

Kasetsart University
 Faculty of International Maritime Studies
 Program in Marine Engineering

1. NAME OF CURRICULUM

Bachelor of Engineering Program in Marine Engineering

2. NAME OF DEGREE

Bachelor of Engineering (Marine Engineering)

B.Eng. (Marine Engineering)

3. Curriculum Outline for Naval Architecture and Marine Engineering Student

Total credit requirements	at least	150	credits
1) General Education Courses	at least	30	credits
1.1) Wellness	at least	6	credits
1.2) Entrepreneurship	at least	3	credits
1.3) Language and Communication	at least	13	credits
1.4) Thai Citizen and Global Citizen	at least	5	credits
1.5) Aesthetics	at least	3	credits
2) Naval Architecture and Marine Engineering Courses at least		114	credits
2.1) Fundamental Courses		30	credits
2.1.1) Mathematics and Science Courses		21	credits
2.1.2) Fundamental Engineering Courses		9	credits
2.2) Specific Course		84	credits
2.2.1) Compulsory Engineering Courses		78	credits
2.2.2) Engineering Elective Courses		6	credits
3) Free Electives	at least	6	credits
4) Internship and Job Visiting	at least	240	hours
5) Training	at least	24	workdays
6) Detail of Curriculum			
1. General Education Courses	at least	30	credits
1.1 Wellness	at least	6	credits
01175131 Swimming for Health			1(0-2-1)

* Student has to apply at least 5 credits by choosing other subjects in this category in order to complete minimum credit requirement.

1.2 Entrepreneurship 3 credits

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

1.3 Language and Communication 13 credits

01355xxx	English	9(- -)
	Thai Language	3(- -)
	Information Technology/Computer	1(- -)

1.4 Thai Citizen and Global Citizen 5 credits

01999111	Knowledge of the Land	2(2-0-4)
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* 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. Marine Engineering Courses at least 114 credits

2.1 Fundamental Courses 30 credits

2.1.1) Basic Mathematics and Science Courses 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 Courses 9 credits

03603101	Introduction to Computer Programming	3(2-3-6)
03604111	Engineering Drawing	3(2-3-6)
03604223	Basic Principles of Engineering Mechanics	3(3-0-6)

2.2) Specific Courses 84 credits

2.2.1) Compulsory Engineering Courses 78 credits

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)
03501311	Maritime Engineering Laboratory I	1(0-3-2)
03501312	Maritime Engineering Laboratory II	1(0-3-2)
03501322	Marine Engineering Material	3(3-0-6)
03501351	Maritime Law and Convention for Marine Engineering	3(3-0-6)
03501352	Ship Production and Safety in a Shipyard	3(3-0-6)
03501363	Marine Mechanical Design	3(3-0-6)
03501472	Ship Control Systems	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03503211	Applied Computer in Marine Engineering	3(2-3-6)
03503231	Diesel Engine	3(3-0-6)
03503311	Marine Mechanical and Electrical Drawing	1(0-3-2)
03503321	Ship Construction and Stability	3(3-0-6)
03503331	Mechanics of Marine Machinery	3(3-0-6)
03503332	Operations and Maintenance of Main engine and Auxiliary Engines	3(3-0-6)
03503341	Thermal Energy System and Marine Heat Transfer	3(3-0-6)
03503351	Marine Piping and Operation of Pumping Systems	3(3-0-6)
03503361	Principle of Watch and Fire Prevention	2(1-3-4)
03503371	Electrical Machine and On Board Maintenance	3(2-3-6)
03503431	Ship Vibration and Propulsion	3(3-0-6)
03503432	Boiler and Power Plant	3(3-0-6)
03503451	Planned Maintenance System	3(3-0-6)
03503461	Ship Waste Management	2(2-0-4)
03503471	Electronic and Computer Systems on Ship	3(2-3-6)
03604241	Thermodynamics I	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)

2.2.2) Engineering Elective Courses at least 6 credits

* Student who opts for cooperative program has to choose 6 credits of the following course

03501490	Cooperative Education	6
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* Student who does not opt for cooperative program has to choose at least 3 credits of the following courses

