Program Specification

For

Doctor of Philosophy Degree

In

Naval Architecture and Marine Engineering

Program Specifications

For Doctor of Philosophy Degree in

Naval Architecture and Marine Engineering

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

Program Specification

A- Basic Information

1- Program title: PhD, in Naval Architecture and Marine Engineering

2- Program type: Single ✓ 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:

Naval Architecture and Marine Engineering PhD program should prove that its graduates can collect and analyze data related to any problem in the field of Naval Architecture and Marine Engineering after representing it graphically and/or statistically. The graduates also should be acquired creative thinking skills and they should have the ability to develop appropriate and innovative solutions to address any engineering problem they may encounter in their field of specialization. Moreover, the graduates should be good users for the most popular commercial software in their field of specialization and they should be able to develop special computer codes to deal with any special issues. Also, the graduates should be able to adapt with the wide and rapid development of technology in the maritime field and they should have the ability to update and transfer what is appropriate of this technology to their workplace. Moreover, they should have the ability to take the appropriate decisions at the right time based on the evidence and proofs after an extensive study of the problem. Ultimately, the graduates should be acquired the skills of leadership, teamwork, effective communication, and continuous self-learning.

1- Graduate Attributes:

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

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 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.
N. Orientation to develop of methods, tools, and new techniques of professional practice.
O. Use of appropriate technology to serve professional applications.

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 a high-level complex problem, 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.
8. Develop of methods, tools and new techniques of professional practice and use of appropriate technology to serve professional applications.

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 problem, 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, D, 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.	L
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
8. Develop of methods, tools, and new techniques of professional practice and use of appropriate technology to serve professional applications.	O

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

Naval Architecture and Marine Engineering Ph.D. 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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D. thesis in the research field.	A, C, F, L	NME601, NME605, NME607, NME608, NME609, NME610, NME611, NME612, NME613
	a1-2 Understand the theories, basics and specialized knowledge in the field of ship hydrodynamics		NME602, NME603, NME610, Ph. D. Thesis
	a1-3 Understand the theories, basics and specialized knowledge in the field of structure and technology		NME604, Ph. D. Thesis
	a1-4 Understand the theories, basics and specialized knowledge in the field of naval architecture and ship design		NME605, NME612, Ph. D. Thesis
	a1-5 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.		NME602, NME606, NME607, NME608
A2- Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	K	NME601, NME602, NME605, NME609, NME610
	a2-2 Undertake aspects pertaining to intellectual property rights.		NME610, NME611, Ph. D. Thesis
A3- Ethical and legal principles of professional practice in the field of specialization	a3-1 Report ethnical and professional responsibility issues arising in the practice of the engineering profession.	K,N	NME604, NME606, NME610, Ph. D. Thesis
A4- Basics and principles of quality in professional practice in the field of specialization.	a4-1 Explain Quality Assurance concepts of different Computer and control components and systems development phases.	F, H, I, L	NME601, NME603, Ph. D. Thesis

	a4-2 Adopt cost-effective practice and resources allocation that does not compromise quality of service.		NME606, NME607, NME608, Ph. D. Thesis
A5- The knowledge related to the impact of professional practice on the Environment, and the work carried out for conservation and preservation.	a5-1 Discuss Social effects of computer and control technologies.	J	NME604, NME609, Ph. D. Thesis
	a5-2 Recognize the interaction between computer and control components and systems development phases technologies and surrounding environment		NME604, NME612, Ph. D. Thesis
B. Intellectual skills			
B1- Analyze and evaluate information in the field of specialization and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control engineering.	B, C,O	NME601, NME602, NME604, NME605, NME606, NME610, NME611, NME612
	b1-2 Interpret, analyze, and evaluate a given system specification information and relate it to the design of the required system.		NME601, NME603, NME607, NME608, NME613
B2- Solve specialized problems with available givens and parameters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering	B, C, E	NME602, NME603, NME606, NME609, NME613
B3- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	A, C, D, E, F	NME601, NME602, NME604, NME605, NME610, NME612
	b3-2 Perform applied research on industrial and societal concerns problems that add to the existing Naval Architecture and Marine Engineering field.		NME608, NME611, Ph. D. Thesis
B4- Write research papers.	b4-1 Write scientific article paper(s) covering an appropriate Naval	A, D, E, F	Ph. D. Thesis

	Architecture and Marine Engineering field		
B5- Assess risks in professional practice.	b5-1 Evaluate pros and cons of given methodologies Naval Architecture and Marine Engineering development.	J, K	Ph. D. Thesis
B6- Plan for performance development in the field of practice.	b6-1 Plan to guide progress in his / her professional career.	C, L, O	NME607, NME608, Ph. D. Thesis
B7- Take professional decisions in different practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development in Naval Architecture and Marine Engineering.	H	NME601, NME603, NME607, NME609, Ph. D. Thesis
B8- Be creative and innovative.	b8-1 Demonstrate creative and innovative thinking in problems solving, using latest engineering techniques, skills, and tools.	B, C, E, H	NME606, NME608, Ph. D. Thesis
B9-Performing conversations and discussions built on the basis of evidence and proofs	b9-1 Manage discussions on basis of evidence and proofs	K, L	NME609, NME613, Ph. D. 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	NME601, NME602, NME604, NME605, NME607, NME608, NME609, NME610, NME611, NME612, NME613
	c1-2 Provide practical and/or laboratory services that can help in solving problem related to Naval Architecture and Marine Engineering.		NME602, Ph. D. Thesis
	c1-3 Demonstrate practical/laboratory skills relevant to Naval Architecture and Marine Engineering.		NME602, Ph. D. Thesis
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	A, L	NME602, NME603, NME604, NME606, NME608, NME610, NME611, NME612
C3- Evaluate and development the means	c3-1 Evaluate methods and tools reported in a specified	A, E, F, H, I	NME601, NME607, Ph. D. Thesis

