Kasetsart University

Faculty of International Maritime Studies

Program in Naval Architecture and Marine Engineering

1. NAME OF CURRICULUM

Bachelor of Engineering Program in Naval Architecture and Marine Engineering

2. NAME OF DEGREE

Bachelor of Engineering (Naval Architecture and Marine Engineering)

B.Eng. (Naval Architecture and Marine Engineering)

3. Curriculum Outline for Naval Architecture and Marine Engineering Stude

Total credit requirements		**151**	**credits**
1) General Basic Courses		**30**	**credits**
1.1) Wellness		3	credits
1.2) Entrepreneurship		6	credits
1.3) Thai Citizen and Global Citizen		13	credits
1.4) Language and Communication		5	credits
1.5) Aesthetics		3	credits
2) Naval Architecture and Marine Engineering Courses		**115**	**credits**
2.1) Fundamental Course		**30**	**credits**
2.1.1) Mathematics and Science Course		21	credits
2.1.2) Fundamental Engineering Course		9	credits
2.2) Specified Application Course		**85**	**credits**
2.2.1) Compulsory engineering Course		79-85	credits
- Naval Architecture		79	credits
- Marine Engineering		85	credits
2.2.2) Engineering elective Course			
Naval Architecture course	at least	6	credits
3) Free Electives	**at least**	**6**	**credits**
4) Internship and Job Visiting	**at least**	**300**	**hours**
5) Training	**at least**	**9**	**hours**
5.1 Naval Architecture		9	workdays
5.2 Marine Engineering		88	workdays

6) Detail of Curriculum

1. General Basic Courses **30 credits**

1.1 Wellness **3 credits**

01175131 Swimming for Health 1(0-2-1)

* Student has to apply at least 2 credits by choosing other subjects in this category in order to complete minimum credit requirement.

1.2 Entrepreneurship **6 credits**

* Student has to choose subjects in this category to complete minimum credit requirement.

1.3 Language and Communication **13 credits**

01999021 Thai Language for Communication 3(3-0-6)

03754xxx English 9(- -)

03752111 Information Resources for Research 1(1-0-2)

1.4 Thai Citizen and Global Citizen **5 credits**

01999111 Knowledge of the Land 2(2-0-4)

* Student has to obtain the other 3 credits, at least, by choosing other subjects in this category.

1.5 Aesthetics **3 credits**

* Student has to choose subjects in this category to complete minimum credit requirement.

2. Naval Architecture and Marine Engineering Courses **115 credits**

2.1 Fundamental Courses **30 credits**

2.1.1) Basic Mathematics and Science Course **21 credits**

01403114 Laboratory in Fundamental of General Chemistry 1(0-3-2)

01403117 Fundamental of General Chemistry 3(3-0-6)

01417167 Engineering Mathematics I 3(3-0-6)

01417168 Engineering Mathematics II 3(3-0-6)

01417267 Engineering Mathematics III 3(3-0-6)

01420111 General Physics I 3(3-0-6)

01420112 General Physics II 3(3-0-6)

01420113 Laboratory in Physics I 1(0-3-2)

01420114 Laboratory in Physics II 1(0-3-2)

2.1.2) Fundamental Engineering Course **9 credits**

	03600011	Introduction to Computer Programming	3(2-3-6)
	03604111	Engineering Drawing	3(2-3-6)
	03604221	Engineering Mechanics I	3(3-0-6)
2.2) Specified Application Courses		**85**	**credits**
2.2.1) Compulsory engineering Course		**79-85**	**credits**
- Naval Architecture		79	credits
	03501212	Introduction to Naval Architecture and Marine Engineering	3(3-0-6)
	03501214	Marine Electrical Engineering Laboratory	1(0-3-2)
	03501221	Ship Structures I	3(3-0-6)
	03501241	Fluid Mechanics in Naval Architecture and Marine Engineering	3(3-0-6)
	03501261	Computer-Aided Design and Drafting	3(3-0-6)
	03501271	Introduction to Marine Electrical Engineering	3(3-0-6)
	03501281	Applied Thermodynamics for Marine Engineers	3(3-0-6)
	03501311	Marine Engineering Laboratory I	1(0-3-2)
	03501312	Marine Engineering Laboratory II	1(0-3-2)
	03501321	Ship Structures II	3(3-0-6)
	03501322	Marine Engineering Material	3(3-0-6)
	03501332	Ship Vibrations	3(3-0-6)
	03501333	Ship Dynamics	3(3-0-6)
	03501334	Ship Hydrostatics and Stability	3(3-0-6)
	03501341	Ship Hydrodynamics	3(3-0-6)
	03501342	Ship Resistance and Propulsion	3(3-0-6)
	03501352	Ship Production	3(3-0-6)
	03501361	Applied numerical method for Naval Architecture and Marine Engineering	3(3-0-6)
	03501362	Computation in Naval Architecture and Marine Engineering	3(2-3-6)
	03501363	Marine Mechanical Design	3(3-0-6)
	03501446	Marine Engineering	3(3-0-6)
	03501461	Ship Design	3(3-0-6)
	03501472	Ship Control System	3(3-0-6)

