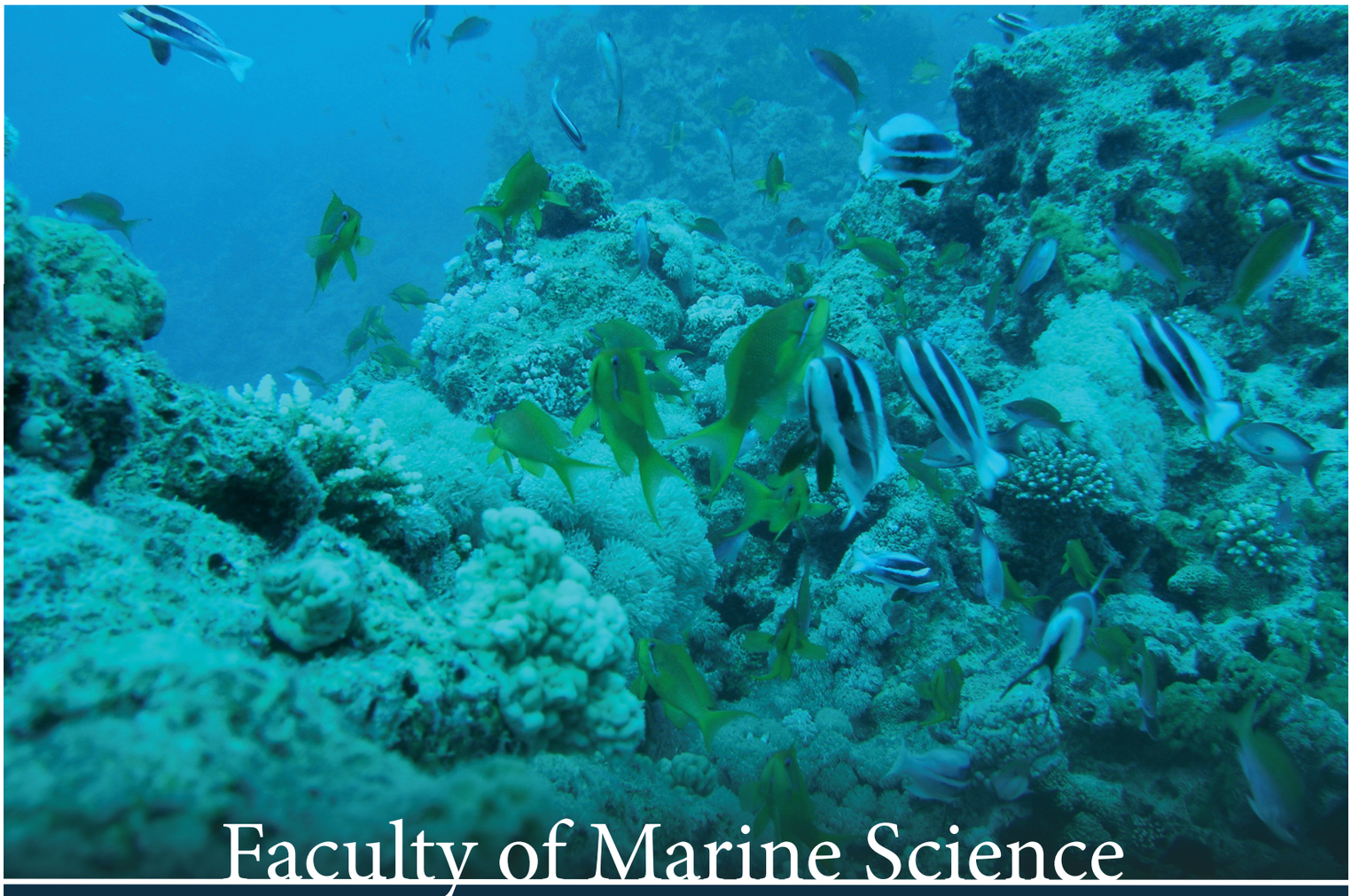

Faculty of Marine Science

Faculty Contact:

Dean's Office
Tel: 6952383 Fax: 6401747
Email : *mar@kau.edu.sa*
Web Site: *http://marine.kau.edu.sa*

History:

In 1974 the department of Oceanography was established within the Faculty of Science. In the beginning, the department limited it's activities to teaching courses in Marine Biology. In 1978 the department was expanded and became the Marine Science institute of King AbdulAziz University. Courses in Marine Physics, Marine Chemistry and Marine Geology were soon introduced so that graduates would have commanding knowledge of the marine environment. In 1981 the Faculty of Marine Science was established.

Vision:

- Excellence in higher education and training programs in Marine Science & Maritime Studies.
- Quality research to serve national and international interests.
- Marine environmental protection programs.
- Exploration of marine natural resources to support the national economy.

Mission:

To serve the nation's marine interests and to develop outstanding academic programs compatible with national and international standards.

Unique Features:

The faculty is credited with being the first faculty of Marine Sciences to be established in Saudi Arabia and the Middle East. To date it is the only faculty in Saudi Arabia offering academic degrees in the field of Marine Sciences.

Faculty of
Marine Science

Graduation Requirements:

To earn a B.Sc degree in Marine Sciences students must complete between 128 and 156 credit hours distributed as follows:
1.) 128 credit hours for Marine Biology, Marine Geology, Marine Chemistry, and Marine Physics.
2.) 129 Credit Hours for Ports and Marine Transportation
3.) 143 Credit Hours for Hydrographic Surveying
4.) 156 Credit Hours for Marine Engineering Program

- •14 credit hours of University courses,
- •15 credit hours of preparatory year courses,
- • 9 credit hours of faculty core courses,
- •18 credit hours of courses from all four faculty departments (Marine Biology Marine Geology Marine Chemistry, and Marine Physics Programs) ,
- •36 89 credit hours of core departmental courses according to specialization,
- •7-19 credit hours of elective courses, and
- •4-12 credit hours of summer training and long sea training.

Department Requirements (Credit Hours 9)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MS	201	Oceanography	3	3			
2	MS	202	Marine Ecology	3	3			
3	MS	231	Fundamental of Marine Safety	3	2	3		
			Total	**9**	**8**	**3**		

Combined Courses (Credit Hours 18)
Required courses for the departments of:

- •Marine Biology | •Marine Geology
- •Marine Chemistry | •Marine Physics Programs

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	EMR	201	Physical Geology	4	3	3		
2	MSC	301	An Introduction to Marine Pollution	2	2			MS 201
3	MSC	302	Dynamics of Marine Ecosystems	2	2			MS 201
4	MSC	303	Marine Biogeochemistry	2	2			CPIT 100
5	MSC	304	Oceanographic Data Processing	2	1	3		
6	MSC	305	An Introduction to Remote Sensing in Marine Environment	2	2			MS 201
7	MSC	306	An Introduction to Integrated Coastal Zone Management	2	2			
8	MSC	307	Cooperative and Field Training	2	1	3		
			Total	**18**	**15**	**9**		

Departments and Academic Degrees:

There are five departments offering the B.Sc. degree and four departments offering M.Sc. degrees.

Department / Program	Academic Degree
Marine Biology	B.Sc. and M.Sc.
Marine Geology	B.Sc. and M.Sc.
Marine Chemistry	B.Sc. and M.Sc.
Marine Physics	B.Sc. and M.Sc.
Maritime Studies Navigation Maritime Studies Survey Maritime Studies Ports and Transport Maritime Studies Marine Engineering	B.Sc.

Public Journals:

Publications : Journal of the Faculty of Marine Sciences
Contact No. :
Email : *ms.journal@kau.edu.sa*
Website : *http://www.kau.edu.sa/centers/spc/jkau/Marine/V.aspx?vol=1*

Faculty of
Marine Science

Course Descriptions:

MS 201: Oceanography
A study of the physical and chemical characteristics of the sea, major divisions of organisms in the sea and geological oceanography, topics include characteristics of sea water (temperature, salinity, density, pressure and osmotic pressure), different methods of determining salinity properties of sea ice, heat, salt and water budgets, evaporation, acoustic and optical properties of sea water, a special lecture will be given explaining the collection of marine data and analysis of sea water and sea floor sediments and determination of the physical and chemical factors in addition to study of the taxonomy of different groups of marine animals and plant.

MS 202: Marine Ecology
Identify the basics of the ecosystem and its compounds and characteristics. Topics include definition of Marine Ecology Principle of ecology, the ecosystem and its components.
Prerequisites: MS 201

MSN 230: Fundamentals of Marine Safety
The aim of this course is to familiarize students with the basic principles of marine safety required to obtain certificates in personal survival, firefighting, medical first aids and Personal safety and social responsibilities as mentioned in STCW Convention and IMO Module Courses 1.19, 1.20, 1.13 and 1.21.
Content: An introduction to emergency situations, Safety equipments and requirements, Personal life saving appliances, distress signals, and survival crafts. Practical training in survival crafts; fire fighting drills; medical care for rescued persons.

MSC 301: Introduction to Marine Pollution
This course integrates material on marine pollution from the field of marine science and offers a unified approach to controlling the adverse effects of wastes disposal in the marine environment.
Contents: Definition of pollution (categories of additions, sources of inputs), types of marine pollutants (organic wastes, oil spills, metals, halogenated hydrocarbons, radioactivity waste, solid wastes and heat); sources, dispersion and fate of pollutants, the effects caused by pollutants on marine environment and humans.

