Potential, Pressure, and Bottom & Surface Boundary Conditions	15	15	--	--	b3-1-1, c1-1-1, c2-1-1, c2-1-2, d6-1
6	Wave Motion due to Pressure Dipoles and 3-D Source Distributions.	15	15	--	--	b1-1-1, b1-1-2, b3-1-1, c1-1-1, c2-1-1, c2-1-2, d2-1, d6-1
Total		90	90	-	--	--

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D6

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Computer Applications and ICT	Projects and practice	Disscretionry subjects	Total
---	15%	30%	35%	10	10		100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	Ship Motion Among Waves	1-5
2nd	Random Variables and Spectral Analysis	6-10
3rd	Pierson - Moscowitz Wave Spectrum, Other Spectrums, Significant Wave Height, and Parameters of Irregular Real Waves	11-15
4th	Stochastic Analysis of Ship Motion Among Irregular Waves	16-20
5th	Analysis of Irregular Waves into Smaller Regular Waves	21-25
6th	Superposition Principle to Collect Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Sea Waves	26-30

7- ILOs Matrix Topics

Course topics	1st	2nd	3rd	4th	5th	6th
Course ILOs	Knowledge & Understanding					
a1-1-1 Identify the wave types.	x	x				
a1-1-2 Identify the surface wave theory.	x	x				
a2-2-1 Recognize how to simulate the dynamics of surface wave generation.	x	x				

a2-2-2 Identify the parameters that affect surface waves.	x	x				
a2-2-3 Investigate the dynamics of progressing and standing waves.	x	x				
a2-2-4 Describe the wave motion.	x	x				
Course ILOs	**Intellectual skills**					
b1-1-1 Investigate modern theories, and methods wave types and wave theory.			x	x		x
b1-1-2 Investigate and manipulate data from experiments and real see on surface wave generation.			x	x		x
b3-1-1 Evaluate the ability to analyze and solve problems on surface progressing waves.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1 prepare search reports for specific types of wave types.			x		x	x
c2-1-1 Prepare reports about surface waves generation.			x	x	x	x
c2-1-2 Practice the ability to distinguish between standing and progressing waves.			x	x	x	x
Course ILOs	**General and transferrable skills**					
d2-1 Apply course skills on surface waves generation and in career development.				x		x
d6-1 Practice in a team to complete report about surface wave.			x	x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				x								
	a1-1-2	x				x								
	a2-2-1	x				x								
	a2-2-2	x				x								
	a2-2-3	x				x								
	a2-2-4	x				x								
Intellectual Skills	b1-1-1		x						x					
	b1-1-2		x						x					
	b3-1-1		x						x					
Professional Skills	c1-1-1		x						x					
	c2-1-1		x						x					
	c2-1-2		x						x					
General and transferrable skills	d2-1		x						x	x				
	d6-1		x						x	x				

9- Assessment

9.1 Assessment Methods

Final- Written Exam.	To assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of References:

11.1Lecture Notes:

Prof. Dr. Mo’men Gaafary, "Surface Wave Dynamics”, Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt.

11.2Recommended Books:

1. Prof. Dr. Mo’men Gaafary, " Lecture Notes on Ship Motion Among Surface Waves”,
Department of Naval Architecture & Marine Engineering,
Faculty of Engineering, Port Said University, Egypt
Updated 2012.
2. J.P. Comstock, "Principals of Naval Architecture", SNAME Publications, 2012.
3. K. J. Rawson, E.C. Tupper, "Basic Ship Theory", Longman, 2009.
4. John Newman, “ Marine Hydrodynamics” Cambridge Press, 1980.