03503495	Marine Engineering Project Preparation	1(0-3-2)
03503499	Marine Engineering Project	2(0-6-3)

and choose to study engineering elective courses of not less than 3 credits

Engineering Elective Courses

Structures Engineering and Materials

03501423	Marine Corrosion	3(3-0-6)
03501425	Composite Structures	3(3-0-6)
03501445	Coastal Engineering and Management	3(3-0-6)
03503481	Materials Selection and Failure Analysis for Marine Applications	3(3-0-6)

Energy Engineering and Environmental

03503441	Marine Renewable Energy	3(3-0-6)
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Production Engineering

03503452	Manufacturing Technology in Marine Engineering Applications	3(3-0-6)
03503453	Quality Control for Ship Engineering	3(3-0-6)
03503454	Analysis and Design of Marine Pressure Vessel System	3(3-0-6)

Other

03503496	Selected Topics in Marine Engineering	3(3-0-6)
03503498	Special Problems	1-3

3. Free Electives **3 credits**

4. Internship and Job Visiting **at least 240 hours**
(Non-credit)

- Third year (End of Semester 2)
- Internship

5. Training **at least 24 workdays**

Student has to complete all training courses as follow:

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

- Leadership and Teamwork
- Medical First Aid
- Proficiency in Survival Craft and Rescue Boats
(other than Fast Rescue Boats)
- Advanced Training in Fire Fighting
- On board training
- Maritime English
- Training Courses in Marine Engineering

Course Planning for Marine Engineering 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)
01999111	Knowledge of the Land	2(2-0-4)
03604111	Engineering Drawing	3(2-3-6)
01355xxx	English	3(- -)
	Thai Language	3(- -)
	Information Technology/Computer	<u>1(- -)</u>
	Total	<u>19(- -)</u>

End of Semester 1

- Basic Seaboard
- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
01175131	Swimming for Health	1(0-2-1)
01403114	Laboratory in Fundamental of General Chemistry	1(0-3-2)
01403117	Fundamental of General Chemistry	3(3-0-6)
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)
03603101	Introduction to Computer Programming	3(2-3-6)
	Wellness	3(- -)
	Thai Citizen and Global Citizen	<u>3(- -)</u>
	Total	<u>21(- -)</u>

Maritime English

End of Semester 2

- Medical First Aid
- Proficiency in Survival Craft and Rescue Boats (other than Fast Rescue Boats)
- Advanced Training in Fire Fighting
- Training Courses in Marine Engineering

Second Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417267	Engineering Mathematics III	3(3-0-6)
03501322	Marine Engineering Material	3(3-0-6)
03503231	Diesel Engine	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604223	Basic Principles of Engineering Mechanics	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)
01355xxx	English	3(- -)
	Wellness	<u>2(- -)</u>
	Total	<u>21(- -)</u>

Maritime English

End of Semester 1

- Leadership and Teamwork
- Training Courses in Marine Engineering

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)
03501352	Ship Production and Safety in a Shipyard	3(3-0-6)
03503211	Applied Computer in Marine Engineering	3(2-3-6)
	Total	<u>19(17-6-38)</u>

End of Semester 2

- On board training

Third Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501311	Maritime Engineering Laboratory I	1(0-3-2)
03501351	Maritime Law and Convention for Marine Engineering	3(3-0-6)
03503321	Ship Construction and Stability	3(3-0-6)
03503332	Operations and Maintenance of Main engine and Auxiliary Engines	3(3-0-6)
03503341	Thermal Energy System and Marine Heat Transfer	3(3-0-6)
03503371	Electrical Machine and On Board Maintenance	3(2-3-6)
	Thai Citizen and Global Citizen	<u>3(- -)</u>
	Total	<u>19(- -)</u>

Maritime English

End of Semester 1

- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501312	Maritime Engineering Laboratory II	1(0-3-2)
03503311	Marine Mechanical and Electrical Drawing	1(0-3-2)
03503351	Marine Piping and Operation of Pumping Systems	3(3-0-6)
03503361	Principle of Watch and Fire Prevention	2(1-3-4)
01355xxx	English	3(- -)
	Aesthetics	3(- -)
	Free Electives	<u>3(- -)</u>
	Total	<u>19(- -)</u>