	03501481	Heat Transfer and Marine Thermal Energy System	3(3-0-6)
	03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
	03501495	Naval Architecture and Marine Engineering Project Preparation	1(0-3-2)
	03501499	Naval Architecture and Marine Engineering Project	2(0-6-3)
	03604222	Engineering Mechanics II	3(3-0-6)
	03604241	Thermodynamics I	3(3-0-6)
	03604281	Workshop Practice	1(0-3-2)
-	Marine Engineering	85	credits
	03501212	Introduction to Naval Architecture and Marine Engineering	3(3-0-6)
	03501214	Marine Electrical Engineering Laboratory	1(0-3-2)
	03501221	Ship Structures I	3(3-0-6)
	03501241	Fluid Mechanics in Naval Architecture and Marine Engineering	3(3-0-6)
	03501261	Computer-Aided Design and Drafting	3(3-0-6)
	03501271	Introduction to Marine Electrical Engineering	3(3-0-6)
	03501281	Applied Thermodynamics for Marine Engineers	3(3-0-6)
	03501311	Marine Engineering Laboratory I	1(0-3-2)
	03501312	Marine Engineering Laboratory II	1(0-3-2)
	03501321	Ship Structures II	3(3-0-6)
	03501322	Marine Engineering Material	3(3-0-6)
	03501332	Ship Vibrations	3(3-0-6)
	03501333	Ship Dynamics	3(3-0-6)
	03501334	Ship Hydrostatics and Stability	3(3-0-6)
	03501342	Ship Resistance and Propulsion	3(3-0-6)
	03501343	Marine Piping and Pump System	3(3-0-6)
	03501351	Maritime Law and Convention for Marine Engineering	3(3-0-6)
	03501352	Ship Production	3(3-0-6)
	03501353	Ship Operations and Maintenance	3(3-0-6)
	03501363	Marine Mechanical Design	3(3-0-6)

03501372	Shipboard Electrical Machines	3(3-0-6)
03501472	Ship Control System	3(3-0-6)
03501481	Heat Transfer and Marine Thermal Energy System	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03501483	Marine Internal Combustion Engine	3(3-0-6)
03501484	Boiler and Gas Turbine	3(3-0-6)
03501485	Marine Diesel Engine	3(3-0-6)
03501495	Naval Architecture and Marine Engineering Project Preparation	1(0-3-2)
03501499	Naval Architecture and Marine Engineering Project	2(0-6-3)
03604222	Engineering Mechanics II	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)

2.2.2) Elective Course

Specific Naval Architecture at least 6 credits

* Student has to choose subjects in this category to complete minimum credit requirement.

03501421	Ship Structures III	3(3-0-6)
03501423	Marine Corrosion	3(3-0-6)
03501445	Coastal Engineering and Management	3(3-0-6)
03501452	Offshore Engineering	3(3-0-6)
03501459	Ship Construction and Management	3(3-0-6)
03501462	Modern Marine Vehicles Design	3(3-0-6)
03501463	Computer-Aided Naval Architecture and Marine Engineering	3(3-0-6)
03501490	Cooperative Education	6
03501496	Selected Topics in Naval Architecture and Marine Engineering	3(3-0-6)

3. Free Electives 3 credits

4. Internship and Job Visiting **at least** **300** **hours**

(Non-credit)

Second year (End of Semester 2)

- Onboard training or shipyard training at least 7 days or 60 hours

Third year (End of Semester 2)

- Internship at least 240 hours

5. Training at least **9** hours

5.1 Naval Architecture **9** **workdays**

- Basic Seaboard 9 workdays
  - Elementary first aid
  - Personal survival techniques
  - Fire prevention and fire fighting
  - Security awareness training for all seafarers
  - Personal safety and social responsibilities

5.2 Marine Engineering **88** **workdays**

5.2.1 Student has to complete all training courses as follow:

- Basic Seaboard 9 workdays
  - Elementary first aid
  - Personal survival techniques
  - Fire prevention and fire fighting
  - Security awareness training for all seafarers
  - Personal safety and social responsibilities
- Basic Seamanship at least 10 workdays
- Advanced Seaboard 12 workdays
- Ship Manuvering course at least 7 workdays
- Training of Workshop Practice course al least 50 workdays

5.2.2 Marine engineering student have to complete Maritime English course which is complied with IMO model course and obtain Maritime English Certification.