11.3 Key words for Internet Search: ***Surface waves, wave dynamics, progressing see waves, representation of wave motion by singularity distributions.***

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME 612
Course Specifications

Stochastic Analysis of Ship Motion Among Waves

Post Graduate Course Specification

Program on which the course is given	Naval Architecture &Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture &Marine Engineering
Department offering the course	Naval Architecture &Marine Engineering
Academic year/Level	M.Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Stochastic Analysis of Ship Motion Among Waves	**Code Symbol:** NME 612	
Lecture	**3 hours**	
Tutorial	**---------**	
Laboratory	**---------**	
Total	**3 hours**	
Full academic year	**Prerequisite**	**NME 510**

C- Professional Information

1- Course Aims:

Since the sea waves are irregular hence, the most suitable way to solve ship motion problems is through probability theory, statistical data, random process analysis, and through what is called stochastic process analysis. This course is important to some students of M.Sc. program, where it provides them with advanced knowledge about stochastic process of ship motion among waves. Also, it provides them with the principles of the random process analysis. Using spectrum analysis, e.g. Pierson – Moscowitz wave spectrum, significant wave heights can be determined. Also, all other irregular wave parameters can be determined for ocean waves. Students learn how to determine the ship motion amplitudes and other motion features due to ship navigation in irregular sea waves. Also, the course leads to apply the principle of superposition of an irregular wave into a group of smaller regular waves. Hence, the total influence on ship motions among irregular sea waves can be determined.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and computer science appropriate to their areas of specialization in Naval Architecture and/or Marine Engineering.	a1-1-1 Show the importance of ship motion among waves. a1-1-2 Identify ship motion random variables and spectral analysis.
A2- Mutual relation between professional aspects of professional practice and its effects on the Environment.	a2-2 Recognize the different effects of marine industries on the environment.	a2-2-1 Recognize how to apply Pierson - Moscowitz wave spectrum and other spectrums. a2-2-2 Identify the stochastic process of ship motion among irregular sea waves. a2-2-3 Show the possibilities of the analysis of irregular waves into smaller regular waves. a2-2-4 Describe the Superposition Principle to Collect the Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Waves.
B. Intellectual skills		
B1- Analyze and evaluate the information in the field of specialization, and relate it to solve problems.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to Naval Architecture and/or marine engineering.	b1-1-1 Analyze and solve problems on stochastic process of ship motion among irregular sea waves b1-1-2 Solve problems on the Analysis of Irregular Waves into Smaller Regular Waves. b1-1-3 Solve problems on the Superposition Principle to Collect the Total Effects of Smaller Regular Waves on Ship Motions due to

		Irregular Waves.
B3- Link and integrate diverse knowledge to solve professional problems.	b3-1 Analyze, interpret and manipulate data from a variety of sources and relate it to solve professional problems.	b3-1-1 Identify theories, and methods of ship motions among waves. b3-1-2 Identify ship motion random variables and spectral analysis. b3-1-3 Interpret Pierson - Moscowitz wave spectrum and other spectrums.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1Prepare reports about ship motion spectral and stochastic process of ship motion among irregular waves. c1-1-2 Practice the ability to apply superposition principle to collect the total effects of waves on ship motions.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report on the specific area of the marine industries.	c2-1-1 Prepare search reports for specific ship motions among regular and irregular waves.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.		d2-1 Apply course skills on surface waves generation and in career development.
D6- Lead a team in familiar professional context		d6-1 lead a team to complete report about ship motion among irregular waves.

3- Course Contents

No.	Topic	Total Hours	Contact hrs			Course ILOs Covered (By No.)
			Lec.	Tut.	Lab.	
1	Ship Motion Among Waves	15	15	-	--	a1-1-1, a1-1-2, b1-1-1, b1-1-2, b1-1-3, c1-1-1
2	Ship Motion Random Variables and Spectral Analysis	15	15	-	--	a1-1-1, a1-1-2, b1-1-1, b1-1-2, b1-1-3, c1-1-1, c1-1-2
3	Pierson - Moscowitz Wave Spectrum, Other Spectrums, Significant Wave Height, and Parameters of Irregular Real Waves	15	15	-	--	a2-2-1, a2-2-2, a2-2-3, a2-2-4, b1-1-1, b1-1-2, b1-1-3, c1-1-1, c1-1-2, d2-1
4	Stochastic Analysis of Ship Motion Among Irregular Waves	15	15	-	--	a2-2-1, a2-2-2, a2-2-3, a2-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d6-1
5	Analysis of Irregular Waves into Smaller Regular Waves	15	15			a2-2-1, a2-2-2, a2-2-3, a2-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d6-1
6	Superposition Principle to Collect Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Sea Waves	15	15	-	--	a2-2-1, a2-2-2, a2-2-3, a2-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d6-1
Total		90	90	-	--	

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2 D6

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disscretionry subjects**	**Total**
---	**15%**	**30%**	**35%**	**10**	**10**		**100%**

6- Course Topics.