End of Semester 2

- Internship not less than 240 hours

Fourth Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501363	Marine Mechanical Design	3(3-0-6)
03503341	Thermal Energy System and Marine Heat Transfer	3(3-0-6)
03503432	Boiler and Power Plant	3(3-0-6)
03503451	Planned Maintenance System	3(3-0-6)
03503461	Ship Waste Management	2(2-0-4)
03503471	Electronic and Computer Systems on Ship	3(2-3-6)
03503495	Marine Engineering Project Preparation	<u>1(0-3-2)</u>
	Total	<u>18(16-6-36)</u>

Maritime English

End of Semester 1

- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501472	Ship Control Systems	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03503499	Marine Engineering Project	2(0-6-3)
	Engineering Elective Courses	3(- -)
	Free Electives	<u>3(- -)</u>
	Total	<u>14(- -)</u>
Maritime English		

Course Planning for Marine Engineering 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)
01999111	Knowledge of the Land	2(2-0-4)
03604111	Engineering Drawing	3(2-3-6)
01355xxx	English	3(- -)
	Thai Language	3(- -)
	Information Technology/Computer	<u>1(- -)</u>
	Total	<u>19(- -)</u>

End of Semester 1

- Basic Seaboard
- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
01175131	Swimming for Health	1(0-2-1)
01403114	Laboratory in Fundamental of General Chemistry	1(0-3-2)
01403117	Fundamental of General Chemistry	3(3-0-6)
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)
03603101	Introduction to Computer Programming	3(2-3-6)
	Wellness	3(- -)
	Thai Citizen and Global Citizen	<u>3(- -)</u>
	Total	<u>21(- -)</u>

Maritime English

End of Semester 2

- Medical First Aid
- Proficiency in Survival Craft and Rescue Boats (other than Fast Rescue Boats)
- Advanced Training in Fire Fighting
- Training Courses in Marine Engineering

Second Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
01417267	Engineering Mathematics III	3(3-0-6)
03501322	Marine Engineering Material	3(3-0-6)
03503231	Diesel Engine	3(3-0-6)
03604241	Thermodynamics I	3(3-0-6)
03604223	Basic Principles of Engineering Mechanics	3(3-0-6)
03604281	Workshop Practice	1(0-3-2)
01355xxx	English	3(- -)
	Wellness	<u>2(- -)</u>
	Total	<u>21(- -)</u>

Maritime English

End of Semester 1

- Leadership and Teamwork
- Training Courses in Marine Engineering

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)
03501352	Ship Production and Safety in a Shipyard	3(3-0-6)
03503211	Applied Computer in Marine Engineering	3(2-3-6)
Total		<u>19(17-6-38)</u>

End of Semester 2

- On board training

Third Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501311	Maritime Engineering Laboratory I	1(0-3-2)
03501351	Maritime Law and Convention for Marine Engineering	3(3-0-6)
03503321	Ship Construction and Stability	3(3-0-6)
03503332	Operations and Maintenance of Main engine and Auxiliary Engines	3(3-0-6)
03503341	Thermal Energy System and Marine Heat Transfer	3(3-0-6)
03503371	Electrical Machine and On Board Maintenance	3(2-3-6)
	Thai Citizen and Global Citizen	3(- -)
	Free Electives	<u>3(- -)</u>
Total		<u>22(- -)</u>

Maritime English

End of Semester 1

- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03501312	Maritime Engineering Laboratory II	1(0-3-2)
03501472	Ship Control Systems	3(3-0-6)
03501482	Marine Refrigerator and Air Conditioner	3(3-0-6)
03503311	Marine Mechanical and Electrical Drawing	1(0-3-2)
03503351	Marine Piping and Operation of Pumping Systems	3(3-0-6)
03503361	Principle of Watch and Fire Prevention	2(1-3-4)
01355xxx	English	3(- -)
	Aesthetics	3(- -)
	Total	<u>22(- -)</u>