and tools available in the field of practice.	published article and researches related to Naval Architecture and Marine Engineering field.		
C4- Use technology to enhance professional practice.	c4-1 Express competence skills to use technology to advance practice	A, E, F	NME603, NME606, Ph. D. Thesis
C5- Plan for performance development in the field of practice and enhance performance of others	c5-1 Plan professional development courses to improve practice and enhance performance of juniors in the field of Naval Architecture and Marine Engineering.	A, E, F, H, I	NME609, Ph. D. Thesis
D. General and transferrable skills			
D1- Communicate effectively using all different methods	d1-1 Communicate effectively with the scientific community, research team and technocrats involved in multinational companies in the related fields to Naval Architecture and Marine Engineering	G	NME601, NME609, Ph. D. Thesis
D2- Use information technology to enhance his/her professional practice	d2-1 Use state-of-the-art computer aided design tools for solving Naval Architecture and Marine Engineering problems.	A, F, I, L	NME605, NME611, Ph. D. Thesis
	d2-2 Employ the information technology skills to serve his / her career development.		NME601, NME602, NME603, NME604, NME606, NME607, NME608, NME610, NME612, NME613
D3- Educating and evaluating others.	d3-1 Design standards to evaluate others performance.	G, K	NME602, Ph. D. Thesis
D4- Use different sources to obtain knowledge and information.	d4-1 Use different sources of information like library, internet access facilities, etc. to upgrade and enhance their conceptual knowledge.	C, L	NME606, NME609, Ph. D. Thesis
D5- Work as team leader as well as a member in larger teams	d5-1 Practice team working, and lead teams in specified professional jobs.	G	NME601, NME602, NME603, NME604, NME610, NME611, NME612
D6- Manage scientific meetings and appropriately	d6-1 Manage scientific meetings and appropriately	G, I	Ph. D. Thesis

utilize time.	utilize time.		
D7- Self evaluation and continuous learning.	d7-1 Express a strong foundation of continuous learning so they can maintain their technical competency.	L	NME609, Ph. D. Thesis
	d7-2 Seek continuous learning through continuous education, organizing and participating in seminars, workshops, national and international conferences.		Ph. D. Thesis

4- Program Academic Reference Standards (ARS)

The external references for standards considered in the development of this program were the Academic Reference Standards (ARS) for postgraduate programs prepared by the 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.

5- Program Structure and Contents:

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

5.2 Program Structure:

Awarding a Ph. D. Degree in Naval Architecture and Marine Engineering required the study of courses amounting to 12 hours weekly for one academic year. These 12 hours constitute specialized courses are selected by the supervision team and approved by the department council. These courses are chosen from among the 600 – level and are directly related to the topic of his research. Also, required for awarding the Ph..D. Degree in Naval Architecture and Marine Engineering is the execution of scientific research that terminated by writing a thesis containing the research results and its complete analysis and defending it successfully.

5.3 Program Contents (Courses):

- **Specialized Requirements Courses*:**

Code No.	Course Title	No. of hours /week			Marks Written Exam
		Lect.	Tut.	Lab.	
NME 601	Marine Systems Economics	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 four courses related to the research topic.

6- 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.

7- Program Matrix:

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

Program Matrix: ILO's (Ph. D. program) – Course (main ILOs) matrix.

Code	Course Title	a1-1	a1-2	a1-3	a1-4	a1-5	a2-1	a2-2	a3-1	a4-1	a4-2	a5-1	a5-2	b1-1	b1-2	b2-1	b3-1	b3-2	b4-1	b5-1	b6-1	b7-1	b8-1	b9-1	c1-1	c1-2	c1-3	c2-1	c3-1	c4-1	c5-1	d1-1	d2-1	d2-2	d3-1	d4-1	d5-1	d6-1	d7-1	d7-2
NME 601	Marine Systems Economics	x					x			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						x	x		x			
NME 603	Ship Performance		x							x					x	x						x						x		x				x			x			
NME 604	Ship Construction (2)			x					x			x	x	x			x								x			x						x			x			
NME 605	Ship structural design (2)	x			x		x							x			x								x								x							
NME 606	Pollution of Marine environment (2)					x			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 Power Systems	x				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			x			x		
NME 610	Ocean Engineering Dynamics	x	x				x	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			x			
NME 613	Marine Structural Reliability	x													x	x								X	x									x						
---	Ph. D. Thesis		x	x	x			x	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

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	Ph. D.
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Define the economical abbreviations applicable to marine engineering fields. a1-1-2 Explain the elements of marine transport tasks and documentations, and containerization activities. a1-1-3 Identify the time value of cash flow .
A2- Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	a2-1-1 Recognize the different approaches in ship design. a2-1-2 Recognize the elements of ship construction costs and overheads
A4- Basics and principles of quality in professional practice in the field of specialization.	a4-2 Adopt cost-effective practice and resources allocation that does not compromise quality of service.	a4-2-1 Identify the feasibility of engineering projects. a4-2-2 Investigate different alternatives in ship design and operation a4-2-3 Estimate the optimum life, optimum speed, permissible price and operation constraints of ships .
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control 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 a given system specification 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 Estimate the costs of building a ship.

B3- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	b3-1-1 Compare and evaluate the data given by specialized institutions concerning ship operation.
B7- Take professional decisions in different practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development in Naval Architecture and Marine Engineering.	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 and development the means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches related to Naval Architecture and Marine Engineering field.	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 different methods	d1-1 Communicate effectively with the scientific community, research team and technocrats involved in multinational companies in the related fields to Naval Architecture and Marine Engineering	d1-1-1 Communicate effectively with any person or society to get the recent information related to ship economy.
D2- Use information technology to enhance his/her professional practice.	d2-2 Employ the information technology skills to serve his / her career development.	d2-2-1 Search for statistical information about expenses of operating ships and rates of escalation
D5- Work as team leader as well as a member in larger teams.	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 Lead a team to complete an accurate project.

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, a2-1-1, b1-1-1, b7-1-1, d1-1-1, d2-2-1
Economic Criteria for Design and Operation Profitability of ships before and after Tax	9	9	--	--	a1-1-3, b1-2-1 b7-1-1
Profitability of ships before and after Tax	6	6	--	--	a4-2-1, a4-2-2, d2-2-1
Computer Aided Ship Design Economics , Optimum Speeds ,Economical Life and Permissible Price of Ships	9	9	--	--	a2-1-1, a4-2-3, c1-1-1, c3-1-2, d5-1-1,
Estimation of Cost of Building and Operating Ships	6	6	--	--	a1-1-2, a2-1-2, a4-2-2, b1-2-3
Optimum Life and Replacement Analyses, Optimum life in case of borrowed capitals.	9	9	--	--	a4-2-1, a4-2-3, b1-2-1,c3-1-1
Permissible Price of Ships , permissible price of ships in case of borrowed capitals	9	9	--	--	a2-1-2, a4-2-3
Relative costs of ship design parameters	6	6	--	--	b1-2-3, b7-1-1
Economy propellers for reduced power operation	3	3	--	--	b3-1-1, c1-1-2, c3-1-2
Feasibility of larger diameter propellers in ballast trips	6	6	--	--	a4-2-1, b1-2-2, d1-1-1, d5-1-1
Designing ships for fuel economy	6	6	--	--	a4-2-2, b1-1-1, b3-1-1, c1-1-2
Priorities for reducing fuel bill	3	3	--	--	b1-1-1, b3-1-1, 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, a4-2-2, b1-1-1, d1-1-1, d2-2-1
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(a2-1), A4(a4-1)	B1(b1-1), (b1-2) B3(b3-1), B7(b7-1)	C1(c1-1) C3(c3-1)	D1(d1-1) D2(d2-2) D5(d5-1)