Topic No.	Topic	Weeks
1st	1. Ship Motion Among Waves	1-5
2nd	2. Random Variables and Spectral Analysis	6-10
3rd	3. Pierson - Moscowitz Wave Spectrum, Other Spectrums, Significant Wave Height, and Parameters of Irregular Real Waves	11-15
4th	4. Stochastic Analysis of Ship Motion Among Irregular Waves	16-20
5th	5. Analysis of Irregular Waves into Smaller Regular Waves	21-25
6th	6. Superposition Principle to Collect Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Sea Waves	26-30

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Course ILOs	**Knowledge & Understanding**					
a1-1-1 Show the importance of ship motion among waves.	x	x				
a1-1-2 Identify ship motion random variables and spectral analysis.	x	x				
a2-2-1 Recognize how to apply Pierson - Moscowitz			x	x	x	x

wave spectrum and other spectrums.						
a2-2-2 Identify the stochastic process of ship motion among irregular sea waves			x	x	x	x
a2-2-3 Show the possibilities of the analysis of irregular waves into smaller regular waves.			x	x	x	x
a2-2-4 Describe the Superposition Principle to Collect the Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Waves.			x	x	x	x
Course ILOs	**Intellectual skills**					
b1-1-1 Analyze and solve problems on stochastic process of ship motion among irregular sea waves	x	x	x			
b1-1-2 Solve problems on the Analysis of Irregular Waves into Smaller Regular Waves.	x	x	x			
b1-1-3 Solve problems on the Superposition Principle to Collect the Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Waves.	x	x	x			
b3-1-1 Identify theories, and methods of ship motions among waves.				x	x	x
b3-1-2 Identify ship motion random variables and spectral analysis.				x	x	x
b3-1-3 Interpret Pierson - Moscowitz wave spectrum and other spectrums.				x	x	x
Course ILOs	**Professional and practical skills**					
c1-1-1Prepare reports about ship motion spectral and stochastic process of ship motion among irregular waves.		x	x	x	x	x
c1-1-2 Practice the ability to apply superposition principle to collect the total effects of waves on ship motions.		x	x	x	x	x
c2-1-1 Prepare search reports for specific ship motions among regular and irregular waves.	x					
Course ILOs	**General and transferrable skills**					
d2-1 Apply course skills on surface waves generation and in career development.			x			
d6-1 lead a team to complete report about ship motion among irregular waves.				x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x				x								
	a1-1-2	x				x								
	a2-2-1	x				x								
	a2-2-2	x				x								
	a2-2-3	x				x								
	a2-2-4	x				x								
Intellectual Skills	b1-1-1		x											
	b1-1-2		x											
	b1-1-3		x											
	b3-1-1		x											
	b3-1-2		x											
	b3-1-3		x											
Professional Skills	c1-1-1		x						x					
	c1-1-2		x						x					
	c2-1-1		x						x					
General and transferrable skills	d2-1		x						x	x				
	d6-1		x						x	x				

9- Assessment

9.1 Assessment Methods

Final- Written Exam.	To assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

10- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector - Computer Lab - Library.

A. laboratory Usage:

Students are expected to prepare and conduct some computer simulation assignments using computer labs.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of laboratory reports.

11- List of References:

11.1 Lecture Notes:

Prof. Dr. Mo’men Gaafary, "Surface Wave Dynamics” Department of Naval Architecture & Marine Engineering, Faculty of Engineering, Port Said University, Egypt Updated 2012.

11.2 Recommended Books:

1. J.P. Comstock, "Principals of Naval Architecture", SNAME Publications, 2012.
2. K. J. Rawson, E. C. Tupper, "Basic Ship Theory", Longman, 2009.
3. John Newman, “ Marine Hydrodynamics” Cambridge Press, 1994.
4. W. G. Price, R.E.D. Bishop, “Probabilistic Theory of Ship Dynamics”, John Wiley & Sons, New York, NY, USA, 1992.