End of Semester 2

- Internship not less than 240 hours

Fourth Year

Semester 1

Course Number	Title	Credits (lecture-lab-self study)
03501363	Marine Mechanical Design	3(3-0-6)
03503341	Thermal Energy System and Marine Heat Transfer	3(3-0-6)
03503432	Boiler and Power Plant	3(3-0-6)
03503451	Planned Maintenance System	3(3-0-6)
03503461	Ship Waste Management	2(2-0-4)
03503471	Electronic and Computer Systems on Ship	3(2-3-6)
	Free Electives	<u>3(- -)</u>
	Total	<u>20(- -)</u>

Maritime English

End of Semester 1

- Training Courses in Marine Engineering

Semester 2

Course Number	Title	Credits (lecture-lab-self study)
03503499	Cooperative Education	<u>6</u>
	Total	<u>6</u>
	Maritime English	

COURSE DESCRIPTIONS

- 03503211 Applied Computer in Marine Engineering 3(2-3-6)
Prerequisite : 03604111
Computer aided design and drawing for marine engineering. Developing and designing model parts by computer. Computer aided manufacturing. Programming for manufacturing. Simulation of the parts manufacturing process. G-code and M-code for CNC machining. Computer aided analysis in marine engineering.
- 03503231 Diesel Engine 3(3-0-6)
Marine diesel engine components. Principle of 2-stroke and 4-stroke engines. Timing diagram. Scavenging. Fuel and lubricant properties. Combustion knock. Fuel diagram. Lubrication diagram. Cooling diagram. Diesel cycle. Brake horsepower. Mechanical efficiency. Thermal efficiency. Indicator diagram. Maintenance and Troubleshooting. Main engine preparation for starting.
- 03503311 Marine Mechanical and Electrical Drawing 1(0-3-2)
Prerequisite : 03604111
Machine parts drawing. Screw threads. Keys and splines. Rivets. Welding. Gears. Springs. Fits and tolerance determination. Working drawing. Detail and assembly drawing of mechanical system. Pipework installing drawing. Plans of ship structures and machinery. Type of Electrical diagram drawing. Single-line diagrams. Wiring diagrams. General arrangement diagrams. Control wiring diagrams. Wiring diagram according to ANSI, DIN, IEC and JIS.
- 03503321 Ship Construction and Stability 3(3-0-6)
Prerequisite : 03604223
Law of flotation. Weight and buoyancy force. Ship displacement. Tonnes per centimetre immersion (TPC). Fresh water allowance. Static stability. Initial stability. Angle of loll. Curves of static stability. Moment of the center of gravity. List and its correction. Effect of slack tanks. Trim and draught calculations using trim tables. Status of ship stability when ship leak.

Stress tables and stress calculation equipment. Load lines and draft marks. rudders and propellers. Water tight integrity of commercial ships. Construction details of bow, stern, double bottom, holds, water tight bulkhead, hatch and hatch cover, tank and ballast, deckhouse and bulkhead structure.

03503331 Mechanics of Marine Machinery 3(3-0-6)

Prerequisite : 03604223

General machinery room layout and schematic diagrams of machinery systems. Types of pumps. Pump characteristics and their applications. Piping arrangement of bilge. Analysis of mechanical strength. Cranes and transport systems. Graphical linkage synthesis. Cam design. Inspection and maintenance of pumps. Operating principles of deck machinery such as mooring winch crane and lifeboat davits. Steering gear control systems.

03503332 Operations and Maintenance of Main Engine and Auxiliary Engines 3(3-0-6)

Prerequisite : 03503231

Managing and planning main Engine and all auxiliary machinery system. Operation and maintenance of fuel, lubricant, water ballast and other liquids. Planning procedure in normal works and emergency of main engine and all auxiliary machinery system. Defective main engine operations. Power failure operations. Fault detection and necessary measures to prevent damage.

03503341 Thermal Energy System and Marine Heat Transfer 3(3-0-6)

Prerequisite : 03501281

Principles of heat transfer. Conduction. Convection and radiation. Heat exchangers and heat transfer enhancement. Systems simulation and optimization, one and two dimensional steady state heat conduction. Numerical and graphical solution techniques. Natural convection. Forced convection. Thermal radiation. Boiling and condensation. Optimized system for fans pumps, compressors-engines, expanders turbines, heat exchangers and fluid flows in conduits. The laws of heat and mass transfer with heat exchanger.