Course Planning for Naval Architecture Students

Non-Cooperative Education Program

First Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417167	Engineering Mathematics I	3(3-0-6)
01420111	General Physics I	3(3-0-6)
01420113	Laboratory in Physics I	1(0-3-2)
03604111	Engineering Drawing	3(2-3-6)
01175131	Swimming for Health	1(0-2-1)
03752111	Information Resources for Research	1(1-0-2)
01999111	Knowledge of the Land	2(2-0-4)
03754xxx	English	3(- -)
	Wellness	2(- -)
	Total	**19(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
01417168	Engineering Mathematics II	3(3-0-6)
01420112	General Physics II	3(3-0-6)
01420114	Laboratory in Physics II	1(0-3-2)
01403117	Fundamental of General Chemistry	3(3-0-6)
01403114	Laboratory in Fundamental of General Chemistry	1(0-3-2)
03600011	Introduction to Computer Programming	3(2-3-6)
01999021	Thai Language for Communication	3(3-0-6)
003754xxx	English	3(- -)
	Total	**20(- -)**

End of Semester 2

- Basic Seaboard 9 workdays

Second Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417267	Engineering Mathematics III	3(3-0-6)
03501212	Introduction to Naval Architecture and Marine Engineering	3(3-0-6)
03501261	Computer-Aided Design and Drafting	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604221	Engineering Mechanics I	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)
03754xxx	English	3(- -)
	Total	**19(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501214	Marine Electrical Engineering Laboratory	1(0-3-2)
03501221	Ship Structures I	3(3-0-6)
03501241	Fluid Mechanics in Naval Architecture and Marine Engineering	3(3-0-6)
03501271	Introduction to Marine Electrical Engineering	3(3-0-6)
03501281	Applied Thermodynamics for Marine Engineers	3(3-0-6)
03604222	Engineering Mechanics II	3(3-0-6)
	Thai Citizen and Global Citizen	3(- -)
	Total	**19(- -)**

End of Semester 2

Onboard training or shipyard training at least 7 days or 60 hours

Third Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501311	Marine Engineering Laboratory I	1(0-3-2)
03501321	Ship Structures II	3(3-0-6)
03501322	Marine Engineering Material	3(3-0-6)
03501334	Ship Hydrostatics and Stability	3(3-0-6)
03501341	Ship Hydrodynamics	3(3-0-6)
03501361	Applied numerical method for Naval Architecture and Marine Engineering	3(3-0-6)
	Entrepreneurship	3(- -)
	Total	**19(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501312	Marine Engineering Laboratory II	1(0-3-2)
03501332	Ship Vibrations	3(3-0-6)
03501333	Ship Dynamics	3(3-0-6)
03501342	Ship Resistance and Propulsion	3(3-0-6)
03501352	Ship Production	3(3-0-6)
03501362	Computation in Naval Architecture and Marine Engineering	3(3-0-6)
03501363	Marine Mechanical Design	3(3-0-6)
	Total	**19(18-3-38)**

End of Semester 2

Internship at least 240 hours

Fourth Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501446	Marine Engineering	3(3-0-6)
03501472	Ship Control System	3(3-0-6)
03501481	Heat Transfer and Marine Thermal Energy System	3(3-0-6)
03501495	Naval Architecture and Marine Engineering Project Preparation	1(0-3-2)
03501xxx	Naval Architecture Elective Courses	3(3-0-6)
	Aesthetics	3(- -)
	Free Electives	3(- -)
	Total	**19(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501461	Ship Design	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03501499	Naval Architecture and Marine Engineering Project	2(0-6-3)
03501xxx	Naval Architecture Elective Courses	3(- -)
	Entrepreneurship	3(- -)
	Free Electives	3(- -)
	Total	**17(- -)**

Course Planning for Naval Architecture Students

Cooperative Education Program

First Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417167	Engineering Mathematics I	3(3-0-6)
01420111	General Physics I	3(3-0-6)
01420113	Laboratory in Physics I	1(0-3-2)
03604111	Engineering Drawing	3(2-3-6)
01175131	Swimming for Health	1(0-2-1)
03752111	Information Resources for Research	1(1-0-2)
01999111	Knowledge of the Land	2(2-0-4)
03754xxx	English	3(- -)
	Wellness	2(- -)
	Total	**19(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
01417168	Engineering Mathematics II	3(3-0-6)
01420112	General Physics II	3(3-0-6)
01420114	Laboratory in Physics II	1(0-3-2)
01403117	Fundamental of General Chemistry	3(3-0-6)
01403114	Laboratory in Fundamental of General Chemistry	1(0-3-2)
03600011	Introduction to Computer Programming	3(2-3-6)
01999021	Thai Language for Communication	3(3-0-6)
03754xxx	English	3(- -)
	Total	**20(- -)**

End of Semester 2

- Basic Seaboard 9 workdays

Second Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417267	Engineering Mathematics III	3(3-0-6)
03501212	Introduction to Naval Architecture and Marine Engineering	3(3-0-6)
03501261	Computer-Aided Design and Drafting	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604221	Engineering Mechanics I	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)
03754xxx	English	3(- -)
	Entrepreneurship	3(- -)
	Total	**22(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501214	Marine Electrical Engineering Laboratory	1(0-3-2)
03501221	Ship Structures I	3(3-0-6)
03501241	Fluid Mechanics in Naval Architecture and Marine Engineering	3(3-0-6)
03501271	Introduction to Marine Electrical Engineering	3(3-0-6)
03501281	Applied Thermodynamics for Marine Engineers	3(3-0-6)
03604222	Engineering Mechanics II	3(3-0-6)
	Thai Citizen and Global Citizen	3(- -)
	Free Electives	3(- -)
	Total	**22(- -)**