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**	**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											
a2-1-1	x			x									
a2-1-2					x		x						
a4-2-1			x			x				x			
a4-2-2			x		x						x		x
a4-2-3				x		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					
b3-1-1									x		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**												
d1-1-1	x									x			x
d2-2-1	x		x										x
d5-1-1				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			x	x								
	a1-1-2	x			x	x								
	a1-1-3	x			x	x								
	a2-1-1	x			x	x								

	a2-1-2	x			x	x								
	a4-2-1	x			x	x								
	a4-2-2	x			x	x								
	a4-2-3	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									
	b3-1-1	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	d1-1-1	x												
	d2-2-1	x												
	d5-1-1	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- 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

NME602
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	Ph. D.
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. Also it provides them with information about powering of ships, propulsion efficiency, cavitation, wake fraction and thrust deduction factor 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. 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.	a1-2 Understand the theories, basics and specialized knowledge in the field of ship hydrodynamics.	a1-2-1 Identify the different theories of ship propeller. a1-2-2 Identify the interaction between ship's hull, propeller and rudder. a1-2-3 Identify the propeller/engine compatibility, and propeller performance.
	a1-5 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-5-1 Identify the components of marine propulsion systems. a1-5-2 Recognize the principles of powering and efficiencies.
A2- Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	a2-1-1 Recognize the properties of optimum & safe propeller. a2-1-2 Categorize conventional & non-conventional propulsion devices. a2-1-3 Outline how to design a marine propeller
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control 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 available givens and paraeters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering.	b2-1-1 Determine the powering requirements and efficiencies of a ship propeller.

B3- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	b3-1-1 Compare and classify design charts to design a propeller. b3-1-2 Investigate propeller performance through model test results.
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.
	c1-2 Provide practical and/or laboratory services that can help in solving problem related to Naval Architecture and Marine Engineering.	c1-2-1 Evaluate the propeller performance through model test.
	c1-3 Demonstrate practical/laboratory skills relevant to Naval Architecture and Marine Engineering.	c1-3-1 Design optimum, free of cavitation propeller for a specific ship.
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	c2-1-1 Prepare search reports for specific types of nonconventional Propellers.
D. General and transferrable skills		
D2- Use information technology to enhance his/her professional practice.	d2-2 Employ the information technology skills to serve his / her career development.	d2-2-1 Apply course skills in career development.
D3- Educating and evaluating others.	d3-1 Design standards to evaluate others performance.	d3-1-1 conduct model test and record the results.
D5- Work as team leader as well as a member in larger teams.	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 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	--	--	a1-2-1, a2-1-3, b1-1-2
Conventional Propellers – Report on Types, Use, Components,…etc.	9	9	--	--	a1-5-1, a2-1-2 d2-2-1
Propeller Action, Arrangement, Configuration, …etc.	12	12	--	--	b1-1-1, d2-2-1
Powering of Ships and Interaction between Hull, Propeller, and Rudder	12	12	--	--	a1-2-2, a1-5-2, b2-1-1, c1-1-2
Open Water and Cavitation/Wind Tunnel Propeller Model Tests	9	9	--	--	a2-1-1, b3-1-2, c1-2-1, d3-1-1, d5-1-1
Design of a Marine Screw Propeller Using Standard Series and Computer Applications	9	9	--	--	a2-1-3, b1-1-2, b3-1-1, c1-1-1, c1-3-1, d5-1-1
Propeller Cavitation	6	6	--	--	a2-1-1, b2-1-1, c1-3-1
Non-Conventional Propulsion Devices – Report on Types, Use, Components,…etc.	9	9	--	--	a1-5-1, a2-1-2, c2-1-1
Propeller Performance and Propeller Caused Vibration	6	6	--	--	a1-2-3, a2-1-1, b3-1-2, c1-1-2
Propeller/Engine Compatibility, and Ship Energy Conservation	9	9	--	--	a1-2-3, d5-1-1
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(a1-2), (a1-5) A2(a2-1)	B1(b1-1), B2(b2-1), B3(b3-1)	C1(c1-1), (c1-2),(c1-3) C2(c2-1)	D2(d2-2), D3(d3-1) D5(d5-1)

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**
-----	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**									
a1-2-1	X									
a1-2-2				X						
a1-2-3									X	X
a1-5-1		X						X		
a1-5-2				X						
a2-1-1					X		X		X	
a2-1-2		X						X		
a2-1-3	X					X				
Course ILOs	**Intellectual skills**									
b1-1-1			X							
b1-1-2	X					X				
b2-1-1				X			X			
b3-1-1						X				
b3-1-2					X				X	
Course ILOs	**Professional and practical skills**									
c1-1-1						X				
c1-1-2				X					X	
c1-2-1					X					
c1-3-1						X	X			
c2-1-1								X		
Course ILOs	**General and transferrable skills**									
d2-2-1		X	X							
d3-1-1					X					
d5-1-1					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
Knowledge & understanding	a1-2-1	x			x	x								
	a1-2-2	x			x	x								
	a1-2-3	x			x	x								
	a1-5-1	x			x	x								
	a1-5-2	x			x	x								
	a2-1-1	x			x	x								
	a2-1-2	x			x	x								
	a2-1-3	x			x	x								
Intellectual Skills	b1-1-1	x			x	x								
	b1-1-2	x			x	x								
	b2-1-1	x			x	x								
	b3-1-1	x			x	x								
	b3-1-2	x			x	x								
Professional Skills	c1-1-1	x			x	x								
	c1-1-2	x			x	x								
	c1-2-1	x			x	x								
	c1-3-1	x			x	x								
	c2-1-1	x			x	x								
General Skills	d2-2-1								x					
	d3-1-1								x					
	d5-1-1								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.