03503351	Marine Piping and Operation of Pumping Systems Prerequisite : 03501241	3(3-0-6)
	<p>Materials pipe. Insulation pipe. Piping design code and standard. Welding. Nondestructive testing of well-meant. Pipe jointing. Drawing pipe system. Fitting and accessories pipe. Characteristic of pump. Design of pumping system. Water and water cold piping system design. Fuel gas piping system design. Air compressor piping system design. Steam piping system design. Pipe support system design. Routine operations of fuel, lubricant, bilge and ballast systems. Cargo pumping systems. Operation of oil purifier.</p>	
03503361	Principle of Watch and Fire Prevention	2(1-3-4)
	<p>Thorough knowledge of principles to be observed in keeping and engineering watch. Safety and emergency procedures. Safety precaution to be observed during a watch and immediate actions to be taken. Engine-room resource management. Use English in written and oral form. Use internal communication system. Fire prevention and fire fighting system. International Safety Management Code (ISM Code). Functional requirements for Safety Management System (SMS). How to safely operations under the International Convention on the Safety Of Life At Sea (SOLAS).</p>	
03503371	Electrical Machine and On Board Maintenance Prerequisite : 03501271	3(2-3-6)
	<p>DC and AC generator. DC and AC motor. Transformer and rectifier. DC and AC switchboard. Electrical circuit protection. Battery and lamp in marine usage. Maintenance and repair of electrical and electronic equipment. Safety requirements for working on electrical systems onboard. Detection if electric malfunction and measures to prevent damage. Construction and operation of electrical testing and measuring equipment. Function and performance test and configuration. High voltage system. Electrical system installation</p>	

03503431	Ship Vibration and Propulsion Prerequisite : 01417267 Vibration and the free response. Response to harmonic excitation. General forced response. Multi degree of freedom system. Design for vibration suppression. Distributed-Parametered systems. Problem analysis by computer programs. Problem solving with numerical methods. Analysis and Solve Vibration Problems of main machine and auxiliary machine, propulsion shafting, rudder system. Isolation system design for eliminate vibration of main propulsion machine and auxiliary machinery.	3(3-0-6)
03503432	Boiler and Power Plant Prerequisite : 03501281 Thermal power plant. Thermodynamics. Cycles and processes steam. Fuel and combustion. Auxiliaries boiler. Pretreatment and feed water-heating. Steam boiler. Steam turbines. Stream condensing. Draft equipment. Smokestack and fans. The Pollution control of flue gases. Internal combustion engine of Nuclear gas turbine. Economics analysis. Auxilality control. Oil water separator by the contaminated oil does not exceed 1 5 ppm. Sewage treatment system and sludge transmission.	3(3-0-6)
03503441	Marine Renewable Energy Marine environment and energy resources. Definitions and orders of magnitude on the subject of marine energy. Constraints of marine environment. Significance of renewable energy. Principles of marine renewable energy. Converting marine energy to renewable energy. Wind energy. Wave energy. Tidal energy. Tidal stream energy. Swel energy. Marine current energy. Ocean thermal energy. Osmotic energy. Case studies.	3(3-0-6)
03503451	Planned Maintenance System Objective of Planned Maintenance System (PMS). Establishment of a complete database of machinery, equipment and fittings. Plan, perform and document vessel maintenance at intervals complying with Class and manufacturer requirements. Systematic maintenance approach based on risk assessment. Maintenance schedule and job procedures. Spare parts inventory	3(3-0-6)

management. Preparations for dry docking and undocking. Survey work and maintenance during dry dock. Unplanned maintenance. Working planned maintenance system according to the International Safety Management Code (ISM Code).