End of Semester 2

Onboard training or shipyard training at least 7 days or 60 hours

Third Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501311	Marine Engineering Laboratory I	1(0-3-2)
03501321	Ship Structures II	3(3-0-6)
03501322	Marine Engineering Material	3(3-0-6)
03501334	Ship Hydrostatics and Stability	3(3-0-6)
03501341	Ship Hydrodynamics	3(3-0-6)
03501361	Applied numerical method for Naval Architecture and Marine Engineering	3(3-0-6)
	Entrepreneurship	3(- -)
	Aesthetics	3(- -)
	Total	**22(- -)**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501312	Marine Engineering Laboratory II	1(0-3-2)
03501332	Ship Vibrations	3(3-0-6)
03501333	Ship Dynamics	3(3-0-6)
03501342	Ship Resistance and Propulsion	3(3-0-6)
03501352	Ship Production	3(3-0-6)
03501362	Computation in Naval Architecture and Marine Engineering	3(3-0-6)
03501363	Marine Mechanical Design	3(3-0-6)
03501495	Naval Architecture and Marine Engineering Project Preparation	1(0-3-2)
	Total	**20(18-6-40)**

End of Semester 2

Internship at least 240 hours

Fourth Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501490	Cooperative Education	6
	Total	**6**

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501446	Marine Engineering	3(3-0-6)
03501461	Ship Design	3(3-0-6)
03501472	Ship Control System	3(3-0-6)
03501481	Heat Transfer and Marine Thermal Energy System	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03501499	Naval Architecture and Marine Engineering Project	2(0-6-3)
	Free Electives	3(- -)
	Total	**20(- -)**

Course Planning for Marine Engineering Students

First Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417167	Engineering Mathematics I	3(3-0-6)
01420111	General Physics I	3(3-0-6)
01420113	Laboratory in Physics I	1(0-3-2)
03604111	Engineering Drawing	3(2-3-6)
01175131	Swimming for Health	1(0-2-1)
03752111	Information Resources for Research	1(1-0-2)
01999111	Knowledge of the Land	2(2-0-4)
03754xxx	English	3(- -)
	Wellness	2(- -)
	Total	**19(- -)**

End of Semester 1

- Basic Seamanship at least 10 workdays
- Training of Workshop Practice course at least 5 workdays
- Maritime English course

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
01417168	Engineering Mathematics II	3(3-0-6)
01420112	General Physics II	3(3-0-6)
01420114	Laboratory in Physics II	1(0-3-2)
01403117	Fundamental of General Chemistry	3(3-0-6)
01403114	Laboratory in Fundamental of General Chemistry	1(0-3-2)
03600011	Introduction to Computer Programming	3(2-3-6)
01999021	Thai Language for Communication	3(3-0-6)
003754xxx	English	3(- -)
	Total	**20(- -)**

End of Semester 2

- Basic Seaboard at least 9 workdays
  - Elementary first aid
  - Personal survival techniques
  - Fire prevention and fire fighting
  - Security awareness training for all seafarers
  - Personal safety and social responsibilities
- Training of Workshop Practice course at least 10 workdays
- Maritime English course

Second Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417267	Engineering Mathematics III	3(3-0-6)
03501212	Introduction to Naval Architecture and Marine Engineering	3(3-0-6)
03501261	Computer-Aided Design and Drafting	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604221	Engineering Mechanics I	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)
03754xxx	English	3(- -)
	Total	**19(- -)**

End of Semester 1

- Training of Workshop Practice course at least 10 workdays
- Maritime English course

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501214	Marine Electrical Engineering Laboratory	1(0-3-2)
03501221	Ship Structures I	3(3-0-6)
03501241	Fluid Mechanics in Naval Architecture and Marine Engineering	3(3-0-6)
03501271	Introduction to Marine Electrical Engineering	3(3-0-6)
03501281	Applied Thermodynamics for Marine Engineers	3(3-0-6)
03604222	Engineering Mechanics II	3(3-0-6)
	Thai Citizen and Global Citizen	3(- -)
	Total	**19(- -)**

End of Semester 2

- Onboard training or shipyard training at least 7 days or 60 hours
- Training of Workshop Practice course at least 10 workdays
- Maritime English course

Third Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501311	Marine Engineering Laboratory I	1(0-3-2)
03501321	Ship Structures II	3(3-0-6)
03501322	Marine Engineering Material	3(3-0-6)
03501334	Ship Hydrostatics and Stability	3(3-0-6)
03501351	Maritime Law and Convention for Marine Engineering	3(3-0-6)
03501372	Shipboard Electrical Machines	3(3-0-6)
	Entrepreneurship	3(- -)
	Total	**19(- -)**

End of Semester 1

- Training of Workshop Practice course at least 10 workdays
- Maritime English course