MSC 302: Dynamics of Marine Ecosystems
Content: Processes on scales of less than 1 Kilometer: Changes in water column physical structure (mixed layer depth) and their effect on planktonic organisms, Mechanism of phytoplankton spring bloom , Effects of boundary layer on phytoplankton (swimming , sinking) , zooplankton (feeding) and benthic organisms (drag). Processes on scale of 1 to 1000 kilometers: Coastal upwelling and its effect on both productivity (primary , secondary) and fish – Internal waves as nutrient pumps and their role in the concentration and transportation of planktonic organisms, biological significance of water fronts (tidal mixing , shelf-seas). Processes on scale of more than 1000 Kilometers: Wind-driven circulation and its role in biological productivity distribution, variability in ocean circulation (El Nino phenomena) and the effect on biological productivity, biological significance of the oceanic deep thermo.
Prerequisites: MS 201

MSC 303: Marine Biogeochemistry
A study of Marine Biochemistry. Topics include: Biogeochemical cycle, constancy of composition of seawater (concepts), exchange at the boundaries: ocean/land (transport of sediments and dissolved substances through estuaries), ocean/atmosphere (gas exchange and fallout), water/sediments (interaction at the particle/water interface and distribution coefficient), water/biota, biolimiting elements and their vertical and horizontal segregation, interference between carbon, oxygen and sulfur.
Prerequisites: MS 201

MS 304: Oceanographic Data Processing
The aim of this applications in data processing in the field of oceanography.Contents: Data entry, storage and recovery, data graphical representation methods and their use in data interpretation, data errors and their correction , filing the data gaps, essential statistical parameters , linear regression and correlation, principles of programming.
Prerequisites: CPIT 100

MSC 305: Introduction to Remote Sensing in Marine Environment
Students will learn the basis of remote sensing and its important role in oceanographic/marine environment data collections, history and definitions of remote sensing physical principles of remote sensing, remote sensing systems and platforms sensors and its technology, Orbits and its determinations, introduction to GPS and LiDAR oceanography satellites.

MSC 306: Introduction to Integrated Coastal Zone Management
The aim of this course is to provide students with the opportunity to apply the knowledge and skills gained in previous coursework and to develop their professional skills in preparing a coastal resource management plan.The course provides professional experience in researching, developing and presenting a coastal plan or document. Develop working knowledge and skills in understanding and accomplishing established objectives in coastal management and environmental resources management.
Prerequisites: MS 201

MSC 307: Cooperative and Field Training
Training students in data collection for a period of at least six weeks. Contents: Particularity on working aboard research vessels, selection of instruments with suitable specifications, selection of appropriate means of transportation of instruments to study area, principal sampling requirements and their relations to spatial and temporal dimension of measured phenomena in the study area.

Department of
Marine Biology

Department Contact:

Chairman's Office
Tel: 9652385 Fax: 6401747
Email : *ms.mb@kau.edu.sa*
Web Site: *http://marine.kau.edu.sa*

History:

The Department of Marine Biology was established in 1975.

Vision:

- Pioneers in higher education with concentration on PhD and training programs in marine biological and environmental sciences.
- Quality research to serve the national and regional interests.
- Marine awareness programs for the benefit of society and the environment.
- Exploration of Marine living resources to support the national economy.

Mission:

Quality educational and training in marine biological and environmental sciences, to raise marine awareness for the benefit of society and the environment.

Departmental Requirements:

Students must complete 128 credit hours distributed as follows:

- (27) Prep Year courses for Scientific Colleges
- (14) University requirements
- (9) Faculty Requirements
- (18) Combined Courses Between the Faculty Department
- (36) Core and Elective courses
- (19) Elective Courses for Aquaculture Track
- (19) Elective Courses for Marine Ecology Track
- (19) Elective Courses for Marine Fisheries Track
- (5) Free Courses

Department of

Marine Biology

Core Departmental Courses: (Credit Hours 36)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MB	320	Marine Botany	3	2	3		BIO 110
2	MB	321	Marine Invertebrates	3	2	3		BIO 110
3	MB	322	Ichthyology	3	2	3		BIO 110
4	MB	323	Principles of Aquaculture	2	1	3		BIO 110
5	MB	324	Fish Health Management	2	2			BIO 110
6	MB	325	Principles of Swimming and Diving	2	1	3		
7	MB	345	Marine Microbiology	2	1	3		BIO 110
8	MB	346	Physiology of Marine Organisms	3	2	3		MB 320,MB 322
9	MB	347	Introduction to Marine Fisheries	2	2			MB 322
10	MB	348	Marine Plankton	3	2	3		MB 321
11	MB	420	Marine Benthos	2	1	3		MB 321, MB 322
12	MB	421	Coral Reefs	2	1	3		MB 321
13	MB	422	Biostatistics and Experimental Design	3	3			STAT 110
14	MB	490	Research Project	4				
			Total	**36**	**22**	**30**		

Elective Courses for Aquaculture Track: Students select 19 credit hours from the following courses

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
15	MB	424	Aquaculture LAB 1	2	1	3		MB 321, 322, 323
16	MB	425	Aquaculture LAB 2	2	1	3		MB 321, 322, 323
17	MB	426	Fish Culture	2	2			MB 322, 323, 424
18	MB	427	Hatchery and Nursery	2	2			MB322, 323, 425
19	MB	428	Fish Diseases	2	2			MB 322, 347, 425
20	MB	429	Crustacean Culture and Mollusk	2	2			MB 321, 323, 424
21	MB	430	Marine Plant Culture	2	2			MB 320 MB 424
22	MB	460	Fish Nutrition	2	2			MB 322, 323, 425
23	MB	461	Special Topics in Biological Oceanography	2	2			MB 322, 323, 346
24	MB	462	Marine Laboratory Techniques	2	1	3		MB 322, 323, 462
25	MB	463	Fish Processors	2	2			
26	MB	464	Small Aquarium Management	2	1	3		MB 322 MB 323
27	MB	465	Genetics Applications in Fish	2	2			MB 346 MB 462
28	MB	466	Marine Biotechnology	2	2			MB322, 323, 462
29	MC	462	Marine Biochemistry	3	2	3		MS201CHEM201
			Total	**31**	**26**	**15**		

Elective Courses for Marine Ecology Track: Students select 19 credit hours from the following courses:

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
30	MB	431	Marine Ecology LAB 1	2	1	3		MB 321 MB 322
31	MB	432	Marine Ecology LAB 2	2	1	3		MB 321 MB 322
32	MB	433	Marine Biodiversity	2	2			MB 321, 322 MB 421
33	MB	434	Ecology of the Red Sea and Arabian Gulf	2	2			MS201 MB421
34	MB	435	Marine Mammals and Turtles	2	2			MB 322
35	MB	436	Environmental Impact Assessment	2	1	3		MS 201
36	MB	466	Marine Biotechnology	2	2			MB322, 323, 462
37	MB	467	Mangrove Ecosystem	2	2			MS 201, 320, 422
38	MB	468	Pollution Effects on Marine Organisms	3	2	3		MB 321, 322
39	MB	469	Marine Primary Producers	2	2			MB 363, 422
40	MB	470	Marine Animal Behavior	2	2			MB 321 MB 322
41	MP	440	Integrated Coastal Zone Management	2	2			MS 201
42	MC	372	Marine Pollution	3	2	3		MS 201
			Total	**28**	**23**	**15**		

Department of
Marine Biology

Elective Courses for Marine Fisheries Track Students select 19 credit hours from the following courses:

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
43	MB	428	Fish Diseases	2	2			MB322 MB347 MB425
44	MB	435	Marine Mammals and Turtles	2	2			MB 322
45	MB	437	Larval Development of Marine Organisms	3	2	3		MB 321 MB 322
46	MB	438	Marine Fisheries LAB	2	1	3		MB 322 MB 347
47	MB	439	Fisheries Dynamics	2	2			MB322 MB347 MB 428
48	MB	440	Fishing Method and Gears	2	2			MB322 MB347 MB428
49	MB	441	Fisheries Management	2	2			MB322 MB347
50	MB	463	Fish Processors	2	2			MB322 MB323 MB462
51	MB	464	Small Aquarium Management	2	1	3		MB322 MB 323
52	MB	465	Genetics Applications in Fish	2	2			MB346 MB462
53	MB	466	Marine Biotechnology	2	2			MB322 MB323 MB462
54	MB	468	Pollution Effects on Marine Organisms	3	2	3		MB321 MB322
55	MB	470	Marine Animal Behavior	2	2			MB321 MB322
			Total	28	24	12		

Course Descriptions:

MB 320: Marine Botany
Students study the morphological characteristics, groups and environment of algae, mangroves and sea grasses in addition to the importance of environments and economics of marine plants. Contents: The morphology of algae, Asexual and sexual reproduction of algae life Cycle, Classification of algae groups and algae (Cyanophyceae, Chlorophyceae, Rhodophyceae, Phaeophyceae, Chrysophyceae, Bacillariophycea, Dinophyceae, Cryptophycea, Prymenisophyceae, and Euglenophyceae), environments of algae – Relation between algae, human being and environment. Principles and methods of algal culture and their economics, Importance of marine plant Economics. Morphological and anatomical adaptation, Environmental requirements, biogeography, zonation biomass and soil characteristics. Seasonality, litter fall and decomposition. Nutrient cycle and export. Environmental and pollution stresses.
Prerequisites: BIO 110

MB 321: Marine Invertebrates
This course aims to introduce students to recognize and understand the taxonomy and the biology of the marine invertebrates, starting from the microscopic animalcules (Protozoan organisms) up to the visible to the naked eye organisms (worms phyla), crustacean, molluscan and echinoderms.Contents: Biological and taxonomical study of patterns of marine invertebrates such as Foraminifer, Heliozoans, Radiolarians, Mastigophorans, & Ciliates (Protozoans), Poriferans (Sponges), Coelenterates, Ctenophores. Worm phyla, Platyhelminthes, Nemertina, and Nematodes, Crustacean, Molluscan and Echinoderms, including examples representing each group describing their environment, external features, internal structures, life cycles, vital systems , and their economic importance.
Prerequisites: BIO 110