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- 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 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	Ph.D degrees
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 other related subjects.	a1-2 Understand the theories, basics and specialized knowledge in the field of ship hydrodynamics.	a1-2-1 Outline the different resistance and powering calculation methods. a1-2-2 Outline propeller design theories.

A4- Basics and principles of quality in professional practice in the field of specialization.	a4-1 Explain Quality Assurance concepts of different Computer and control components and systems development phases.	a4-1-1 Outline the different types and the procedures of conducting sea trials for ships. a4-1-2 Identify the power penalty due to hull and propeller roughness.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-2 Interpret, analyze, and evaluate a given system specification 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 available givens and parameters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering	b2-1-1 Design B-type marine propellers. b2-1-2 Predict ship performance for ships in service.
B7- Take professional decisions in different practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development in Naval Architecture and Marine Engineering.	b7-1-1 Create sea trials data sheet. b7-1-2 Assess the power penalty due to hull and propeller roughness.
C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	c2-1-1 Prepare technical report for the results of sea trials. c2-1-2 Prepare a scientific report on engine performance.
C4- Use technology to enhance professional practice.	c4-1 Express competence skills to use technology to advance practice	c4-1-1 Conduct seminars on natural gas powered vessels. c4-1-2 Conduct measurements for typical replica of hull and propeller surfaces, using surface measure instrument.
D. General and transferrable skills		
D2- Use information technology to enhance his professional practice	d2-2 Employ the information technology skills to serve his career development	d2-2-1 Conduct seminars on natural gas powered vessels.
D5- Work as team leader as well as a member in larger teams.	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 Conduct of ship sea trials and awareness of related equipment.

3-

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, c4-1-2
Hull and Propeller Roughness	12	12	-	-	a1-2-1, a1-2-2, a4-1-2, b1-2-1, b1-2-2, b7-1-2, c4-1-2
Power Penalty and speed loss	6	6	-	-	a1-2-1, a4-1-2, b7-1-1, b7-1-2
Modern propulsion Systems and sea trails	12	12	-	-	a4-1-1, c2-1-1, c2-1-2, d5-1-1
Speed loss due to wind and waves	12	12			d5-1-1, b7-1-1, b7-1-2
performance of Tug boats	6	6			b1-2-2, c2-1-2
Application of Natural Gas in marine field	12	12			b2-1-2, c4-1-1, d2-2-1
The effect shallow waters on ship performance	6	6			a4-1-1, b2-1-2, 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),A4(a4-1)	B1(b1-2), B2(b2-1), B7(b7-1)	C2(c2-1), C4(c4-1)	D2(d2-2) D5(d5-1)

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
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						
a4-1-1						X				X
a4-1-2				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	

b7-1-1					X		X			
b7-1-2				X	X		X			
Course ILOs	**Professional and practical skills**									
c2-1-1						X				
c2-1-2	X					X		X		X
c4-1-1									X	
c4-1-2			X	X						
Course ILOs	**General and transferrable skills**									
d2-2-1									X	
d5-1-1						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												
	a4-1-1	x							x					
	a4-1-2	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												
	b7-1-1	x												
	b7-1-2	x												
	c2-1-1	x				x			x					
Professional Skills	c2-1-2	x												
	c4-1-1	x												
	c4-1-2	x												
General and transferrable skills	d2-2-1	x				x								
	d5-1-1	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- 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

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	Ph. D.
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 other related subjects.	a1-3 Understand the theories, basics and specialized knowledge in the field of structure and technology.	a1-3-1 Recognize the construction materials used, e.g. steel, aluminum, GRP, HTS and differentiate between their applications.

A5- The knowledge related to the impact of professional practice on the Environment, and the work carried out for conservation and preservation.	a5-1 Discuss Social effects of computer and control technologies.	a5-1-1 Define the construction criteria related to different types of marine vessels.
	a5-2 Recognize the interaction between computer and control components and systems development phases technologies and surrounding environment	a5-2-1 Investigate the structural connections related problems onboard ships.
A3- Ethical and legal principles of professional practice in the field of specialization.	a3-1 Report ethnical and professional responsibility issues arising in the practice of the engineering profession.	a3-1-1Recognize the classification societies' rules set for building and maintaining ships (sea-going and inland).
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control engineering.	b1-1-1 Demonstrate an investigatory approach for detecting problems sources.
B3- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	b3-1-1 Evaluate 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.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	c2-1-1 Prepare a professional technical report for construction of a special vessel.

D. General and transferrable skills		
D2- Use information technology to enhance his/her professional practice.	d2-2 Employ the information technology skills to serve his / her career development.	d2-2-1 Apply course skills in career development.
D5- Work as team leader as well as a member in larger teams.	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 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, a3-1-1 a5-1-1, a5-2-1
2. Hull structural Vibrations	12	12	--	--	a1-3-1, a3-1-1 a5-1-1, a5-2-1
3. Shafting and Propeller Vibrations	15	15	--	--	b1-1-1, c1-1-1, c2-1-1, d5-1-1
4. Hull- Propeller- Engine foundation compatibly	15	15	--	--	b1-1-1, b3-1-1, c2-1-1, d2-2-1, d5-1-1,
5. Vibration monitoring analysis theory and its characteristics	18	18	--	--	b3-1-1, c1-1-1, c2-1-1, d5-1-1
6. Vibration limits and criteria	18	18	--	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1, d2-2-1, d5-1-1
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(a1-3), A3(a3-1), A5(a5-1), (a5-2)	B1(b1-1), B3(b3-1)	C1(c1-1) C2(c2-1)	D2(d2-2) D5(d5-1)

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**	**Computer Applications and ICT**	**Projects and practice**	**Disccretionry subjects**	**Total**
---	**---**	**30%**	**70%**	**--**			**100%**

6- Course Topics

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				
a3-1-1Recognize the classification societies' rules set for building and maintaining ships (sea-going and inland).	x	x				
a5-1-1 Define the construction criteria related to different types of marine vessels.	x	x				
a5-2-1 Investigate the 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
b3-1-1 Evaluate 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**					
d2-2-1 Apply course skills in career development.				x		x
d5-1-1 Lead a team to complete an accurate proposed project.			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	a1-3-1	x												
	a3-1-1	x				x								
	a5-1-1	x				x								
	a5-2-1	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	d2-2-1		x							x				
	d5-1-1		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	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.