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501312	Marine Engineering Laboratory II	1(0-3-2)
03501332	Ship Vibrations	3(3-0-6)
03501333	Ship Dynamics	3(3-0-6)
03501342	Ship Resistance and Propulsion	3(3-0-6)
03501352	Ship Production	3(3-0-6)
03501353	Ship Operations and Maintenance	3(3-0-6)
03501363	Marine Mechanical Design	3(3-0-6)
	Total	**19(18-3-38)**

End of Semester 2

Internship not less than 240 hours

Fourth Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501472	Ship Control System	3(3-0-6)
03501481	Heat Transfer and Marine Thermal Energy System	3(3-0-6)
03501483	Marine Internal Combustion Engine	3(3-0-6)
03501485	Marine Diesel Engine	3(3-0-6)
03501495	Naval Architecture and Marine Engineering Project Preparation	1(0-3-2)
03501xxx	Naval Architecture Elective Courses	3(3-0-6)
	Aesthetics	3(- -)
	Free Electives	3(- -)
	Total	**19(- -)**

End of Semester 1

- Training of Workshop Practice course at least 5 workdays
- Ship Manuvering course at least 7 workdays
- Maritime English course

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501343	Marine Piping and Pump System	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03501484	Boiler and Gas Turbine	3(3-0-6)
03501499	Naval Architecture and Marine Engineering Project	2(0-6-3)
	Entrepreneurship	3(- -)
	Free Electives	3(- -)
	Total	**17(- -)**

End of Semester 2

- Advanced Seaboard 12 workdays
  - Medical First Aid at least 4 workdays

- Proficiency in Survival Craft and Rescue Boats
  (other than Fast Rescue Boats) at least 4 workdays
- Advanced Training in Fire Fighting at least 4 workdays

- Training of Workshop Practice course at least 10 workdays
- Maritime English course

COURSE DESCRIPTIONS

03501212 Introduction to Naval Architecture and Marine Engineering 3(3-0-6)

Type and purpose of ships and offshore structures, basic concepts of ship resistance and propulsion, power system, strength and dynamic of ship and platform, general knowledge on marine and shipyard industries.

03501214 Marine Electrical Engineering Laboratory 1(0-3-2)

Prerequisite : 03501271

Fundamental experiments on marine electrical engineering, DC circuits, AC circuits, power factor correction, electrical characteristic test for important marine electrical devices and equipment.

03501221 Ship Structures I 3(3-0-6)

Prerequisite : 03604221

Concept of forces, stresses and strain, Hooke's law, stress and strain under axial loading and shear loading, torsion, stresses in a shaft within the elastic range, pure bending, shear and bending moment diagrams, shearing stresses in a beam and thin-walled member, transformations of stress and strain, Mohr’s circle, stresses under combined loadings, deflection of beams and stringers, buckling of stanchions, failure theory. Components of ship structures and stiffener members, analysis of midship section, applications of classification society rules in ship structural design

03501241 Fluid Mechanics in Naval Architecture and Marine Engineering 3(3-0-6)

Prerequisite : 01417168

Properties of fluid, hydrostatic, displacement and buoyancy, fresh water allowance, stability and metacenter, bernoulli equation, equation of continuity and motion, momentum and energy equations, potential flow, similitude and dimensional analysis, pipe flow, drag force and lift force, free surface flow, wave mechanics, steady incompressible flow.

03501261 Computer-Aided Design and Drafting 3(3-0-6)

Prerequisite : 03604111

Two and three dimensional drafting for naval architecture and marine engineering works, use of computer for design and analysis of mechanical and maritime engineering problems, physical modeling and simulations of mechanical and maritime engineering problems and related applications.

03501271 Introduction to Marine Electrical Engineering 3 (3-0-6)

Prerequisite : 01420112

Type and purpose of general shipboard electrical system, basic concepts of electrical circuits and circuit calculations, vital electrical systems and equipment onboard ship, electrical load analysis of ship.

03501281 Applied Thermodynamics for Marine Engineers 3(3-0-6)

Prerequisite : 03604241

Principle of reciprocating engines, compression ignition engines, diesel cycle, applications to reciprocating engines in ships and marine vehicles, principle of gas turbine engines, brayton cycle, applications to gas turbine engines in ships and marine vehicles, refrigeration, vapor compression refrigeration cycle, application to ship refrigeration systems, air conditioning, application to ship air conditioning systems, introduction to ship propulsion and ship auxiliary system.

03501311 Marine Engineering Laboratory I 1(0-3-2)

Prerequisite : 03604222, 03604241, 03501221 and 03501241

Experiments on fluid mechanics, dynamic lab, material and structure tests.

03501312 Marine Engineering Laboratory II 1(0-3-2)

Prerequisite : 03501311

Engine tests, thermodynamics and heat transfer lab, experiments of naval architecture and marine engineering, ship buoyancy and stability, ship model testing, test of ship inclination, propeller tests.