MB 322: Ichthyolog
The basic aim of this course is to provide a brief overview of the classification and geographical distribution of fish throughout the world, and variations among fishes in their external morphology and internal systems. It provides an account of fish ecology, food and feeding habits, migration, and reproduction etc...Contents: An introduction to classification and geography of fishes, study of the adaptation and modification in external features and internal systems. Study some aspects such as ecology, food and feeding habits, reproduction and migration etc...
Prerequisites: BIO 110

MB 323: Principles of Aquaculture
This course is an introduction to aquaculture.
Contents: The historic background and definitions of aquaculture species and methods. Water parameters, water systems, (open, close, semi close) water sources and quality, Environment, water degradation aquaculture. Nutrition sources natural, supplemental and prepared feeding Initial precaution and pollution control.
Prerequisites: BIO 110

MB 324: Fish Health Management
This course will provide an overview of infection and non-infection diseases in marine environment and in aquaculture. The course will discuss the economic effect of aquatic diseases.
Contents: The meaning of disease in relation to aquatic organism, common causes of diseases in farmed and wild marine animals, complex interactions between the pathogens and host , immune system in fish and immune response.
Prerequisites: BIO 110

MB 345: Principles of Swimming and Diving
Basic equipment, ears and sinuses, circulation and respiration, hypoxia anoxia, and drowning, conduction, exhaustion- protective clothing- diving accessories and safety equipment, physics of gases, Archimedes principle, principles of aqualung- life jacket and buoyancy aids- burst lung and emergency ascent- decompression sickness and its avoidance, nitrogen narcosis, CO2 poisoning, Co poisoning and O2 poisoning and dangerous marine life, venomous and fire coral.

Department of
Marine Biology

MB 346: Marine Microbiology
This course is intended to introduce students to the world of microbiology. It provides a sound introduction to the main elements of marine microbiology: including the habitats and ecology of marine microorganisms, their taxonomy, and a practical guide to microbiological techniques and methods.Contents: The Characteristics of groups of microorganisms: importance and distribution in nature, morphology, fine structure, growth and nutrition of bacteria. Influence of biological factors on marine microorganisms. Habitat and taxonomy of marine micro organisms. Role of bacteria and other microbes in elements cycling. Benefits and male fits of marine micro organisms.
Prerequisites: BIO 110

MB 347: Physiology of Marine Organisms
This course provides students with general overview of the physiological aspects of marine organisms , and examines the similarities and differences between structural parts and their functional systems in a natural assemblage of aquatic organisms , in addition to environmental effects on aquatic organisms' physiology.
Contents: Photosynthetic, pigments and energy sources , photosynthesis & respiration , Osmotic,regulation fermentation - nitrogen fixation - extra cellular product of algae , movement & Rhythm , Polarity and morphogenesis , effect of environmental factors on marine plants and physiological adaptation.
Prerequisites: MB 320, MB 321

MB 348: Introduction to Marine Fisheries
This course is intended to introduce students to marine commercial fisheries, and the effects of ecological parameters on fisheries. Contents: Fisheries resources (location and species) , commercial values , effects of ecological parameters , developmental inhibitors , policy and management , economical agreements , fisheries marine laws. Commercial fisheries and their importance to world food supply, Methods of harvest and products marketed , Economic problems of common property resources.
Prerequisites: MB 322

MB 349: Marine Plankton
Study of the plankton organisms, their divisions & growth factors; Economical and ecological importance and its importance in the food chain, the larval stages for the groups of the animal kingdom.Contents: The introduction to phytoplankton , Phytoplankton definitions, Principles of classification , Phytoplankton groups and classifying according to size – Factors affecting the growth of , phytoplankton , Primary production , factors affecting floatation , seasonal succession and vertical distribution – ecology and life cycle , quantitative and qualitative methods , coastal and oceanic plankton , Vertical migration and parameters that effect on. Seasonal and spatial variations , reactions between plankton and other organisms , effects of pollutants on plankton , Economical and ecological importance – Plankton in Red Sea and Arabian Gulf , Economical methodology of plankton culture.
Prerequisites: MB 321

MB 420: Marine Benthos
This course is intended to introduce students to the different benthic environments and the relationship between benthic fauna and their environments and the adaptation methods. The importance of benthic organisms in the marine food chain, and marine ecology.Contents: The divisions of benthic environments , Coastal and deep-sea benthic communities , Condition of benthic organisms life in different environments , Ecology of deep-sea organisms , Methods of collection and extraction of marine benthos from sediments , Sediment analysis , Effect of marine benthos on the sediments structure (bioturbation).
Prerequisites: MB 321, MB 322

MB 421: Coral Reefs
A study of the ecological factors that impacts coral reefs, and ways of protecting coral reefs. Contents: Coral reef through geological past characteristics and composition of recent reefs, biological and physical, characteristics (body, shape, size, color, tentacles and mutualistic relationship with Zooxanthelae) ecological requirements of coral reefs, types of corals and reefs.
Prerequisites: MB 321

MB 422: Biostatistics and Experimental Design
This course is intended to introduce students to different statistical methods of designing, and analyzing experimental designs. Contents: Analytical terminologies used in experimental design , Experimental design , Replication - Randomization - Experimental error , Experimental error control , Principles of a good experiments , Types of experimental designs (simple and factorial experiments) , Statistical analysis , F test , ANOVA tables , Means comparison , Means tables.
Prerequisites: STAT 110

MB 490: Research project
This course enables students to perform a complete scientific research in one of the marine biology and environment fields. Students, under the supervision of one or more department members, will conduct a scientific research to study a marine biology phenomena through data collection, data analysis and data interpretation in light of previous studies , Students will present their research and its results in a seminar where a departmental committee will discuss and evaluate students.

Elective Courses - Aquaculture Division

MB 424: Aquaculture LAB 1
Students carry laboratory experiments in the cultivation of selected species of fish, crustaceans, herbs and seaweed, including growth rates and environmental requirements and the rate of housing and nutrition.
Prerequisites: MB 322, MB 322, MB 323

MB 425: Aquaculture LAB 2
Students run the hatchery the production of algae feeding mothers collection housed mothers breeding mothers custody of larval stages the collection of larvae and larval rearing stages developing Control of predation the preparation of work schedules

feeding various stages of aquaculture the preparation of specific combinations of feed ingredients to feed the fish and shellfish methods of collecting samples of shellfish Clinical examination of infected objects isolation and identification of pathogens Classification of pathogenic bacteria reinfection laboratory practical ways to control and treatment visits to fish farms.
Prerequisites: MB 322, MB 323, MB 324

MB 426: Fish Culture
To introduce students to the types of cultured fishes and their cultured methods.Contents: Biology and culture of different types of marine fishes e.g. canos, groupers, mullets, seganus, floundered fishes, jax, and red and black drum fishes.
Experimental studies of the effects of growth, stock densities, territorial requirements and feeding on different types of fishes.
Prerequisites: MB 322, MB 323, MB 424

MB 427: Hatchery and Nursery
To introduce students to cultured organisms production and rearing.Contents: Principles , site selection , tanks design , breeding in captivity , eggs state , nursery and transition , diseases and pollution , larval rearing , stock , living and non-living feeds , water management , size grading , harvest , reproduction and production of larvae.Hatchery function , plant feed production , brooders , stock , breeding hatchery , larval nursery , larval collection , larval rearing , cannibalisms , work schedule preparation.
Prerequisites: MB 322, MB 323, MB 425

MB 428: Fish Diseases
This course will provide in-depth coverage of the biology of etiological agents, and takes account of recent developments – methods available for disease control , emphasizing the use of antibiotics, vaccines and probiotics.Contents: Biological and taxonomical study of bacterial, viral, fungal and parasitic fish pathogens , diagnosis proceeds includes gross clinical signs of diseases , internal abnormalities apparent , histopathological examination of tissues – strategies used to control disease.
Prerequisites: MB 312, MB 347, MB 425

MB 429: Crustaceans and Molluscs Culture
To introduce students to the types of cultured organisms and their cultured methods.Topics include biology and culture of different types of marine crustaceans such as shrimps, crabs, lobsters, and mollscans such as mussels, oyster, clam , cultured methods , site selection , brood stock and reproduction , larval development – economy and production.
Prerequisites: MB 321, MB 323, MB 424

MB 430: Crustaceans and Molluscs Culture
To introduce students to the types of cultured organisms and their cultured methods.Topics include culture of different types of marine sea weeds and algae cultured methods mangrove economy and production.
Prerequisites: MB 320, MB 424

MB 460: Crustaceans and Molluscs Culture
A study of types of feeds constraints in feed formulation and production processes sources of fish feed ingredients and their implications eventual product quality and its acceptance by consumers.Topics include glossaries feeds ingredients energy protein lipids carbohydrates vitamins and minerals feeds requirement (for shrimp, mollusk and fish) artificial feeds organisms used as live feeds (Algae, phytoplankton, Rotifer Artemia).
Prerequisites: MB 322، MB 323، MB 425

MB 461: Special Topics in Biological Oceanography
The course aims to introduce students to the most important developments in the field of marine biology.
Contents: the course is comprised of one or more of the following:
• study the phenomenon of biological phenomena occurring in the seas and oceans, in the center of attention Matkon often specialists in the field of marine biology at that time.
• see the latest techniques used in the measurement of biological variables in the seas and oceans and the application of what is modern ways to treat and analyze data of marine life.
Prerequisites: MB 322, MB 323, MB 425