- 03503452 Manufacturing Technology in Marine Engineering Applications 3(3-0-6)
Manufacturing technology significance in marine applications. Non-destructive Examination. CNC Machining Technology. Metal Forming Technology. Casting Technology. Forging Technology. Rolling Technology. Extrusion Technology. Drilling Technology. Milling Technology, Turning Technology. Grinding Technology. Welding Technology. Geometric Dimensioning and Tolerancing. Case studies for marine engineers.
- 03503453 Quality Control for Ship Engineering 3(3-0-6)
Principle of quality control. Statistical quality control. Variable control charts, Attribute control charts. Other statistical process control. Process capability analysis, Acceptance sampling. Attributes sampling plan and Variable sampling plans when navigation ship and docking ship.
- 03503454 Analysis and Design of Marine Pressure Vessel System 3(3-0-6)
Prerequisite : 03501221
Pressure vessel design. Components and materials of the standard pressure tank. Gas tank design. Oil storage tank design. Water tank design. Ballast tank design. Heat exchanger design. Design of pressure tank applied to liquid carrier ship. Design of pipe inside tank pressure.
- 03503461 Ship Waste Management 2(2-0-4)
The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78). Prevention of pollution of the sea by oil. Control of pollution by noxious liquid. Prevention of pollution by harmful substances carried by sea in packaged form. Prevention of pollution by sewage from ships. Prevention of pollution by garbage from ships. Prevention of air pollution from ships. Engineering techniques for the control and management of ship waste.

03503471	Electronic and computer systems on ship Principle of electronic circuit. Network theory. Analog and digital signal transmission line. Introduction to the operation of optimization equipment using machine learning and artificial intelligence. Operation of marine electronics equipment controlled by information technology and internet of things.	3(2-3-6)
03503481	Materials Selection and Failure Analysis for Marine Applications Materials selection significance in marine applications. Type of materials and important properties. Materials Charts. Materials selection and case studies. Product defects and testing. Materials degradation. Failure modes in materials. Corrosion and mechanical failure. Failure analysis and prevention. Case studies.	3(3-0-6)
03503490	Cooperative Education On the job training as a temporary employee according to the assigned project including report and presentation.	6
03503495	Marine Engineering Project Preparation Preparation of project proposal. Literature review. Project planning. Progress report writing and presenting project proposal.	1(0-3-2)
03503496	Selected Topics in Marine Engineering Selected topics in marine engineering at the bachelor's level. Topics are subject to change each semester.	3(3-0-6)
03503498	Special Problems Study and research in marine engineering at the bachelor's level and compile into a report.	1-3
03503499	Marine Engineering Project Prerequisite : 03503495 Project of practical interest in various fields of marine engineering project.	2(0-6-3)

Required fundamental course descriptions

01403114	Laboratory in Fundamentals of General Chemistry Prerequisite : 01403117 Laboratory in Fundamentals of General Chemistry.	1(0-3-2)
01403117	Fundamentals of General Chemistry 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.	3(3-0-6)
01417167	Engineering Mathematics I Limits and continuity of functions, derivatives and applications, differentials, integration and applications, polar coordinates, improper integrals, sequences and series, mathematical induction.	3(3-0-6)
01417168	Engineering Mathematics II Prerequisite : 01417167 Vector and solid analytic geometry, calculus of multivariables functions, calculus of vector – valued functions.	3(3-0-6)
01417267	Engineering Mathematics III 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.	3(3-0-6)
01420111	General Physics I Mechanics, harmonic motion, waves, fluid mechanics, thermodynamics.	3(3-0-6)

01420112	<p>General Physics II</p> <p>Prerequisite : 01420111</p> <p>Electromagnetism, electromagnetic waves, optics, introduction to modern physics and nuclear physics.</p>	3(3-0-6)
01420113	<p>Laboratory in Physics I</p> <p>Prerequisite : 01420111 or Corequisite or 01420117 or Corequisite</p> <p>Laboratory for General Physics I or Basic Physics I.</p>	1(0-3-2)
01420114	<p>Laboratory in Physics II</p> <p>Prerequisite : 01420113 และ 01420112 หรือพร้อมกัน หรือ 01420118 หรือพร้อมกัน</p> <p>Laboratory for General Physics II or Basic Physics II.</p>	1(0-3-2)
03501214	<p>Marine Electrical Engineering Laboratory</p> <p>Prerequisite : 03501271 or Corequisite</p> <p>Fundamental experiments on marine electrical engineering, DC circuits, AC circuits, power factor correction, electrical characteristic test for important marine electrical devices and equipment.</p>	1(0-3-2)
03501221	<p>Ship Structures I</p> <p>Prerequisite : 03604223</p> <p>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.</p>	3(3-0-6)
03501241	<p>Fluid Mechanics in Naval Architecture and Marine Engineering</p> <p>Prerequisite : 01417168</p> <p>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.</p>	3(3-0-6)