03501321 Ship Structures II 3(3-0-6)

Prerequisite : 03501221

Calculation of forces exerted on ships and offshore structures, calculation of ship longitudinal strength, load distributions on ship, combined stresses and losses of ship strength, strength of hull panels including major parts of ship structures, ship grillages systems, materials using in ship structures, corrosion and protection.

03501322 Marine Engineering Materials 3(3-0-6)

Relationships between structures, properties and production processes. Applications of main groups of marine engineering materials; metals, polymers, ceramics and composite materials. Phase equilibrium diagrams and their interpretations. Mechanical properties of marine engineering materials. Fabrication techniques of metals for marine use. Heat treatment of steels. Non-ferrous metals for marine use. Corrosion and degradation of marine engineering materials. Selection of stainless steels for marine applications.

03501332 Ship Vibrations 3(3-0-6)

Prerequisite : 03604222 and 01417267

Basic mechanical vibrations, free vibrations of one-degree of freedom and multi-degree of freedom, simple harmonic, general period and random forced vibrations, method and techniques to reduce and control vibration, vibrations of ship and off-shore structures, dynamics and vibrations problems of propeller shafts and equipment, vibrations problems of ship panels and curved surfaces.

03501333 Ship Dynamics 3(3-0-6)

Prerequisite : 03604222 and 01417267

Velocity and acceleration analysis, kinematics and dynamics force analysis, applications and balancing of mechanical and marine systems, ship motions, damping and added mass due to ship motions, ocean wave, wave equation, ship response amplitude opertors, encounter frequency.

03501334 Ship Hydrostatics and Stability 3(3-0-6)

Prerequisite : 03501212

Ship displacement, volume displacement, ship buoyancy, fresh water allowance, statical stability, Initial metacentric height, test of ship inclination, angle of list, angle of loll, curves of statical stability, dynamic stability, effect of movement of center of gravity, loss of metacentric height, effect of slack tanks, trim, longitudinal stability, loss of intact buoyancy, effect of flooding on stability, IMO recommendations on stability.

03501341 Ship Hydrodynamics 3(3-0-6)

Prerequisite : 03501241

Two and three dimensional potential flow, boundary value problem, radiation and diffraction problems, ship motion equation, other ship hydrodynamics problems.

03501342 Ship Resistance and Propulsion 3(3-0-6)

Prerequisite : 03501241

Factors of ship resistance, frictional resistance, residuary resistance, wave-making resistance, Froude's law of comparison, ship model test, ship powering system, estimation of effective, propellers and propulsion power, propulsive power transmission, thrust deduction, hull efficiency, wake fraction, marine propulsors, screw propeller geometry, law of similarity for propellers, openwater characteristics, propeller design procedure, propeller cavitations.

03501343 Marine Piping and Pump System 3(3-0-6)

Prerequisite : 03501241

Piping system, pipe sizing and selection, valves and fittings, head loss calculation, pump types, characteristic, performance and power, net positive suction head and cavitation, pump selection, parallel and series pump installation, piping-and-pump installation, testing, operating and maintenance.

03501351 Maritime Law and Convention for Marine Engineering 3(3-0-6)

Introduction to maritime law, related International maritime conventions and national legislation, International convention for the prevention of pollution

from ships, basic knowledge of anti-pollution equipment required by national legislation, basic knowledge of anti-pollution equipment required by national legislation, convention of the prevention of marine pollution by dumping of wastes and other matter (London Dumping Convention), International convention relating to intervention on the high seas in cases of oil pollution casualties, 1969, international convention on civil liability for oil pollution damage, 1969 (CLC 1969), responsibilities under the International conventions and codes, certificates and other documents required to be carried on board ships by International conventions, load lines responsibilities under the relevant requirements of the International convention on load lines, responsibilities under the relevant requirements of the International convention for the safety of life at sea, responsibilities under international instruments affecting the safety of the ship, passengers, crew and cargo.

03501352 Ship Production 3(3-0-6)

Prerequisite : 03501322

Theory and concept of ship building process, casting, hot and cold forming, cutting, turning, shaping, drilling, milling, Welding and surface finishing, material and building processes relationships, building cost, ship yard location, layout and construction, production engineering and inspection, quality control, procedure control and systems, ship yard safety, dry dock and maintenance of ships, computer aided design and manufacture.

03501353 Ship Operations and Maintenance 3(3-0-6)

Boiler and steam plant in ship, oil purification, principles of pneumatic control, control circuits for marine auxiliary systems, air compressor systems, principles of operation of evapoators, distillation plant in ship, seawage treatment plants, steering gear and basic control systems, operation and maintenance of cargo handling equipment and deck machinery.

03501361 Applied numerical method for Naval Architecture and Marine Engineering 3(3-0-6)

Prerequisite : 01417267

Root finding method, systems of equations, function approximation, numerical integral, Numerical method for differential equations, fourier

transform, relation between time domain and frequency domain, laplace domain and fourier domain, numerical methods and its applications.

03501362 Computation in Naval Architecture and Marine Engineering 3(2-3-6)

Prerequisite : 03600011 และ 03501361

Computer programming, numerical analysis and application on naval architecture and marine engineering problems, practical training on various kinds of ship design programs.