MB 462: Marine Laboratory Techniques
Students are introduced to different fish processing ways such as preservation and handlings, use of different ways of fish processing, Microbial characteristics of fresh fish biochemical characteristics of fresh fish. They are taught the how to differentiate between fresh and spoiled fish (microbial and biochemical), nutritional analysis of fresh and preserved fish and effects of preservation on nutritive value, the use of marine bacteria as a natural products producer. Students conduct primary tests to discover new antimicrobial compound, confirmation tests to discover new antimicrobial compound, Separation, purification and identification of new compound, and gene transformation.
Prerequisites: MB 322, MB 323, MB 346

MB 463: Fish Processing
The aim of this course is to introduce students to different ways of fish processing (preservation, handlings …etc.).Characteristics of fresh fish, stages of fish spoilage, factors affecting fish spoilage, autolysis and bacteriology decomposition and their effects on the composition of fish tissue, handling of fish, cooling, freezing, canning, salting, smoking, other fish products – effects of preservation on the nutritive value of preserved fish.
Prerequisites: MB 322 MB 323 MB 462

MB 464: Small Aquariums Management
This course aims to introduce students to small fish aquarium management and economical importance.Economical importance - construction, operation, maintenance, and management of small aquaria for museums and home, commercial, or public display of marine and freshwater fishes.
Prerequisites: MB 322, MB 323

MB 465: Fish Genetics Applications
The aim of this course is to know the genetic application in fish. Contents: The introductory genetic principles using fish examples, Cytogenetic and quantitative genetic methods in fish cul-

ture, population genetic methods in fishery management
Prerequisites: MB 346, MB 442

MB 456: Marine Biotechnology
This module introduces marine biotechnology focusing on diversity of marine organisms and their use as a sustainable resource in biomedical and industrial applications.Topics include introduction to marine biotechnology Marine bacteria and fungi for industrial biomedical uses Microalgae and marine invertebrates as a source of chemicals and pharmaceuticals Impact of marine biotechnology on aquaculture and fishing industries.
Prerequisites: MB 322 MB 323 MB 462

MC 462: Marine Biochemistry
An in-depth study of marine life, the importance of sea food and variation in sea life and its importance.Contents: Photochemical reactions and effects of environment on it- Adaptation of metabolism (proteins, lipids and carbohydrates) in marine animals- Biochemical adaptation for diving- Anaerobic metabolism- Effect of hormones in marine animals- Adaptation of marine animals towards estuaries- Formation and structure of calcified tissues in marine animals and calcium metabolism.
Prerequisites: MS 201 CHEM 110

Elective Courses - Marine Ecology Division

MB 431: Marine Ecology LAB 2
Students gather samples from the Red Sea shores and classify them into different groups of aquaculture. They take them to the lab to conduct experiments. The lab involves conducting quantitative analysis using equations of biodiversity calculated on computerized applications to identifying different environments of marine life.
Prerequisites: MB 321 MB 322

MB 432: Marine Ecology LAB 2
This lab involves field trips and laboratory studies the areas covered involve, virtual anatomical characteristics - biomass , the impact of zone nation and environmental factors affecting - the mechanical structure of the bottom floor , the organic content , vegetation and decomposition - the impact of organic pollution on the environment - methods of collecting samples , samplers , keeping concentration samples - dyeing samples - measurements of productivity and crop-based.
Prerequisites: MB 321 MB 322

MB 433: Marine Biodiversity
This course will provide an overview of current issues in biodiversity. Students will become familiar with major taxa of aquatic organisms to lower taxonomic levels. Topics include the introduction to the concept of enhancing the natural state of aquatic resource management through ecological effectiveness; biodiversity conservation and habitat management. Description of the key features of the major aquatic biomes and their adaptation to particular habitats. Diversity in aquatic systems, considering gradients of diversity on global scales, with depth in the oceans. Physical, ecological, and historical factors that influence habitat diversity. Mechanisms that generate and maintain patterns of diversity, zonation, succession and patchiness of the aquatic organisms. Calculation of biodiversity indices using different methods. Biodiversity of aquatic organisms in the Red Sea.
Prerequisites: MB 321, MB 322, MB 421

MB 434: Ecology of the Red Sea and Arabian Gulf
This course aims to provide an account of the historical development of the Red Sea and the Arabian Gulf and their environmental conditions. Improve the environmental awareness of students particularly towards the importance of the various marine ecosystems. It provide a generalized idea of the great biodiversity of these two environmentsTopics include the study of the different environmental factors and their effect on the distribution and behavior of various marine communities. A detailed study of the ecology of the Red Sea and the Arabian Gulf such as Coral Reef ecology, Mangrove ecology, Sea Weed ecology and Coastal ecology. A detailed study of human impact on various marine environments. Methods of controlling and minimizing such impacts.
Prerequisites: MS 201 MB 421

MB 435: Marine Mammals and Turtles
An introduction to marine mammals and turtles divisions with emphasis on selected species from each division protection. The course includes the taxonomy of marine mammals and turtles, their occurrence, general description, morphology, main genus and species. (Special attention will be focused on Red Sea and Arabian Gulf species), geographical distribution and general biology. Adaptation to marine environments, conservation, protection and economic importance.
Prerequisites: MB 322

MB 436: Environmental Impact Assessment
An examination of environmental management from different perspectives, including socioeconomic and community aspects. Topics include global environmental issues Physical environment plant, animal and microbial interactions within terrestrial and aquatic ecosystems (the various issues discussed are climate change, salinisation, eutrophication, and contaminant impacts) Ecosystem function and sustainable use of resources Integrated environmental management as a means of limiting the effects of problems Environmental ethics and legislation risk environmental impact assessment and the evaluation process
Prerequisites: MS 201

MB 466: Marine Biotechnology
This module introduces marine biotechnology focusing on diversity of marine organisms and their use as a sustainable resource in biomedical and industrial applications.Contents: The introduction to marine biotechnology , Marine bacteria and fungi for industrial biomedical uses, Microalgae and marine invertebrates as a source of chemicals and pharmaceuticals , Impact of marine biotechnology on aquaculture and fishing industries.
Prerequisites: MB 322 MB 323 MB 462

MB 467: Mangrove Ecosystem
This course introduces students to the ecosystems of mangroves and salts marshes plants. Contents: The introduction , identifica-

tion and classification of halophytes, mangroves and sea grass-morphological and anatomical adaptations , environmental requirements , biogeography, zonation , biomass and soil characteristics , seasonality , litter fall and decomposition and nutrients recycle and export , environmental and pollution stresses - environmental and economical importance.
Prerequisites: MS 201, MB 320, MB 422

MB 468: Pollution Effect on Marine Organisms
This course will provide an overview of sources of pollution and its effects on the environment's marine organisms.Contents: The definition of pollution and its sources , Level of pollution, Biological effect of pollution , Atmospheric constituents, Fossil fuels, Water pollution, oxygen levels, Eutrophication, Pesticide problems, Effects of pollution on marine animals.
Prerequisites: MB 321, MB 322

MB 469: Marine Primary Production
A study of the phytoplankton organisms, their divisions and growth factors; economical and ecological importance.Contents: The introduction to phytoplankton , Phytoplankton definitions, Principles of classification , Phytoplankton groups , Factors affecting the growth of –phytoplankton , Primary production , factors affecting floatation , seasonal succession and distribution , reactions between phytoplankton and other organisms , effects of pollutants on phytoplankton , Economical and ecological importance , Phytoplankton in Red Sea and Arabian Gulf , Economical methodology of phytoplankton culture.
Prerequisites: MB 363, MB 422

MB 470: Marine Animal Behavior
Students are introduced to marine ecosystem in relation to the behavior of animals. Contents: Community structure and factors affecting it , population ecology , trophic relationships , zonation and distribution , recruitment , rhythms , territoriality , dominance , social and courtship behavior , kinesis and learned behavior.
Prerequisites: MB 321, MB 322

Elective Courses: Marine Fisheries Division

MB 428: Fish Diseases
This course will provide in depth coverage of the biology of etiological agents, and takes account of recent developments methods available for disease control , emphasizing the use of antibiotics, vaccines and probiotics.Contents: Biological and taxonomical study of bacterial, viral, fungal and parasitic fish pathogens , diagnosis proceeds includes, gross clinical signs of diseases , internal abnormalities apparent , histopathological examination of tissues – strategies used to control disease.
Prerequisites: MB 322, MB 347, MB 425

MB 435: Marine Mammals and Turtles
Students will be introduced to marine mammals and turtles divisions , with emphasis on selected species from each division , protection. Contents: The course includes the taxonomy of marine mammals and turtles, their occurrence, general description, morphology, main genus and species. (Special attention will be focused on Red Sea and Arabian Gulf species), geographical distribution and general biology. Adaptation to marine environments, conservation, protection and economic importance.
Prerequisites: MB 322

MB 437: Larval Development of Marine Organisms
Students are taught the larval development of marine invertebrates.Contents: The Studies of life cycle and the shape of the larval stages of marine invertebrate organisms such as: sponges, Coelentrate, Annelids, Crustacea, Molluscan, and Ecinodermata.
Prerequisites: MB 321, MB 322

MB 438: Marine Fisheries LAB
Students are exposed to the different types of fishing gear - nets yarn - field trials on the use of different fishing equipment , Selection of fishing gear - Analysis of catch - Applications for computational for stock Fish - Using cooperative field trips with fishing boats in a draft.
Prerequisites: MB 322, MB 347