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	Ph. D.
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph. D thesis in the research field.	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
	a1-4 Understand the theories, basics and specialized knowledge in the field of naval architecture and ship design	a1-4-1 Show the theories and basics of ship structural design.

A2-Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	a2-1-1 Recognize the appropriate acceptance criteria according to Rules
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control 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- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	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 enhance his/her professional practice	d2-1 Use state-of-the-art computer aided design tools for solving Naval Architecture and Marine Engineering problems.	d2-1-1 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, a1-4-1, b1-1-1, c1-1-1
2- Theory of plasticity	12	12			a1-1-2, a1-4-1, c1-1-1
3- Limit state analysis	12	12	-	--	a1-1-2, a2-1-1, b1-1-1, b3-1-1, d2-1-1
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, a1-4-1, a2-1-1, 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, a1-4-1, 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), (a1-4) A2 (a2-1)	B1 (b1-1), B3 (b3-1)	C1 (c1-1)	D2 (d2-1)

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**	**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	
a1-4-1 Show the theories and basics of ship structural design.	x	x			x		x
a2-1-1 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**						
d2-1-1 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	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								
	a1-4-1	x				x								
	a2-1-1	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	Ph. D.
Date of specification approval	August 2019

A- Basic Information

Title: Marine Environment pollution (2)	**Code Symbol**: NME606	
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 other related subjects.	a1-5 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-5-1 Identify sources of marine pollution and search for all the marine pollution hazards from the available references.

		a1-5-2 Show information about the available methods for tretment of marine pollution. a1-5-3 Outline the required procedures to prenent marine pollution accidents.
A3- Ethical and legal principles of professional practice in the field of specialization	a3-1 Report ethical and professional responsibility issues arising in the practice of the engineering profession.	a3-1-1 Show how to write a report for marine pollution accident. a3-1-2 List the most important requirement form the IMO and classification societies for preventing marine pollution.
A4- Basics and principles of quality in professional practice in the field of specialization.	a4-2 Adopt cost-effective practice and resources allocation that does not compromise quality of service.	a4-2-1 Outline how to calculate the cost of removing pollution after an accident and the required penalties.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-2 Interpret, analyze, and evaluate a given system specification 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 available givens and parameters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering	b2-2-1 Predict the safety equipment and control methods for different marine pollution accidents.
B8- Be creative and innovative.	b8-1 Demonstrate creative and innovative thinking in problems solving, using latest engineering techniques, skills, and tools.	b8-1-1 Discuss the innovated methods of fighting pollution b8-1-2 Identify the new areas in the ship which cause marine pollution

C. Professional and practical skills		
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	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.
C4- Use technology to enhance professional practice.	c4-1 Express competence skills to use technology to advance practice	c4-1-1 Use satellites to define the path of oil spill to know the source of pollution. c4-1-2 Identify the environmental effects which affect the marine pollution
D. General and transferrable skills		
D2- Use information technology to enhance his professional practice	d2-2 Employ the information technology skills to serve his career development	d2-2-1 Use computer program to calculate all the amount of spilled oil and the economical cost of treatment.
D4- Use different sources to obtain knowledge and information.	d4-1 Use different sources of information like library, internet access facilities, etc. to upgrade and enhance their conceptual knowledge.	d4-1-1 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	-	-	a1-5-1, a1-5-3, a3-1-2, a4-2-1, d2-2-1, d4-1-1
IMO requirements regarding marine environment protection	6	6	-	-	a1-5-1, a1-5-2, b1-2-1, b8-1-2, c4-1-1, d2-2-1
Requirements of classification societies	9	9	-	-	a1-5-3, a3-1-1, a3-1-2, a4-2-1, b1-2-2, b2-2-1, d4-1-1
Marine pollution fighting	12	12	-	-	a1-5-2, b1-2-2, b1-2-3, b1-2-3, b2-2-2, d4-1-1

Skimming units	9	9	-	-	b8-1-2, c4-1-1, d2-2-1, d4-1-1
Chemical and mechanical methods of fighting pollution	9	9	-	-	a3-1-1, b1-2-1, b2-2-1, c4-1-2, d4-1-1
Collision of ships as a source of pollution	12	12	-	-	a1-5-1, c2-1-1, c4-1-1
Grounding of ships and rescue	9	9	-	-	b8-1-1, c4-1-1, c4-1-2, d2-2-1, d4-1-1
Ship stability due grounding	12	12	-	-	b2-2-1, c2-1-1, c4-1-1
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(a1-5), A3(a3-1), A4(a4-2)	B1(b1-2), B2(b2-1), B8(b8-1)	C2(c2-1), C4(c4-1)	D2(d2-2), D4(d4-1)

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	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**								
a1-5-1	x	x					x		
a1-5-2		x		x					
a1-5-3	x		x						
a3-1-1		x			x				
a3-1-2	x		x						
a4-2-1	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
b8-1-1							x		
b8-1-2		x			x				
Course ILOs	**Professional and practical skills**								
c2-1-1							x		x
c4-1-1		x			x		x	x	x
c4-1-2						x		x	
Course ILOs	**General and transferrable skills**								
d2-2-1	x	x			x			x	
d4-1-1	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	a1-5-1	x		x					x					
	a1-5-2	x		x					x					
	a1-5-3	x		x										
	a3-1-1	x		x										
	a3-1-2	x		x					x					
	a4-2-1	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										
	b8-1-1	x		x										
	b8-1-2	x		x										
Professional Skills	c2-1-1	x		x		x			x					
	c4-1-1	x		x										
	c4-1-2	x		x										
General and transferrable skills	d2-2-1					x								
	d4-1-1													