11.3Key words for Internet Search:

Ship Motion, Regular and irregular Waves, Spectrum analysis of Ocean Waves, Stochastic Process of Ship Motion Among Irregular waves.

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

NME613
Marine Structural Reliability
Course Specification

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Naval Architecture and Marine Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: Marine Structural Reliability	**Code Symbol**: NME 613	
Lecture	3 hours	
Tutorial / Laboratory	--	
Total	3 hours	

B- Professional Information

1- Course Aims:

course gives the student knowledge and tools how to design marine structures with regard to limit state based approaches by means of probability and risk analysis approaches. A variety of simplistic and advanced methodologies are compared with objective to demonstrate their advantages and limitations. Realistic and typical examples for marine structures are used throughout the course in order to introduce the student to real examples with their challenges of complexity which require solid and well-motivated assumptions.

After finishing the course, the student will have good knowledge and understanding how a reliability analysis of a marine structure should be carried out. After completion of this course, the student should be able to:

- Carry out a reliability analysis of a part of a ship or an offshore structure,
- Understand and discuss the advantages and limitations using a FORM, SORM and other simulation method for probabilistic analysis,
- Critically evaluate and compare various design concepts with respect to reliability and safety measures.

2- Intended Learning Outcomes (ILOs)

A. Knowledge and understanding		
NAQAAE Academic Reference Standards (ARS)	**ILO's**	**Course ILO's**
A1. Theories, basics and specialized knowledge in the field of learning, as well as the subjects that affect his/her professional practice.	A1-4 Understand the theories, basics and specialized knowledge in the field of Naval Architecture and Ship and Design.	a1-4-1 Identify the basic statistics and probabilistic theory a1-4-2 Show the statistical distributions of functions and their properties

B. Intellectual skills		
B1. Define and analyze information in the field of specialization, and relate to them to solve problems.	b1-2 Interpret, analyze, and evaluate specific available information and relate it to the design of the required system.	b1-2-1 Select the statistical distribution appropriate to certain data.
B2- Solve specialized problems with lack of some data and variables, (incomplete data).	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with incomplete data) related to the specific field of research.	b2-1-1 Choose the appropriate reliability method to each problem.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Identify the limit state function.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice		d2-1 Use computer program to calculate reliability index

3- Course Contents

Topic	Total Hours	Contact hrs			Course ILOs Covered (By No.)
		Lec.	Tut.	Lab.	
1. Basic statistics and probabilistic theory	12	12	-	-	a1-4-1, a1-4-2
2. Probability density functions and distributions, statistical distributions and their properties.	12	12	-	-	a1-4-1, a1-4-2
3. Cornell safety index	12	12	-	-	b1-2-1, b2-1-1, d2-1
4. First order reliability methods (FORM).	12	12	-	-	b1-2-1, b2-1-1, d2-1
5. Second order reliability methods (SORM).	12	12	-	-	b1-2-1, b2-1-1, d2-1
6. Simulation methods (Monte Carlo).	12	12	-	-	b1-2-1, b2-1-1, d2-1
7. Reliability and risk analysis in limit states design	12	12	-	-	c1-1-1, d2-1
8. Ultimate strength limit state (ULS), design loads (strength)	6	6	-	-	c1-1-1, d2-1
Total	90	90			

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-4)	B1(b1-2), B2 (b2-1)	C1(c1-1)	D2

5- Course Subject Area:

A	**B**	**C**	**D**	**E**	**F**	**G**	
Humanities and Social Science	**Mathematics and Basic Sciences**	**Basic Engineering Science**	**Applied Engineering And Design**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**20%**	**---**	**80%**	**--**			**100%**

6.Course Topics.