03501363 Marine Mechanical Design 3(3-0-6)

Prerequisite : 03501221

Fundamental of mechanical design, properties of materials, theories of failure, design of simple marine machine elements, rivets, welding and underwater welding, screw fastener, keys and pins including cargo handling equipment, shafts including bearings, clutches, gears for marine propulsion system, chains and ship anchors, ship mooring systems, prevention of oil pollution in the sea and design project.

03501372 Shipboard Electrical Machines 3(3-0-6)

Prerequisite : 03501271

Principle, operation, type and efficiency of AC and DC generator, AC and DC motor, transformer and rectifier, AC and DC switchboard, electircal circuit protection, battery and lamp in marine usage, and electrical safety system.

03501421 Ship Structures III 3(3-0-6)

Prerequisite : 03501321

Stress distributions, local strength analysis, panels under external loads, ship stanchions loading from the strength of panels with grillage, finite-element method in ship strength analysis.

03501423 Marine Corrosion 3(3-0-6)

Prerequisite : 03501322

The role of corrosion engineering, metallic materials and their application in engineering purposes, electrochemical corrosion principles, influences of

environmental parameters on corrosion behaviors of metals, marine corrosion, corrosion prevention and control principals, failure analysis methodology, case studies of corrosion failure of engineering equipment in marine environment.

03501445 Coastal Engineering and Management 3(3-0-6)

Coastal morphology, wave description and wave theory, short-term and long-term wave analysis, wave statistics, wave generation, near shore wave transformation and breaking, tides and water levels, coastal erosion and accretion, coastal structures, environmental impact assessment for coastal structure.

03501446 Marine Engineering 3(3-0-6)

Prerequisite : 03501342

Alignment analysis of marine propulsion, power and speed interactions among engines, ship propellers and hulls, characteristics of electrical generators, motors and distribution systems with emphasis on marine ship-service and propulsion systems, propulsion shaft torsion vibration analysis with emphasis on application to reciprocating marine propulsion engines.

03501452 Offshore Engineering 3(3-0-6)

Offshore oil and gas industry, oil and gas properties, petroleum reservoir, petroleum exploration, offshore environment, offshore platforms, petroleum drilling, well types, petroleum production, subsea engineering.

03501459 Ship Construction and Management 3(3-0-6)

Principles of management, production management and shipbuilding industry including related industries, shipyard organization, shipyard facilities and equipment, shipbuilding process, planning scheduling and production control, management by optimization, information systems management, case study in shipbuilding.

03501461 Ship Design 3(3-0-6)

Prerequisite : 03501321, 03501331 and 03501342

Preliminary ship design to meet user's general requirements, principal dimensions, form, power requirements, ship stability, outfitting of ship, structural

design and accommodation arrangement; including other conveniences, preliminary design drawings, applications of computer-aided ship design programs.

03501462 Modern Marine Vehicles Design 3(3-0-6)

Design of various kinds of marine vehicles; concepts and developments in modern marine design.

03501463 Computer Aided Naval Architecture and Marine Engineering 3(3-0-6)

Prerequisite : 03501321

Fundamentals of finite element method and computational fluid dynamics, solutions of finite element equations, general procedures for higher order and isoparametric element formations, partial differential equations and discretization methods, algorithms for the calculation of the flow-field and heat transfer, applications of finite element and computational fluid dynamics programs for marine problems.

03501472 Ship Control System 3(3-0-6)

Prerequisite : 01417267 and 03501271

Automatic control principles, analysis and modeling of linear control elements, stability of linear feedback systems and nonlinear systems, design and compensation of control systems, time domain design, lead and lag compensator design, frequency response, application of control theory to marine system, steering systems and fin action, ship motion control and auto pilot system.

03501481 Heat Transfer and Marine Thermal Energy System 3(3-0-6)

Prerequisite : 03604241

Modes of heat transfer, heat conduction, heat convection, heat radiation, applications of heat transfer, heat exchangers and heat transfer enhancement, boiling and condensation, introduction to thermal system design, heat exchanger design.

03501482 Marine Refrigerator and Air Conditioner 3 (3-0-6)

Prerequisite : 03501281

Properties of air, psychometric diagram, type of refrigeration and air system, general refrigeration and air condition system, gas cycle refrigeration and heat pump of marine, sample vapour compression refrigeration and air system, properties of common refrigerants and air, compound vapour compression system, multiple evaporator and compressor systems, refrigeration compressors of marine type, matching component in vapour compression system of marine, multiple unit in ship, steam jet refrigeration and air system, building survey and heat load estimates in ship, air distribution and duct design, pressure losses and duct sizing, ventilation system, multi-zone air unit system on deckhouse, basics of HVAC hot water systems, equipment selection, selection of common primary refrigerants currently specified under MAPOL recommendation, installing operating and testing HVAC pumps, safety device and control under the SOLAS 2010 standard in merchant ship convention, electrical power design.