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 Hegazy

- **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. Dr. 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	Ph.D degrees
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Classify different types of marine power stations.
	a1-5 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-5-1 Show the required steps to calculate and design the marine transmission parameters and shaft alignment.
A4- Basics and principles of quality in professional practice in the field of specialization.	a4-2 Adopt cost-effective practice and resources allocation that does not compromise quality of service.	a4-2-1 Outline the charcteristics of power transmission systems.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-2 Interpret, analyze, and evaluate a given system specification 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 practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development in Naval Architecture and Marine Engineering.	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 and development the means and tools available in the field of practice.	c3-1 Evaluate methods and tools reported in a specified published articles and researches related to Naval Architecture and Marine Engineering field.	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 enhance his professional practice	d2-2 Employ the information technology skills to serve his career development	d2-2-1 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, a1-5-1, a4-2-1, 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, a1-5-1, d2-2-1
Marine transmission and shaft alignment	15	15	-	-	a1-5-1, a4-2-1, b1-2-1, b7-1-1
Inspection and control in marine equipment	15	15	-	-	b1-2-1, b6-1-1, b7-1-1, d2-2-1
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), (a1-5), A4(a4-2)	B1(b1-2), B6(b6-1), B7(b7-1)	C1(c1-1), C3(c3-1)	D2(d2-2)

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	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		
a1-5-1	x			x	x	
a4-2-1				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**					
d2-2-1				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	a1-1-1	x							x					
	a1-5-1	x							x					
	a4-2-1	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	d2-2-1	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- 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	Ph.D.
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Classify different types of marine power stations. a1-1-2 Outline the design process of the heat exchanger and piping systems
	a1-5 Understand the theories, basics and specialized knowledge in the field of Marine Engineering.	a1-5-1 Show how to calculate the energy and power of marine systems.
A4- Basics and principles of quality in professional practice in the field of specialization.	A4-2 Adopt cost-effective practice and resources allocation that does not compromise quality of service.	a4-2-1 Show the charcteristics and fuction of different safety equipment systems.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-2 Interpret, analyze, and evaluate a given system specification 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- Perform research and studies to add to the accumulated knowledge.	b3-2 Perform applied research on industrial and societal concerns problems that add to the existing Naval Architecture and Marine Engineering field.	b3-2-1 Select 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.
B8- Be creative and innovative.	b8-1 Demonstrate creative and innovative thinking in problems solving, using latest engineering techniques, skills, and tools.	b8-1-1 Design the machinery systems and improve the waste heat recovery 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 identify the limit state function.
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	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	d2-2 Employ the information technology skills to serve his career development	d2-2-1 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, b8-1-1, d2-2-1
Retaining wasted energy	12	12	-	-	a1-5-1, b6-1-1, b8-1-1
Calculation of energy and power	12	12	-	-	b3-2-2, c1-1-1
Design of heat exchangers	12	12	-	-	a1-1-2, b6-1-1, b8-1-1, d2-2-1
Design of piping systems and materials	12	12	-	-	b3-2-2, b6-1-1, c2-1-1, d2-2-1
Safety equipment	9	9	-	-	a4-2-1, b3-2-1, c1-1-1
Purifiers and purification	12	12	-	-	b3-2-1, b8-1-1
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	Professional Skills	General Skills
Programme Academic Standards that the course contribute in achieving	A1(a1-1), (a1-5), A4(a4-2)	B1(b1-2),B3(b3-2), B6(b6-1), B8(b8-1)	C1(c1-1), C2(c2-1)	D2(d2-2)

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.

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

Course Contents

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				
a1-5-1		x						
a4-2-1						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	
b8-1-1	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**							
d2-2-1	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					
	a1-5-1	x							x					
	a4-2-1	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												
	b8-1-1	x												
Professional Skills	c1-1-1	x				x			x					
	c2-1-1	x												
General and transferrable skills	d2-2-1	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. 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	PhD
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Show 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- Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	a2-1-1 Identify the momentum integral equation and the velocity profile of 2-dimensional flow.
A5- The knowledge related to the impact of professional practice on the Environment, and the work carried out for conservation and preservation.	a5-1 Discuss Social effects of computer and control technologies.	a5-1-1 Identify the solution of boundary layer equations and its application on ships and propellers.
B. Intellectual skills		
B2- Solve specialized problems with available givens and parameters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering	b2-1-1 Apply the boundary layer equations on ships and propellers.
B7- Take professional decisions in different practical contexts.	b7-1 Acquire decision making capabilities in different situation when facing problems related to analysis, design and development in Naval Architecture and Marine Engineering.	b7-1-1 Identify the boundary layer characteristics.
B9-Performing conversations and discussions built on the basis of evidence	b9-1 Manage discussions on basis of evidence and proofs	b9-1-1 Determine drag of flat plate and airfoil.
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
C5- Plan for performance development in the field of practice and enhance performance of others	c5-1 Plan professional development courses to improve practice and enhance performance of juniors in the field of Naval Architecture and Marine Engineering.	c5-1-1 Solve boundary layer equations and its application on ships and propellers.

D. General and transferrable skills		
D1- Communicate effectively using all different methods	d1-1 Communicate effectively with the scientific community, research team and technocrats involved in multinational companies in the related fields to Naval Architecture and Marine Engineering	d1-1-1 Apply the gained knowledge to determine the hydrodynamic characteristic of boundary layer.
D4- Use different sources to obtain knowledge and information.	d4-1 Use different sources of information like library, internet access facilities, etc. to upgrade and enhance their conceptual knowledge.	d4-1-1 Collect data to Review the equations of boundary layer for laminar and turbulent flow on smooth and rough surfaces.
D7- Self evaluation and continuous learning.	d7-1 Express a strong foundation of continuous learning so they can maintain their technical competency.	d7-1-1 Prepare reports & presentation for relevent subject

3- Course Contents

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	-	-	a2-1-1, b9-1-1
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	-	-	a5-1-1, c 1-1-1, c1-1-2, c5-1-1, d 5-1-1, d7-1-1
Estimate drag force for flat plate by using boundary theory, applicable to propellers	12	12	-	-	d1-1-1, d5-1-1, d7-1-1
application on ships and propellers	6	6	-	-	b7-1-1, d1-1-1

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) A5(a5-1)	B2 (b2-1) B7(b7-1) B9(b9-1)	C1(c1-1) C5(c5-1)	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	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 propellers	**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					
a5-1-1						X		
Course ILOs	**Intellectual skills**							
b 2-1-1		X		X				
b 7-1-1				X				X
b 9-1-1			X					
Course ILOs	**Professional and practical skills**							
c 1-1-1						X		
c1-1-2					X	X		
c 5-1-1						X		
Course ILOs	**General and transferrable skills**							
d 1-1-1							X	X
d5-1-1						X	X	
d7-1-1						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	**a 1-1-1**	x												
	a 1-1-2	x												
	a 2-1-1	x												
	a 5-1-1	x												
Intellectual Skills	**b 2-1-1**	x		x										
	b 7-1-1	x		x										
	b 9-1-1	x		x										

		c 1-1-1	x												
	Professional Skills	**c 1-1-2**	x												
		c 5-1-1	x												
		d 1-1-1	x												
	General and transferrable skills	**d5-1-1**	x												
		d7-1-1	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