Topic No.	Topic	Weeks
1st	Basic statistics and probabilistic theory vibration and monitoring equipments identifications	1-4
2nd	Probability density functions and distributions, statistical distributions and their properties	5-8
3rd	Cornell safety index	9-12
4th	First order reliability methods (FORM).	13-16
5th	Second order reliability methods (SORM).	17-20
6th	Simulation methods (Monte Carlo).	21-24
7th	Reliability and risk analysis in limit states design	25-28
8th	Ultimate strength limit state (ULS), design loads (strength)	29-30

6- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Course ILOs	**Knowledge & Understanding**							
a1-4-1 Identify the basic statistics and probabilistic theory	x	x						
a1-4-2 Show the statistical distributions of functions and their properties	x	x						

Course ILOs	Intellectual skills							
b1-2-1 Select the statistical distribution appropriate to certain data.			x	x	x	x		
b2-1-1 Choose the appropriate reliability method to each problem.			x	x	x	x		
Course ILOs	**Professional and practical skills**							
c1-1-1 Identify the limit state function.							x	x
	General and transferrable skills							
Course ILOs								
d2-1 Use computer program to calculate reliability index			x	x	x	x	x	x

7- <u>Teaching and Learning Method:</u>

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brainstorming**	**Projects**	**Report**	**Self learning**	**Cooperative**	**Discovering**	**Computer Simulation**	**Practical Experiments**
Knowledge & understanding	a1-4-1	x												
	a1-4-2	x												
Intellectual Skills	b1-2-1	x		x		x	x							
	b2-1-1	x		x		x	x							
Professional Skills	c1-1-1	x				x								
General and transferrable skills	d2-1	x				x								

8- <u>Assessment</u>

8.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, problem solving, and problem identification.

8.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	31
Total	100%	

9- Facilities required for teaching and learning

Class Room Equipped with Computer and Video Projector

A. laboratory Usage:

none.

B. Library Usage:

Students should be encouraged to use library.

10- List of references:

[1] Robert E. Melchers, "Structural Reliability Analysis and Prediction", ISBN: 978-0-471-98771-0-May 1999

[2] O. Ditlevsen , H. O. Madsen , "Structural Reliability Methods", ISBN 0471960861, 9780471960867.

[3]A Papanikolaou - Risk-Based Ship Design , 2009,ISBN:978-3-540-89041-6

11- Program Coordination Committee:

Course Coordinator: **Dr. Arwa Hussein**

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019

Course Specification

Program on which the course is given	Naval Architecture and Marine Engineering
Major or minor element of program	Major
Department offering the program	Naval Architecture and Marine Engineering
Department offering the course	Physics and Mathematical Engineering
Academic year/Level	M. Sc.
Date of specification approval	August 2019

A- Basic Information

Title: ***Applied Statistics and Probability***	**Code Symbol**: SCI 604	
Lecture	3 hours	
Tutorial / Laboratory	-	
Total	3 hours	Bylaw 2000

B- Professional Information

1- Course Aims:

This course is designed to provide basic concepts probability and statistical methods and their relevance in the engineering. Topics include the calculus of events, probability, random variables, distributions, Independence, moments, moment-generating functions, Conditional probability, Estimation Theory, Testing of hypotheses, Regression and Correlation.

2- Intended Learning Outcomes (ILOs) for the whole program

This course is designed to achieve the above objectives through the following Intended **Learning Outcomes (ILOs)**:

NAQAAE Academic Reference Standards (ARS)	Program ILOs	Course ILOs
A. Knowledge and understanding		
A1- Basic facts & theories in the field of mechanical design, and production.	a1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of mathematics and engineering science appropriate to their areas of specialization in marine engineering, so as to apply acquired knowledge in analysis, developing new engineering research. a1-2 Identify different equation, their properties and applications. a1-4 a Knowledge of engineering techniques, and Concept of solutions for any mathematical systems.	a1-1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of reinforcements of the finite element and finite difference methods. a1-2-1 Identify different types of the finite element and finite difference methods, their properties and applications. a1-4-1 a Knowledge of engineering the finite element and finite difference methods techniques.
A4- Basics and principles of quality in professional practice in the field of specialization.	a4-1 an understanding of variation formulation and approximation techniques for the engineering marine.	a4-1-1 an understanding of variational formulation and approximation techniques for the engineering techniques.
A5- The knowledge related to the impact of professional practice on the variational formulation of boundary-value problems.	a5-2 Recognize the Motivation and variational [or weak] formulation.	a5-2-1 Recognize the Motivation and variational [or weak] formulation.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem	b1-1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems

specialization, and relate it to solve problems and formulate theories.	solving) to solve problems related to marine engineering.	related to any branch.
B3- Perform research and studies to add to the accumulated knowledge.	b3-1 Write an research plain to conduct applied research.	b3-1-1 Write an research plain to conduct applied research by use finite element and finite difference methods.
B4- Write research papers.	b4-1 Compare and evaluate published articles and research concerning specified problem related to marine engineering.	b4-1-1 Compare and evaluate published articles and research concerning specified problem related to any branch.
B9-Performing conversations and discussions built on the basis of evidence and proofs.	b9-1 Manage discussions on basis of evidence and proofs	b9-1-1 Manage discussions on basis of evidence and proofs related to the finite element and finite difference methods.
C. Professional and practical skills		
C1- Master the basic as well as the latest professional skills in the field of specialization.	c1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools.	c1-1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools related to the finite element and finite difference methods.
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report on specialized related to the finite element and finite difference methods.	c.2-1-1 Write and evaluate a professional report on specialized related to the finite element and finite difference methods.
D. General and transferrable skills		
D1-Communicate effectively using all different methods	d1-1 Express professional and communication skills to innovate and to interact with the scientific community, research team and technocrats involved in multinational companies at global level in the related fields to marine	d1-1-1 Express professional and communication skills to innovate and to interact with the scientific community, research team and technocrats involved in multinational companies at global level in the related to the finite element and finite

	engineering.	difference methods.
D4- Use different sources to obtain knowledge and information.	d4-1 Apply self evaluation and specify his/her educational needs related marine engineering.	d4-1-1 Apply self evaluation and specify his/her educational needs related to the finite element and finite difference methods.
D7- Self evaluation and continuous learning.	d7-1 Apply self evaluation and specify his educational needs related marine engineering.	d7-1-1 Apply self evaluation and specify his educational needs related to the finite element and finite difference methods.

3- <u>Course Contents</u>

Lecture Topics	**Total Hours**	**Lecture Hours**	**Practical /Tutorial Hours**
1- An introduction to the finite element and finite difference methods.	**3**	**3**	--
2- Variational formulation and approximation (Notation – boundary and initial value problems – gradient and divergence theorems – functional).	**9**	**9**	--
3- Variational formulation of boundary- value problems (Motivation - variational [or weak] formulation).	**9**	**9**	--
4- Variational methods of approximation (the Ritz method – the method of Weighted Residuals- the Galerkin method - the Least squares method - the Collocation method- the Courant method – Time dependent problems).	**12**	**12**	--
5- Finite element analysis of one dimensional problems.	**6**	**6**	--
6- Finite element analysis of two dimensional problems.	**6**	**6**	--
7- Two dimensional Finite elements and interpolation functions.	**9**	**9**	--
8- Second order, multivariable equations.	**9**	**9**	--
9- Iso-parametric elements and numerical integration.	**6**	**6**	--
10- Computer implementation (general outline – input data – calculation of element matrices – assembly in a banded matrix form – imposition of boundary conditions – solution of equations	**15**	**15**	--

and postprocessing – applications of the computer program).			
Total	**84**	**84**	**--**

4- Relationship between the course and the programme

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Academic Program Standards that the course contributes in achieving.	A1 (a1-1, a1-2, a1-4), A4 (a4-1), A5 (a5-2)	B1 (b1-1), B3 (b3-1), B4 (b4-1), B9 (b9-1)	C1 (c1-1), C2 (c2-1)	D1 (d1-1), D4 (d4-1), D7 (d7-1)

5- Course Subject Area:

A	B	C	D	E	F	G	
Humanities and Social Science	Mathematics and Basic Sciences	Basic Engineering Science	Applied Engineering And Design	Applications	Projects and practice	Discretionary subjects	Total
5%	50%	20%		15%	10%		100%

6- Course Topics.