MB 439: Fish Populations Dynamics
Introduce students to fish populations and stock assessments evaluation.Contents: The classical theory and analysis of exploited fish populations. Fish dynamics development , Mortality, growth, recruitment, and yield models, evaluated, and applied to fishery data. Estimate fish survival and population size.
Prerequisites: MB 322, MB 347, MB 428

MB 440: Fishing Methods and Gears
This course is intended to familiarize students with the different gears and methods of catching.Contents: Fishing methods- selection of fishing gear in relation to fish behavior and substrate type , efficacy and selectivity of fishing gear - electronic fishing aids, communication, fish detection and position finding equipment. Video tapes display.
Prerequisites: MB 322, MB 347, MB 428

MB 441: Fisheries Management
This course is intended to introduce students to classic and current concepts in marine fisheries management. Contents: Methods of fishery management and objectives , Principle and development , how to organized fisheries , fisheries statistics , fisheries resources and their collection methods , Trawling quantity evaluation , fisheries development and reservation, Laws and strategies – Natural and industrial mortality.
Prerequisites: MB 322, MB 347

MB 463: Fish Processing
This course introduces students to different ways of fish processing (preservation, handlings …etc.).Contents: Characteristics of fresh fish , stages of fish spoilage , factors affecting fish spoilage , autolysis and bacteriology decomposition and their effects on the composition of fish tissue – handling of fish , cooling , freezing , canning , salting , smoking , other fish products , effects of preservation on the nutritive value of preserved fish.
Prerequisites: MB 322, MB 323, MB 462

MB 464: Small Aquariums Management
This course introduces students to small fish aquarium management and economical importance.Contents: Economical importance - construction, operation, maintenance, and management of small aquaria for museums and home, commercial, or public

Department of Marine Biology

display of marine and freshwater fishes.
Prerequisites: MB 322 MB 323

MB 465: Genetics Applications in Fish
The aim of this course is to know the genetic application in fish. Contents: Introductory genetic principles using fish examples, Cytogenetic and quantitative genetic methods in fish culture, population genetic methods in fishery management.
Prerequisites: MB 346 MB 462

MB 466: Fishing Methods and Gears
This module introduces marine biotechnology focusing on diversity of marine organisms and their use as a sustainable resource in biomedical and industrial applications.Contents: Introduction to marine biotechnology . Marine bacteria and fungi for industrial biomedical uses . Microalgae and marine invertebrates as a source of chemicals and pharmaceuticals . Impact of marine biotechnology on aquaculture and fishing industries.
Prerequisites: MB 322 MB 323 MB 462

MB 468: Pollution Effect on Marine Organisms
This course will provide an overview of sources of pollution and effects on environments marine organisms.Contents: The definition of pollution, sources of pollution, Level of pollution, Biological effect of pollution , Atmospheric constituents, Fossil fuels, Water pollution, oxygen levels, Eutrophication, Pesticide problems, Effect of pollution on marine animals.
Prerequisites: MB 321 MB 322

MB 470: Marine Animal Behavior
Students are introduced to marine ecosystem in relation to the behavior of animals. Contents: Community structure and factors affecting it , population ecology , trophic relationships , zonation and distribution , recruitment , rhythms , territoriality , dominance , social and courtship behavior , kinesis and learned behavior.
Prerequisites: MB 321, MB 322

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Department of

Marine Chemistry

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History:

The Department of Marine Chemistry was established in 1978.

Vision:

Marine Chemistry Department will enhance its position as a comprehensive department and as a national leader in the teaching of marine chemistry and its utilization for the service of society.

Mission:

• To provide quality education that would enable students to meet the requirement of the industry and to find professional solutions to regional marine problems
• To provide high quality innovative multidisciplinary research programmed to address the issues of sustainable exploitation of marine resources.

Departmental Requirements:

To earn a B.Sc. degree in Marine Chemistry, students must complete 128 credit hours of courses according to specialization, distributed as follows: 15 credit hours of prep year requirements for scientific colleges

- (27) Prep Year courses for Scientific Colleges
- (14) University requirements
- (9) Faculty Courses
- (18) Combined Courses for all Faculty Department
- (46) Core Courses / Specialist Courses
- (9) Elective Courses
- (5) Free Courses

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Study Requirements Plan for Department of Marine Chemistry: (Credit Hours 46)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	CHEM	202	General Chemistry	4	3	3		CHEM 110
2	CHEM	231	Organic Chemistry	4	3	3		CHEM 110
3	CHEM	211	Volumetric and Gravimetric Analysis	4	3	3		CHEM 110
4	MC	360	Marine Chemistry	2	2			CHEM 110 MS 201
5	MC	361	Marine Analytical Chemistry	4	3	3		CHEM 110 MS 201
6	MC	370	Marine Organic Chemistry	3	2	3		CHEM 231
7	MC	371	Chemistry of Coastal Water	2	2			MC 360
8	MC	372	Marine Pollution	3	2	3		MS 201
9	MC	462	Marine Biochemistry	3	2	3		MS 201 CHEM 110
10	MC	463	Marine Geochemistry	3	3			CHEM 202 MC 360
11	MC	464	Marine Organic Geochemistry	2	2			MC 370
12	MC	465	Special Topics in Chemical Oceanography	1	1			
13	MC	473	Cycle of Elements in Seawater	3	2	3		MC 360
14	MC	474	Chemistry of Marine Natural Products	2	2			CHEM 231 MC462
15	MC	475	Chemical Oceanography of Regional Seas	2	2			MC 463
16	MC	490	Research Project	4		4		
			Total	**46**	**34**	**28**		

Elective Courses for Marine Chemistry Track: (Number of credit hours 9)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MC	476	Trace Metals in Seawater	3	2	3		MC 360
2	MC	477	Limnology	3	2	3		CHEM 202, MC 360
3	MP	336	Physical Properties of Ocean Water	3	2	3		PHYS 110, MS 201
4	MP	435	Remote Sensing in Physical Oceanography	3	2	3		PHYS 203, MP 338
5	MP	440	Integrated Coastal Zone Management	2	2			MS 201
6	MB	436	Environmental Impact Assessment	2	1	3		MS 201
7	MB	466	Marine Biotechnology	2	1	3		MB 322 + MB 323
8	MB	325	Principles Of Swimming and Diving	2	1	3		
			Total	**20**	**13**	**21**		

Course Descriptions:

MC 360: Marine Chemistry

Students will become familiar with different chemical reactions in seawater. Contents: include chemical and physical properties of pure water molecule The effect of salinity on the chemical and physical properties of water molecule Ionic interaction Acidbase reactions Complexation reactions Redox reactions Dissolved gases.

Prerequisites: CHEM 110 MS 201

MC 361: Marine Analytical Chemistry

The course aims at familiarizing students with the most advanced analytical techniques applied in the analysis of seawater and sediments including their theoretical basis., full understanding of the principles of the analytical methods and techniques necessary for the optimal use of the instruments and the production of high quality data. Contents: Statistics of analytical errors and sampling , principles of spectrophotometry, fluorometry, segmented flow injection, flame photometry plasma emission (ICP) and atomic absorption spectrophotometry (AAS), Electrochemical techniques including polarography and ion selective electrodes , Chromatography methods and application , Mass spectroscopy and application.

Prerequisites: CHEM 110 MS 201

MC370: Marine Organic Chemistry

The marine organic chemistry course provides students with a fundamental understanding of major marine biogeochemical cycles and their interaction with physical and biological components of marine system. Contents: include the importance of marine organic matter source of organic matter in marine environment Primary production in Seawater Classification of organic matter (dissolved & particulate) and its composition Distribution and fate of organic compounds Interaction between organic matter & minuals Organic sulphur compounds Chemistry of aquatic humic substances.

Prerequisites: CHEM 231

MC 371: Chemistry of Coastal Waters

Identification of the physical and chemical characteristics of the coastal area and transition features such as estuaries. Students should be able to identify the chemical processes taking place in coastal waters, including estuaries, and how and to what extent these chemical processes could be affected by other geological, physical and biological processes. The interaction of these processes will define the fate of material in the coastal water. Contents: include: coastal areas and the interface between land and ocean. Biological, chemical, geological and physical processes

taking place in the coastal area, and the flux and cycling of material between land and ocean
Prerequisites: CHEM 360

MC 372: Marine Pollution
A study of the various aspects of marine pollution and the hazards to human beings caused by consuming polluted fish and shellfish and the damage inflicted on marine organisms and ecosystems. This course integrates material on marine pollution from the field of marine science and offers a unified approach to controlling the adverse effects of wastes disposal in the marine environment. It deals with the following: an evaluation of the sources of marine pollutants (Organic Wastes Oil spills Metals Halogenated hydrocarbons Radioactivity waste Solid wastes and heat.
Prerequisites: MS 201

MC 462: Marine Biochemistry
Objectives: A better understanding of the marine life, the importance of sea food and variation in the sea life and its importance. Contents: includes the study of photochemical reactions and effects of environment on it Adaptation of metabolism (proteins, lipids and carbohydrates) in marine animals Biochemical adaptation for diving Anaerobic metabolism Effect of hormones in marine animals Adaptation of marine animals towards estuaries Formation and structure of calcified tissues in marine animals and calcium metabolism.The practical aspect of ths course includes an estimation of carbohydrates, proteins, lipids, cholesterol and amino acids in marine organisms. Separation and determination of lipids (esterolipids, phospholipids and triglycerides). Extraction and isolation of enzymes and estimation of nucleic acids in marine animals separation of amino acids using chromatography.
Prerequisites: MS 201 CHEM 110

MC 463: Marine Geochemistry
Knowledge of the chemical process at airsea water interface, sea watermarine sediments interface and chemical characteristics of sea water column. Study of the formation of hot brine deep in the Red Sea and the chemical properties of the brine and metalliferous sediments. Contents: include the study of the origin and chemical history of the earth's oceans: Suspended matter Interstitial water Chemistry of the marine interfaces (air/water water/sediments)
Prerequisites: MC 360 CHEM 202

MC 464: Marine Organic Geochemistry
The course is designed to track the fate of marine organic matter from its formation through its transformation and destruction during depositional, diagenetic (remineralization) and catagenic (petroleum generation) processes. Contents: include the production and fate of organic matter, the condition for accumulation of organicrich sediments and the chemical diagensis of organic compounds in sediments and the formation of high molecular weight compounds (humic materials and kerogen), the molecular evaluation of organic compounds in recent sediments and molecular assessment of organic compounds in ancient sediment and petroleum formation.
Prerequisites: MC 370

MC 465: Cycle of Elements in Seawater
The course aims at creating and enforcing the relationship between the department's staff and students and public and private organizations having activities related to oceanography. This will increase the job opportunity of undergraduates in their field of interest and will deepen the interaction between the department as an academic institution and the production and service sectors of the society. Contents: A number of lectures covering different subjects related to the marine environment given by specialists from some selected organizations such as Saudi Aramco, desalination industry, wastewater treatment, water research institute, etc.