- 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 Maritime Engineering Laboratory I 1(0-3-2)
Prerequisite : 03604241 and 03501221
Dynamic labs. Material and structure tests. Thermodynamics and heat transfer labs. Engine tests.
- 03501312 Maritime Engineering Laboratory II 1(0-3-2)
Prerequisite : 03501241 and 03501334 or 03503321
Experiments on fluid mechanics. Naval architecture and ocean engineering labs. Ship buoyancy and stability labs. Ship model testing. Ship incline experiment. Propeller test.
- 03501322 Marine Engineering Material 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.

- 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 and Safety in a Shipyard 3(3-0-6)
- Prerequisite : 03501322
- Theories and concepts of ship manufacturing processes. Casting. Hot and cold forming. Cutting, Turning, Shaping, Drilling, Milling, Welding and Surface Finishing. Relationship of manufacturing processes and materials. Production cost estimation. Locations and layouts of the shipyard. Dry docks and Ships maintenance. Quality and Inspection control. System control and Safety operation of Health and Environment. Health, Safety and Environment, Fire protection System in a Shipyard.

03501363	Marine Mechanical Design Prerequisite : 03501221	3(3-0-6)
	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, design and sizing of outfitting, prevention of oil pollution in the sea and design project.	
03501423	Marine Corrosion Prerequisite : 03501322	3(3-0-6)
	Role of corrosion engineering. Metallic materials and their applications in engineering purposes. Electrochemical corrosion principles. Influences of environmental parameters on corrosion behaviors of metals. Forms of corrosion. Marine corrosion. Corrosion prevention and control. 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.	
03501472	Ship Control Systems Prerequisite : 01417267 and 03501271	3(3-0-6)
	Automatic control principles, analysis and modeling of linear control elements, stability of linear feedback systems, design and compensation of control systems, time domain design, lead and lag compensator design, frequency response, application of control theory to steering systems and fin action, ship motion control, marine robotics, and auto pilot system.	

03501482	<p>Marine Refrigerator and Air Conditioner</p> <p>Prerequisite : 03501281</p> <p>Basic knowledge of refrigeration and coefficient of performance. Modified vapor compression refrigeration cycles. System components analysis of the refrigeration in ship. General refrigerant and their properties and that specified under MAPOL recommendation. Evaporative cooling and cooling towers. Absorption refrigeration. Calculation of cooling load of refrigeration systems in ship. Freezing of foods in ship. Air condition in ship. Cooling load estimation of air conditioning systems in ship. Air distribution and duct system design in ship. Safety device and control under the SOLAS.</p>	3(3-0-6)
03603101	<p>Introduction to Computer Programming</p> <p>Computer concepts. Computer components. Hardware and software interaction. EDP concepts. Program design and development methodology. High-level language programming.</p>	3(2-3-6)
03604111	<p>Engineering Drawing</p> <p>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.</p>	3(2-3-6)
03604223	<p>Basic Principles of Engineering Mechanics</p> <p>Prerequisite: 01417167</p> <p>Force systems and resultant. Equilibrium. Dry friction. Application of equilibrium equations to structures and machines. Fluid statics. Kinematics and kinetics of particles and rigid bodies. Newton's laws of motion. Principles of work and energy. Impulse and momentum.</p>	3(3-0-6)
03604241	<p>Thermodynamics I</p> <p>Prerequisite : 01417167</p> <p>Properties of pure substances. Ideal gas. Basic heat transfer and energy conversion. First law of thermodynamics. Second law of thermodynamics and Carnot cycle. Entropy.</p>	3(3-0-6)

03604281

Workshop Practice

1(0-3-2)

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