Topic No.	Topic	Weeks
1st	An introduction to the finite element and finite difference methods.	1
2nd	Variational formulation and approximation (Notation – boundary and initial value problems – gradient and divergence theorems – functional).	2-4
3rd	Variational formulation of boundary- value problems (Motivation - variational [or weak] formulation).	5-7
4th	Variational methods of approximation (the Ritz method – the method of Weighted Residuals- the Galerkin method - the Least squares method - the Collocation method- the Courant method – Time dependent problems).	8-11
5th	Finite element analysis of one dimensional problems.	12-13

6th	Finite element analysis of two dimensional problems.	14-15
7th	Two dimensional Finite elements and interpolation functions.	16 - 18
8th	Second order, multivariable equations.	19 - 21
9th	Iso-parametric elements and numerical integration.	22-23
10th	Computer implementation (general outline – input data – calculation of element matrices – assembly in a banded matrix form – imposition of boundary conditions – solution of equations and postprocessing – applications of the computer program).	24-28

7- ILOs Matrix Topics

Course topics	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**
Course ILOs	**Knowledge & Understanding**									
a1-1-1 Demonstrate sufficient essential knowledge and a deep understanding of the concepts and theories of reinforcements of the finite element and finite difference methods.		x	x	x						
a1-2-1 Identify different types of the finite element and finite difference methods, their properties and applications.		x								
a1-4-1 a Knowledge of engineering the finite element and finite difference methods techniques.	x									
a4-1-1 an understanding of variational formulation and approximation techniques for the engineering techniques.			x							
a5-2-1 Recognize the Motivation and variational [or weak] formulation.				x	x					
Course ILOs	**Intellectual Skills**									

b1-1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to any branch.	x	x	x		x	x	x	x	x	x
b3-1-1 Write an research plain to conduct applied research by use finite element and finite difference methods.		x		x						
b4-1-1 Compare and evaluate published articles and research concerning specified problem related to any branch.		x						x		
b9-1-1 Manage discussions on basis of evidence and proofs related to the finite element and finite difference methods.	x				x					
Course ILOs	**Professional Skill**									
c1-1-1 Express competence skills, such as identifying, formulating, analyzing, and creating engineering solutions, using latest engineering techniques, skills, and tools related to the finite element and finite difference methods.	x	x	x	x	x	x	x	x	x	x
c.2-1-1 Write and evaluate a professional report on specialized related to the finite element and finite difference methods.		x		x						
Course ILOs	**General Skills**									
d1-1-1 Express professional and communication skills to innovate and to interact with the scientific community, research team and technocrats involved in multinational companies at global level in the related to the finite element and finite difference methods.				x						
d4-1-1 Apply self evaluation and specify his/her educational needs related to the finite element and finite difference methods.		x		x		x	x			
d7-1-1 1 Apply self evaluation and specify his educational needs related to the finite element and finite difference methods.			x	x		x	x			

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		Teaching and Learning Method												
		Lecture	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Report	Self learning	Cooperative	Discovering	Computer Simulation	Practical Experiments
Knowledge & understanding	a1-1-1	x			x	x								
	a1-2-2	x												
	a1-4-1	x												
	a4-1-1	x												
	a5-2-1	x												
Intellectual Skills	b1-1-1				x	x								
	b3-1-1		x	x					x	x				
	b4-1-1		x	x					x	x				
	b9-1-1		x	x					x	x				
Professional Skills	c1-1-1				x	x								
	c2-1-1		x	x					x	x				
General Skills	d1-1-1													
	d4-1-1		x							x				
	d7-1-1		x							x				

9- Assessment

9.1 Assessment Methods

Final Written Examination : to assess students' knowledge, understanding, analysis, creativity, problem solving, and problem identification.

9.2 Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	100	30
Total	100%	

10- Facilities required for teaching and learning

Blackboard – Class Room Equipped with Computer and Video Projector.

A. laboratory Usage:

Students are expected to use computer lab in faculty workshops or others.

B. Library Usage:

Students should be encouraged to use library technical resources in the preparation of oral presentation. At least one oral presentation should involve a significant component of library research to encourage this component of study.

11- List of References:

Course book.

Essential Books (Text Books):

Applied Statistics and Probability for Engineers, **4th Ed. by Douglas C. Montgomery and George C. Runger. 2006. ISBN: 0-471-74589-8.**

12- Program Coordination Committee:

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

Programme coordinator: **Assoc. Prof. Dr. Moustafa Mohamed**

Head of the Department: **Assoc. Prof. Dr. Saad Bahey Eldeen**

Date: August 2019