MC473: Chemistry of Marine Natural Products
Components of marine ecosystem and the distinctions between chemical equilibrium and steady state as concepts to explain the constancy of composition of seawater. Contents: Energy transfer through the food chain in the marine ecosystem major constituents of seawater and the cycling of the natural essential elements of nutritive value (nitrogen and phosphorus) as well as carbon.
Prerequisites: MC 360

MC474: Chemistry of Marine Natural Products
This course is a study of bioactive compounds derived from marine flora and fauna. Contents: include the study of bioactive compounds derived from marine flora and fauna. Among the topics covered are marine toxins and venoms.
Prerequisites: CHEM 231, MC 462

MC 475: Chemical Oceanography of Regional Seas
Students study the chemical and physical characteristics of the regional sea water. Contents: include spatial and temporal variations of the chemical and physical characteristics (pressure, temperature, oxygen, salinity, and nutrient salts) at the regional sea water (Red Sea, Gulf of Aden, Arabian Gulf and Arabian Sea).
Prerequisites: MC 463

MC 490: Research Project
Students will acquire the skills necessary to critically examine a specific scientific problem and to be able to design and execute an adequate scientific research programmed, collect and interpret data, and arrive at relevant conclusions. Contents: include selecting research titles with the help of staff members. Literature review and presentation (seminar) in the presence of the Scientific Committee (SC) of the department by the end of the first ten weeks of the semester.

Elective Courses

MC 467: Trace Metals in Seawater
A study of the distribution and speciation of trace metals in seawater. Contents: include sources and sinks of trace metals in seawater vertical and horizontal distribution in seawater biogeochemical cycles of selected trace metals in seawater speciation of trace metals.
Prerequisites: MC 360

MC 477: Limnology
This course is an introduction to the complexity of the ecosystem and how some physical processes and facts are interfering and are necessary to understanding the chemistry of the environment.

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Contents: include the identification of the physical processes, biological activities and chemical interactions that may take place in inland water and how all these parameter are interrelated.

Prerequisites: CHEM 202, MC 360

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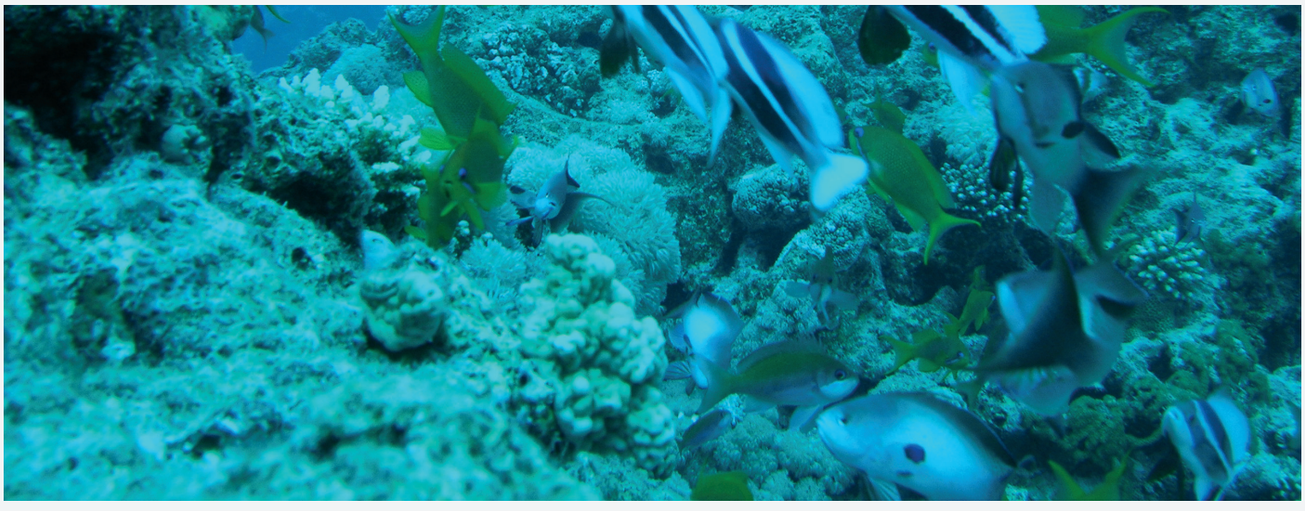

Department of

Marine Geology

Department Contact:

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History:

The Department of Marine Geology was established in 1978.

Vision:

- High standard teaching and state of art training in different fields of Marine Geology.
- Generate interest for postgraduate research in the field
- Geomarine undergraduate awareness programs related to society and environment

Mission:

To serve the nation by imparting teaching and training at the undergraduate level in Marine GeoSciences and to carry out interdisciplinary research.

Departmental Requirements:

To earn the B.Sc. in Marine Geology, students must complete 128 credit hours of courses according to specialization, distributed as follows:

- (27) Prep Year courses for Scientific Colleges
- (14) University requirements
- (9) Faculty courses
- (18) Combined Courses for all Faculty Department
- (47) Core Courses / Specialist Courses
- (8) Elective Courses
- (5) Free Courses

Department of

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Department Study Plan:

Core Courses for Marine Geology Department (Credit Hours 47)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	EMR	202	Introduction to mineralogy	3	2	3		
2	EPS	201	Sedimentation & Startigraphy	2	1	3		EMR 201
3	MP	336	Physical Properties of Sea Water	3	2	3		MS 201, PHYS 110
4	MG	381	General Marine Geology	3	3	-		EMR 201 , MS 201
5	MG	382	Marine Microfossils	3	2	3		MS 202
6	MG	391	Marine Sediments	3	2	3		MG 381
7	MG	392	Regional Marine Geology	2	2			MG 381
8	MG	393	Introduction to Marine Geophysics	3	2	3		PHYS 101, MG 381
9	MG	482	Mineralogy of Marine Sediments	3	2	3		MG 391,EPS 201
10	MG	483	Marine Carbonate Sediments	2	2			MG 391
11	MG	484	Marine Paleoenvironment	3	2	3		MG 391
12	MG	485	Coastal Processes	3	2	1		MG 482
13	MG	491	Marine Mineral Resources	2	2			MG 391
14	MG	492	Geochemistry of Marine Sediments	3	2	3		MG 391
15	MG	493	Remote Sensing in Marine Geology	3	2	3		PHYS 101,MG 484
16	MG	494	Research Project	4		4		Dept. Approval
17	MB	325	Principles of Diving and Swimming	2				
			Total	**47**	**30**	**35**		

Elective Courses: Students select 8 credit hours from the following courses

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MG	495	Marine Geophysics	3	3	3	3	MG 393
2	MG	496	Geology of Deep Sea	2	2	2		MG 381
3	MG	497	Special Topics (1)	3	2	2		Dept. Approval
4	MG	498	Special Topics (2)	3	2	2		Dept. Approval
5	MG	499	Application of statistics in Marine Geology	3	2	2		STAT 110
6	Math	202	General Math 2	3	4	4		MATH 110
7	MSS	220	Fundamental of Surveying	2	4	4		MATH 110
8	EMR	203	Optical Mineralogy	3	3	3	3	EMR 202
9	EPS	331	Introduction to Paleontology	3	2	2	3	EMR 201
			Total	**25**	**24**	**24**	**9**	

Course Descriptions:

MG 381: General Marine Geology

This course aims to give students the fundamental principles of the geology of the oceans and how to explore it by using different equipments and tools. Course topics include age and depth of the ocean basins Sea floor spreading and plate tectonics The features of ocean floors Tools of the marine geology Changes in sea level Marine provinces Sedimentation in ocean.

Prerequisites: EMR 201 , MS 201

MG 382: Marine Microfossils

Training students on the basic principles of marine microfossils and how to identify different types of fossils and understand their importance and applicability. Contents: General introduction to the importance of marine microfossils among the marine fossils, especially the macro-ones, types of marine microfossils such as foraminifera, ostracoda, diatoms, coccoliths, and radiolarian , etc.), marine microfossils and their life cycle, ecology, distribution, environmental factors affecting them, shell chemistry, shell morphology and description, taxonomy and taphonomy and importance and applicability specially in the field of paleoceanography and paleoclimatology, marine pollution, and oil exploration.