- 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	Ph. D.
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D. thesis in the research field.	a1-1-1 Define the equations of fluid motion. a1-1-2 Define the equations of fluid continuity, stability, and diffusion.
A2- Basics, methodologies and ethics of scientific research and its different tools.	a2-1 Recognize Basics, methodologies and ethics of scientific research and its different tools.	a2-1-1 Identify the properties of sea water, and balance of air and sea water. And categorize current forces and motion.
	a2-2 Undertake aspects pertaining to intellectual property rights.	a2-2-1 Describe the dynamics of friction and frictionless current motion.
A3- Ethical and legal principles of professional practice in the field of specialization	a3-1 Report ethnical and professional responsibility issues arising in the practice of the engineering profession.	a3-1-1 Show the dynamics of sea tides, tide forces and effects.
B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control 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- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	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.
C2- Write and evaluate technical and professional reports.	c.2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	c2-1-1 Prepare search reports about physical and theoretical Geostrophic current flows. Investigate the dynamics of sea tides, tide forces and effects.
D. General and transferrable skills		
D2- Use information technology to improve his/her professional practice.	d2-2 Employ the information technology skills to serve his / her career development.	d2-2-1 Apply course skills in career development.
D5- Work in a team and apply time management.	d5-1 Practicing team work in specified professional jobs.	d5-1-1 lead a team to complete an accurate design.

3- Course Contents

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, a3-1-1
2. Equations of Fluid Continuity, and Current Stability and Diffusion	12	12			a1-1-1, a1-1-2, a2-1-1 a2-2-1, a3-1-1
3. Linear Equations of Fluid Motion	15	15	-	--	b1-1-1, c1-1-1, c2-1-1, d5-1-1,

4. Physical and Theoretical Representation of Geostrophic Current Flows	18	18	-	--	b1-1-1, b3-1-1, c2-1-1, d2-2-1, d5-1-1,
5. Friction and Frictionless Current Motions	18	18	-	--	b3-1-1, c1-1-1, c2-1-1, d5-1-1
6. Physics and Theory of Tides	18	18	-	--	b1-1-1, b3-1-1, c1-1-1, c2-1-1,d1-1-1, d2-2-1, d5-1-1
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),(a1-2) A2(a2-1), (a2-2) A3(a3-1)	B1(b1-1), B3(b3-1),	C1(c1-1) C2(c2-1)	D2(d2-2) D5(d5-1)

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**	**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				
a3-1-1 Show the dynamics of sea tides, tide forces and effects..	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
c2-1-1 Prepare search reports about physical and theoretical Geostrophic current flows. Investigate the dynamics of sea tides, tide forces and effects.			x	x	x	x

Course ILOs	General and transferrable skills					
d2-2-1 Apply course skills in career development.				x		x
d5-1-1 lead a team to complete an accurate 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												
	a1-1-2	x				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	
General Skills	d2-2-1		x							x				
	d5-1-1		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	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	Ph. D.
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 Ph. D. program, 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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Identify the wave types. a1-1-2 Identify the surface wave theory.

A5- The knowledge related to the impact of professional practice on the Environment, and the work carried out for conservation and preservation.	a5-2 Recognize the interaction between computer and control components and systems development phases technologies and surrounding environment.	a5-2-1 Recognize how to simulate the dynamics of surface wave generation. a5-2-2 Identify the parameters that affect surface waves. a5-2-3 Investigate the dynamics of progressing and standing waves. a5-2-4 Describe the wave motion.
B. Intellectual skills		
B1- Define and analyze information in the field of specialization, and relate to them to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control engineering.	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.
B3- Perform research and studies to add to the accumulated knowledge.	b3-2 Perform applied research on industrial and societal concerns problems that add to the existing Naval Architecture and Marine Engineering field.	b3-2-1 Evaluate the ability to analyze and solve problems on surface progressing waves.
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 search reports for specific types of wave types.
C2- Write and evaluate technical and professional reports.	c2-1 Write and evaluate a professional report related to Naval Architecture and Marine Engineering.	c2-1-1 Prepare reports about surface waves generation. c2-1-2 Practice the ability to distinguish between standing and progressing waves.
D. General and transferrable skills		
D2- Use information technology to enhance his/her professional practice	d2-1 Use state-of-the-art computer aided design tools for solving Naval Architecture and Marine Engineering problems.	d2-1-1 Apply course skills on surface waves generation and in career development.

D5- Work as team leader as well as a member in larger teams	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 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, a5-2-1, a5-2-2, a5-2-3, a5-2-4
2	Wave Theory, (deep, moderate, and shallow water waves)	15	15	--	--	a1-1-1, a1-1-2, a5-2-1, a5-2-2, a5-2-3, a5-2-4
3	Surface Waves Generation	15	15	--	--	b1-1-1, b1-1-2, c1-1-1, c2-1-1 c2-1-2, d5-1-1
4	Standing, and Progressing Surface Waves	15	15	--	--	b1-1-1, b1-1-2, b3-2-1, c2-1-1 c2-1-2, d2-1-1, d5-1-1
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, d5-1-1
6	Wave Motion due to Pressure Dipoles and 3-D Source Distributions.	15	15	--	--	b1-1-1, b1-1-2, b3-2-1, c1-1-1, c2-1-1, c2-1-2, d2-1-1, d5-1-1
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
Program Academic Standards that the course contribute in achieving	A1(a1-1) A2(a2-2)	B1(b1-1) B3(b3-2)	C1(c1-1) C2(c2-1)	D2(d2-1) D5(d5-1)

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**	**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 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				
a5-2-1 Recognize how to simulate the dynamics of surface wave generation.	x	x				

a5-2-2 Identify the parameters that affect surface waves.	x	x				
a5-2-3 Investigate the dynamics of progressing and standing waves.	x	x				
a5-2-4 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
b3-2-1 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**					
d2-1-1 Apply course skills on surface waves generation and in career development.				x		x
d5-1-1 Practice in a team to complete report about surface wave.			x	x	x	x

8- Teaching and Learning Method:

Course Intended learning outcomes (ILOs)		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								
	a5-2-1	x				x								
	a5-2-2	x				x								

	a5-2-3	x				x								
	a5-2-4	x				x								
Intellectual Skills	b1-1-1		x						x					
	b1-1-2		x						x					
	b3-2-1		x						x					
Professional Skills	c1-1-1		x						x					
	c2-1-1		x						x					
	c2-1-2		x						x					
General and transferrable skills	d2-1-1		x						x	x				
	d5-1-1		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.