03501483 Marine Internal Combustion Engine 3(3-0-6)

Prerequisite : 03501281

Types and operation of marine internal combustion engines, design and parts of marine engine, thermo-chemistry and fuel processing, engine cycles, combustion in spark-ignition engine, combustion in compression ignition engine, ignition system, marine cooling system, air and fuel inductions, lubricant and lubrication system, propulsion and performance of marine diesel engine, marine engine vibration, fuel injection pump timing adjustment, measurement of crankshaft deflection in marine engine, pollution control system and emission elimination.

03501484 Boiler and Gas Turbines 3(3-0-6)

Prerequisite : 03501281

Type of boiler, the principle of boiler and gas turbine, properties of steam control systems and alarms, the use of steam turbines in the sea, gas cycle, brayton cycle, ranking cycle, to test and improve the water quality of the steam generator, inspection of steam boiler, gas turbines maintain and modify.

03501485 Marine Diesel Engine 3(3-0-6)

Prerequisite : 03501281

Principle of diesel engine, rating and selection, engine control panel and monitoring system, installation, operation and maintenance of marine diesel engine.

03501490 Cooperative Education 6

On the job training as a temporary employee according to the assigned project including report and presentation.

03501495 Naval Architecture and Marine Engineering Project Preparation 1(0-3-2)

Preparation of project proposal. Literature review and progress report.

03501496 Selected Topics in Naval Architecture and Marine Engineering 3(3-0-6)

Selected topics in naval architecture and marine engineering at the bachelor's level, topics are subject to change each semester.

03501499 Naval Architecture and Marine Engineering Project 2(0-6-3)

Prerequisite : 03501495

Project of practical interest in various fields of naval architecture and marine engineering or ship design team project.

Required fundamental course descriptions

01403114 Laboratory in Fundamentals of General Chemistry 1(0-3-2)

Prerequisite : 01403117

Laboratory in Fundamentals of General Chemistry.

01403117 Fundamentals of General Chemistry 3(3-0-6)

Atomic structure. Periodic table and periodic properties. Chemical bonds. Stoichiometry. Gases. Liquids. Solids. Solutions. Chemical kinetics. Chemical equilibria. Acids and bases. Ionic equilibria. Representative elements. Metals. Nonmetals and metalloids. Transition metals.

01417167 Engineering Mathematics I 3(3-0-6)

Limits and continuity of functions, derivatives and applications, differentials, integration and applications, polar coordinates, improper integrals, sequences and series, mathematical induction.

01417168 Engineering Mathematics II 3(3-0-6)

Prerequisite : 01417167

Vector and solid analytic geometry, calculus of multivariables functions, calculus of vector – valued functions.

01417267 Engineering Mathematics III 3(3-0-6)

Prerequisite : 01417168

First order linear differential equations, linear differential equations with constant coefficients, Laplace transforms and inverse transforms, power series solutions, system of linear differential equations.

01420111 General Physics I 3(3-0-6)

Mechanics, harmonic motion, waves, fluid mechanics, thermodynamics.

01420112 General Physics II 3(3-0-6)

Prerequisite : 01420111

Electromagnetism, electromagnetic waves, optics, introduction to modern physics and nuclear physics.

01420113 Laboratory in Physics I 1(0-3-2)

Prerequisite : 01420111 or Corequisite or 01420117 or Corequisite

Laboratory for General Physics I or Basic Physics I.

01420114 Laboratory in Physics II 1(0-3-2)

Prerequisite : 01420113 and 01420112 or Corequisite or 01420118 or Corequisite

Laboratory for General Physics II or Basic Physics II.

03600011 Introduction to Computer Programming 3(2-3-6)

Basic structure of modern computer systems; data representation in computer; algorithmic problem solving; program design and development

methodology; introductory programming using a high-level programming language; programming practice in computer laboratory.

03604111 Engineering Drawing 3(2-3-6)

Lettering. Orthographic projection. Orthographic drawing and pictorial drawing. Dimensioning and tolerancing. Sections. Auxiliary views and development. Freehand sketches. Detail and assembly drawing. Basic computer-aided drawing.

03604221 Engineering Mechanics I 3(3-0-6)

Prerequisite : 01417167

Force systems. Resultant force. Equilibrium. Center of gravity and centroids. Fluid statics. Distributed force. Friction. Principle of virtual work and stability.

03604222 Engineering Mechanics II 3(3-0-6)

Prerequisite: 03604221

Kinetics and kinematics of particles and rigid bodies. Newton's second law of motion. Equation of motion. Principle of impulse and momentum. Principle of work and energy. Impact. Fundamental of space motion.

03604241 Thermodynamics I 3(3-0-6)

Prerequisite: 01417167

Properties of pure substances. Ideal gas. Basic heat transfer and energy conversion. First law of thermodynamics. Second law of thermodynamics and Carnot cycle. Entropy.

03604281 Workshop Practice 1(0-3-2)

Practice in work-piece measuring, gas and arc welding, metal sheet works, lathe works, safety in workshop.