Prerequisites: MSC 202

MG 391: Marine Sediments

This course aims to make students familiar with the origin and distribution of marine sediments in different marine environmental settings. Contents: Marine sediments and their relation to continental rocks, Sedimentary cycle- Sources, classification, composition, rate of sedimentation and geographic distribution of marine sediments, Major types of sediments, terrigenous sediments, biogenic sediments, Hydrogenous sediments, textural properties of marine sediments and its relation with the environments, composition of shallow and deep marine sediments.

Prerequisites: MG 381

MG 392: Regional Marine Geology

The basic knowledge about the geology of seas around the Saudi Arabia. Contents: The origin and formation of the Red Sea, mor-

phology and topography of the Red Sea, geology and geophysics of Red Sea, hot brines and hydrothermal deposits of the Red Sea, Atlantis II Deep, origin and formation of the Arabian Gulf , morphology and topography of the Arabian Gulf, origin, composition and distribution of bottom sediments in the Arabian Gulf.
Prerequisites: MG 381

MG 393: Introduction to Marine Geophysics
This course introduces students to marine geophysics and its relationship to marine geology. Contents: include physical properties of marine sediments and rocks Seismic methods marine seismic surveys_ Reduction and plotting of seismic data, Geological interpretation of seismic data Gravity and Magnetic methods Land and marine gravity and magnetic surveys & aeromagnetic survey Interpretation of magnetic stripes on the ocean floor Electrical methods: Selfpotential, Resistivity, and induced polarization methods. Electrical surveying and interpretation.
Prerequisites: PHYS 110 MG 381

MG 482: Mineralogy of Marine Sediments
This course aims to make students able to identify mineralogical composition of marine sediments and their relationship to source rocks, weathering and climate.Contents: components forming marine sediments, factors controlling the abundance of minerals in marine sediments, Heavy and light minerals and their relation to source rocks, Minerals stability series, clay minerals, origin, classification, internal structure, diagenesis , relationship between climate and clay minerals, distribution of clay minerals in the world oceans, carbonate and evaporite minerals, Interpretation of X-ray diffraction patterns for clay, carbonate and evaporite minerals.
Prerequisites: MG 391, EPS 201

MG 483: Marine Carbonate Sediments
This course looks at the origin and distribution of carbonate sediments in the world oceans. Contents: The origin of calcium carbonate grains, Recent marine carbonate sediments, The major carbonate minerals, Primary carbonate precipitation , Carbonate grains of biological origin - Pelloids origin of aragonite muds, Micrite envelopes and intraclasts, Pellets and peletoids , Ooliths , Shallow and temperate-water carbonates, Calcium carbonate dissolution in the deep ocean, carbonate diagenesis.
Prerequisites: MG 391

MG 484: Marine Paleoenvironments
This course aims to make students able to describe and observe modern near-shore and deep-sea environments and to identify their origins, and compare them with their ancient counterparts. Content: The classification and identification of modern near shore and deep-sea marine environments: deltas, sand barriers, estuaries, lagoons, tidal flats, tidal channels, sabkhas, mangrove swamps, beaches, coral reefs, neritic realm and deep-sea environments.
Prerequisites: MG 391

MG 485: Coastal Processes
This course aims to make students familiar with the most common coastal processes and description and division of coastal features, and controlling factors with modern examples.Contents: Tthe factors controlling the configuration of coasts, Identification of morphological units for the shore profile, Characteristic features of surf zone, Coastal evolution and changing coastline, Coastal Processes, Wave refraction.
Prerequisites: MG 482

MG 491: Introduction to Marine Geophysics
This course aims to make students familiar with the marine mineral resources and their importance. The course components include the introduction to nonliving marine resources Classification of marine mineral resources Accumulations, geographical distribution and economic value of offshore mineral resources Placer deposits Carbonate deposits evaporite deposits Aggregate minerals Phosphorite Hydrothermal deposits Metalliferous sediments of the Red Sea Sulfur and sulfide deposits Manganese nodules Economic impacts on landbased mining industry Economic potential and strategic importance of oil and gas in the Arabian Gulf. This is the components
Prerequisites: MG 391

MG 492: Geochemistry of Marine Sediments
This course aims to make students familiar with the factor and processes related to the chemical components of the earth and marine sediments. Contents: include the basic principles Elements distribution in the earth and oceans The geochemistry of marine sediments Natural levels of chemical constituents in marine sediments Early diagenesis in marine sediments Introduction to isotopic geochemistry.
Prerequisites: MG 391

MG 493: Remote Sensing in Marine Geology
This course aims to make students familiar with the principles of remote sensing, techniques and application in marine geology. Contents: include interaction of electromagnetic radiation with atmosphere, Land, and water Remote sensing Satellite (Landsat, Spot, Ikones, Quickbird, Radar) Satellite images Resolution Comparison of Remote sensing Satellite to Study Coastal areas, and shallow water Image processing (image enhancement, supervise classification and unsuper classification images, change detection, water depth mapping and variation in bottom type) Analysis and interpretation of data for marine geological studies (carbonate environments, sabkhas, intertidal zone. Coastal change detection).
Prerequisites: PHYS 110, MG 484

MG 494: Geochemistry of Marine Sediments
This course aims to train students to use their capability in scientific planning and application for data acquisition and collection of the necessary information for their research projects. Students will carry out a research projects preferably related to an applied subject. They will also carry out literature reviews, accomplish the research work and record their results with analysis of data and discussion in dissertation format. Results will be discussed in an open seminar.

Elective Courses

MG 495: Marine Geophysics
This course teaches students the principles and applications of marine geophysics so that they can be able to understand the im-

Department of Marine Geology

portance of the subject in relation to marine geology and the interrelationship. Contents: Shallow seismic surveys, Marine seismic reflection surveying with one vessel, Marine seismic (reflection & refraction) surveying with two vessels, Marine gravity surveying, Marine magnetic surveying , Interpretation of marine seismic sections and maps, Interpretation of marine gravity profiles and maps, Interpretation of marine magnetic profiles and maps, Examples for geophysical surveys in the Red Sea with interpretation.
Prerequisites: MG 495

MG 496: Introduction to Marine Geophysics
A study of ocean basins and their contents including topography and deposits. Contents: include description of the ocean basins Trenches and island arcs Oceanic rises and ridges Sedimentation in the world oceans Eolian sediments in the oceans Submarine volcanism Sea floor spreading Hydrothermal processes and deposits in the oceans.
Prerequisites: MG 381

MG 497: Special Topics (1) in Marine Geology
This course is allocated for teaching modern special topics in geological oceanography. Topics and syllabus will be specified by the department.

MG 498: Special Topics (2) in Marine Geology
This course is allocated for teaching modern special topics in geological oceanography. Topics and syllabus will be specified by the department.

MG 499: Applications of Statistics in Marine Geology
This course aims to make students familiar with the most common statistical techniques in the field of marine geology and how to apply and interpret them using real data.
Contents: include measuring and sampling concepts Processing and presenting the data. Measuring the average and variability Testing normal populations Two and one way analyses of variance (ANOVA) Data transformation Univariate statistical methods (e.g. coefficient of correlation, linear and nonlinear regression, diversity indices, spectral analysis, mapping analysis) Multivariate statistical methods (e.g. cluster analysis, principle component analysis (PCA), multidimensional scaling (MDS), Rmode and Qmode factor analysis, correspondence analysis, canonical correlation and spectrum).
Prerequisites: STAT 110

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Department of

Marine Physics

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History:

The Department of Marine Physics was established in 1978.

Vision:

- Arrange and collaborate in local, regional and international training programs.
- Inspire necessary and promising areas of research that have significant bearing on the society.
- Build bridges between different marine disciplines for innovative research collaboration.

Mission:

Serve the nation's territorial interest and conservation of Marine environment.

Departmental Requirements:

To earn a B.Sc. degree in Marine Chemistry, students must complete 128 credit hours of courses according to specialization, distributed as follows: 15 credit hours of prep year requirements for scientific colleges

- (27) Prep Year courses for Scientific Colleges
- (14) University requirements
- (9) Faculty Courses
- (18) Combined Courses for all Faculty Department
- (46) Core Courses / Specialist Courses
- (9) Elective Courses
- (5) Free Courses

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Department Study Plan

Study Requirements Plan for Department of Marine Physics: (Credit Hours 41)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MP	335	Marine Meteorology	3	2	3		PHYS 110 MS 201
2	MP	336	Physical Properties of Oceanic Water	3	2	3		PHYS 110 MS 201
3	MP	337	Air-Sea Interaction	3	2	3		MATH 202 MP 335
4	MP	338	Ocean Circulation	3	2	3		MATH 202 MP 336
5	MP	430	Dynamical Oceanography (1)		2	3		MATH 203 MP 338
6	MP	431	Waves and Tides	3	2	3		MATH 203 PHYS 203
7	MP	432	Physical Oceanography of Adjacent Seas	2	2			MP 338
8	MP	433	Near Shore Physical Processes	2	2			MP 431
9	MP	434	Dynamical Oceanography (2)	3	2	3		MP 430
10	MP	499	Research Project	4		4		
11	PHYS	203	General Physics (3)	4	3	3		PHYS 110 MATH 110
12	MATH	202	Calculus (2)	4	3	2		MATH 110
13	MATH	203	Calculus (3)	4	3	2		MATH 202
			Total	**38**	**27**	**32**		