11.2 Recommended 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	Ph. D.
Date of specification approval	August 2019

A- Basic Information

Title: Stochastic Analysis of Ship Motion Among Waves	**Code Symbol:** NME612	
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 other related subjects.	a1-1 Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Show the importance of ship motion among waves. a1-1-2 Identify ship motion random variables and spectral analysis.
	a1-4 Understand the theories, basics and specialized knowledge in the field of naval architecture and ship design.	a1-4-1 Define the basics knowledge of ship motion among waves.
A5- The impact of professional practice on the Environment, and the work carried out for conservation and preservation.	a5-2 Recognize the interaction between computer and control components and systems development phases technologies and surrounding environment	a5-2-1 Recognize how to apply Pierson - Moscowitz wave spectrum and other spectrums. a5-2-2 Identify the stochastic process of ship motion among irregular sea waves. a5-2-3 Show the possibilities of the analysis of irregular waves into smaller regular waves. a5-2-4 Describe the Superposition Principle to Collect the Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Waves.
B. Intellectual skills		
B1- Define and analyze information in the field of specialization, and relate to them to solve problems and formulate theories.	b1-1 Demonstrate an investigatory and analytic thinking approach (Problem solving) to solve problems related to computer and control 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- Perform research and studies to add to the accumulated knowledge.	b3-1 Compare and evaluate published articles and research concerning specified problem related to Naval Architecture and Marine Engineering field.	b3-1-1Identify 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 related to Naval Architecture and Marine Engineering.	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.	d2-2 Employ the information technology skills to serve his / her career development.	d2-2-1 Apply course skills on surface waves generation and in career development.
D5- Work as team leader as well as a member in larger teams	d5-1 Practice team working, and lead teams in specified professional jobs.	d5-1-1 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, a1-4-1, 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, a5-2-2, a5-2-3, a5-2-4, b1-1-1, b1-1-2, b1-1-3, c1-1-1, c1-1-2, d2-2-1
4	Stochastic Analysis of Ship Motion Among Irregular Waves	15	15	-	--	a1-4-1, a5-2-1, a5-2-2, a5-2-3, a5-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d5-1-1
5	Analysis of Irregular Waves into Smaller Regular Waves	15	15			a5-2-1, a5-2-2, a5-2-3, a5-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d5-1-1
6	Superposition Principle to Collect Total Effects of Smaller Regular Waves on Ship Motions due to Irregular Sea Waves	15	15	-	--	a1-4-1, a5-2-1, a5-2-2, a5-2-3, a5-2-4, b3-1-1, b3-1-2, b3-1-3, c1-1-1, c1-1-2, d5-1-1
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
Program Academic Standards that the course contribute in achieving	A1(a1-1), (a1-4) A5(a5-2)	B1(b1-1) B3(b3-1)	C1(c1-1) C2(c2-1)	D2(d2-2) D5(d5-1)

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**	**Computer Applications and ICT**	**Projects and practice**	**Discretionry 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				
a1-4-1 Define the basics knowledge of ship motion	x			x		x

among waves.						
a5-2-1 Recognize how to apply Pierson - Moscowitz wave spectrum and other spectrums.			x	x	x	x
a5-2-2 Identify the stochastic process of ship motion among irregular sea waves.			x	x	x	x
a5-2-3 Show the possibilities of the analysis of irregular waves into smaller regular waves.			x	x	x	x
a5-2-4 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			
b3-1-1Identify 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**					
d2-2-1 Apply course skills on surface waves generation and in career development.			x			
d5-1-1 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								
	a1-4-1	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	d2-2-1		x						x	x				
	d5-1-1		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. 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
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	Ph. D.
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 other related subjects.	a1-1Understand the theories, basics and specialized knowledge pertinent to a Ph.D thesis in the research field.	a1-1-1 Identify the basic statistics and probabilistic theory a1-1-2 Show the statistical distributions of functions and thier proerties

B. Intellectual skills		
B1- Analyze and evaluate information in the field of specialization, and relate it to solve problems and formulate theories.	b1-2 Interpret, analyze, and evaluate a given system specification 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 available givens and parameters.	b2-1 Apply broad knowledge of modern computational methods and think critically to solve unstructured problems (with complete or incomplete data) related Naval Architecture and Marine Engineering	b2-1-1 Choose the appropriate reliability method to each problem.
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 Demonstrate the problem and its limits
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 enhance his professional practice	d2-2 Employ the information technology skills to serve his career development	d2-2-1 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	-	-	a1-1-1, a1-1-2
2. Probability density functions and distributions, statistical distributions and their properties.	12	12	-	-	a1-1-1, a1-1-2
3. Cornell safety index	12	12	-	-	b1-2-1 b2-1-1
4. First order reliability methods (FORM).	12	12	-	-	b1-2-1 b2-1-1 d2-2-1
5. Second order reliability methods (SORM).	12	12	-	-	b1-2-1 b2-1-1

					d2-2-1
6. Simulation methods (Monte Carlo).	12	12	-	-	b1-2-1 b2-1-1 d2-2-1
7. Reliability and risk analysis in limit states design	12	12	-	-	b9-1-1 c1-1-1 d2-2-1
8. Ultimate strength limit state (ULS), design loads (strength)	6	6	-	-	b9-1-1 c1-1-1 d2-2-1
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	B1, B2, B9	C1	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**							
a1-1-1	x	x						
a1-1-2	x	x						
Course ILOs	**Intellectual skills**							
b1-2-1			x	x	x	x		
b2-1-1			x	x	x	x		
b9-1-1							x	x
Course ILOs	**Professional and practical skills**							
c1-1-1							x	x
	General and transferrable skills							
Course ILOs								
d2-2-1			x	x	x	x	x	x

7- 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												
	a1-1-2	x												
Intellectual Skills	b1-2-1	x		x		x	x							
	b2-1-1	x		x		x	x							
	b9-1-1	x		x		x	x							
Professional	c1-1-1	x				x								
General and transferrable	d2-2-1	x				x								

8- Assessment

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