Elective Course of Marine Geology: (Credit Hours 14)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MP	435	Remote Sensing in Physical Oceanography	3	2	3		PHYS 203 MP 338
2	MP	436	Modeling of Marine Dynamics	2	1	3		MATH 204 MP 433
3	MP	437	Marine Acoustics	2	2			PHYS 203 MP 336
4	MP	438	Special Topics in Physical Oceanography	2	2			
5	MP	440	Integrated Coastal Zone Management	2	2			MS 201
6	MSS	220	Fundamental of Surveying	4	3	3		MATH 110
7	CS	101	Introduction to Computer Science	4	3	3		MATH 110
8	MATH	204	Differential Equations (1)	3	3			MATH 202
9	MATH	241	Linear Algebra	3	3			MATH 110
10	MATH	305	Differential Equations (1)	3	3			MATH 204
11	PHYS	252	Classical Mechanics (1)	3	3			PHYS 110 MATH 202
12	MB	315	Principles Of Swimming and Diving	2	1	3		
			Total	**33**	**28**	**15**		

Course Descriptions:

MP 335: Marine Meteorology

Objectives: The aim of this course is to familiarize students with the physical characteristics of the atmosphere as well as the dominant meteorological conditions over the oceans.
Contents: includes include the atmosphere Meteorological elements (temperature, pressure, humidity, wind speed, radiations)
Prerequisites: PHYS 110, MS 201

MP 336: Marine Meteorology

Objectives: The aim of this course is to familiarize with the typical distributions of the physical properties of oceanic waters as well as the horizontal and vertical water movements due to the variations in these properties. Contents: include general introduction Typical distributions (vertical , horizontal , temporal) of physical properties in world oceans
Prerequisites: PHYS 110, MS 201

MP 337: Air-Sea Interaction

This course aims to familiarize students with air-sea interaction and the way they affect each other. Contents: General characteristics of the sea surface , characteristics of atmospheric planetary boundary layer, energy and momentum fluxes.
Prerequisites: MATH 202l, MP 335

MP 338: Ocean Circulation

The aim of this course is to familiarize students with the principle factors controlling water circulation as well as the major current systems in the world oceans.
Contents: include general atmospheric circulation and its relation to oceanic surface circulation Ekman layer.
Prerequisites: MATH 202 MP 336

MP 430: Dynamical Oceanography (1)

The aim of this course is to familiarize students with the effects of the earth's rotation and water vertical stratification on the water motions in seas and oceans. Contents: include fundamentals of geophysical fluid dynamics: Introduction Coriolis force Governing

equations Rotation effects: Geostrophic flows and vorticity dynamics Ekman layer Linear barotrobic waves Barotrobic instability Large scale ocean circulation Stratification effects: Stratification Internal Waves Turbulence in stratified Fluids.
Prerequisites: MATH 203 MP 338

MP 431: Waves and Tides
The aim of this course is to familiarize students with the effects of the earth's rotation and the water vertical stratification on the water motion in the seas and oceans. Contents: include waves classification of waves wind generated, waves Wave forms in deep and shallow waters Wave dispersion and group speed Wave energy Wave attenuation effects: breaking, friction and white capping Wave transformation effects: shoaling, refraction, diffraction and reflection Waves of unusual character Tides: Tide-generating forces The dynamical Lecture of tides Tidal constituents Tidal currents Tidal Power.
Prerequisites: MATH 203 PHYS 203

MP 432: Physical Oceanography of Adjacent Seas
The aim of this course is to familiarize students with the water exchange among the adjacent regional seas and the exchange between them and the Indian Ocean as well as the resulting effects. Contents: Include history of scientific exploration in the region climatology monsoonal wind and seawater circulation patterns Seawater exchange between red sea and gulf of aden seawater exchange between Arabian gulf and gulf of oman surface and subsurface circulation of arabian sea and its relation to the Indian ocean, circulation distribution and variation of physical characteristics sea level changes.
Prerequisites: MP 338

MP 433: NearShore Physical Processes
The aim of this course is to familiarize students with the physical processes occurring in the nearshore area and the various consequent effects. Contents: include the physical factors controlling sediment movements Beach nomenclature Sediment movements by currents and waves Long shore currents and Rip currents Sediment transport in tidal flats Eastuarine Circulation and its sediment transport effects.
Prerequisites: MP 431

MP 434: Physical Oceanography of Adjacent Seas
The aim of this course is to familiarize students with the effects of the water vertical stratification on the water motion in the seas and oceans. Contents: Layered models , Stratified geostrophic dynamics , Upwelling , Quasi Geostrophic dynamics ,Baroclinic instability , Fronts, Jets and Vortices.
Prerequisites: MP 430

MP 499: Research Project
Training students to conduct integrated scientific research on one of the physical oceanography disciplines. Student will be supervised by faculty members to conduct scientific research on marine physical phenomena through data collection, data analysis and data interpretation in light of previous studies. They will present their research findings at a seminar where a committee of faculty members will examine and evaluate their projects.

Elective Courses

MP 435: Remote Sensing in Physical Oceanography
The aim of this course is to familiarize students with the principles of remote sensing and its various applications in the field of physical oceanography. Contents: Include the concept of remote sensing History of remote sensing Physics of remote sensing Satellite platform system Image processing Satellites for marine applications.
Prerequisites: PHYS 203 MP 338

MP 436: Modeling of Marine Dynamics
The aim of this course is to familiarize students with the principles of numerical modeling of the dynamical processes in the seas and oceans. Contents: Include modeling principles Coastal zone models Oceanic circulation models Wave models Tidal models Pollutant dispersion models Red Sea and Arabian Gulf models.
Prerequisites: MATH 204 MP 433

MP 437: Marine Acoustics
The aim of this course is to make students familiar with the factors affecting the sound propagation in the seawater.
Contents: Comparison of electromagnetic and sound waves Propagation of sound waves in the sea Pressure and intensity of sound waves Reference intensity and pressure Power ratio dB values Effect of temperature, salinity and pressure on the sound velocity in the sea Sound speed equation Ray tracing Calculation of sound speed in sea water Vertical and horizontal representation of the changes in sound speed with depth and between hydrographic stations Locating the SOFAR channels and the quiet zones Utilization of echo sounders and their range of frequencies.
Prerequisites: PHYS 203 MP 336

MP 438: Special Topics in Physical Oceanography
The aim of this course is to provide students with uptodate information on progress in the field of physical oceanography.
Contents: will contain one or more of the following topics:
• Studying one of the physical phenomenons that occur in the ocean or the sea and is currently receiving the attention of the physical oceanographer at that time.
•Being exposed to the latest technologies used in measuring the physical parameters in the oceans and the seas and applying the latest methodologies in processing and analyzing physical oceanographic data.
•Understanding the important role that is played by both operational observing systems and operational prediction systems, in the oceans and the seas, on the regional and global scales.

MP 440: Integrated Coastal Zone Management
The aim is to make students familiar with the concept of integrated coastal zone management and its utilization. Contents: include pressures on the coastal zone Human alterations of coastal zone Coastal impact assessment The need and benefits for integrated coastal zone management (ICZM) Environmentally sensitive coastal zone planning Sustaining the coast.
Prerequisites: MS 201

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Department of
Maritime Studies

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History:

The Department of Maritime studies was established in 2002.

Vision:

World-class hydrographic survey and maritime education and training in the Kingom of Saudi Arbia to develop the Saudi human resource and from the national economy.

Mission:

Quality hydrographic surving and Maritime education and training to certify the high qualified students with the international certificants, to address the rising demand of the Saudi Hydrographices surveying and maritime industry, through the appoved international program in according to the IMO, IHO and UNCTAD standards which support the recognition of the kingdom by the international organization (IMO, IHO) for thr benefit of the kingdom.

Departmental Requirements:

The department offers four basic specializations:

1. Nautical Science,
2. Hydrographic Surveying,
3. Ports and Marine Transportation, and
4. Marine Engineering.

To earn a degree in Maritime Studies, students must complete between 129 and 156 credit hours according to specialization, distributed as follows:

Course requirements of Nautical Science Program:

- (27) Preparative year requirements
- (14) University requirements
- (9) Faculty requirements
- (71) Core courses for (Nautical Science Program)
- (10) Elective Courses
- (12) Training

Course requirements of Hydrographic Surveying Program:

- (27) Preparative year requirements
- (14) University requirements
- (09) Faculty requirements
- (67) Core courses for (Hydrographic Surveying Program)
- (08) Elective Courses
- (04) Training

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Course requirements of Ports and Marine Transportation Program

- (27) Preparative Year requirements
- (14) University requirements
- (09) Faculty requirements
- (68) Core courses for Ports and Marine Transportation Program
- (07) Elective Courses
- (04) Training

Course requirements of Marine Engineering Program

- (27) Preparative requirements year
- (14) University requirements
- (09) Faculty requirements
- (89) Core courses for (Marine Engineering Program)
- (09) Elective Courses
- (08) Training

Department Study Plan:

Study Requirements Plan for Department of Maritime Studies: (Credit Hours 71)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MATH	201	Mathematics for Maritime Studies	4	3	2		MATH 110
2	PHYS	204	Physics 204	4	3	3		PHYS 110
3	PHYS	281	Physics (Practical)	1	-	3		PHYS 110
4	MSE	389	Introduction to Marine Engineering	2	2		2	
5	MSN	240	Principles of Marine Navigation	3	3	2	3	PHYS 204,
6	MSN	241	Seamanship	3	3	2	3	MATH 201
7	MSN	242	Navigation Instruments	3	3	2		
8	MSN	243	Maritime Communication	2	2	2		PHYS 204
9	MSN	244	Ship Construction	3	3		3	PHYS 204
10	MSN	245	Marine Meteorology	2	2	2		
11	MSN	291	Leadership & physical Education 1	1	2			
12	MSN	330	Coastal Navigation	3	3		2	MSN 240
13	MSN	331	Deck Operation	3	3	2		MSN 241
14	MSN	332	Electronic Navigation Systems	3	3	2		MSN 242
15	MSN	333	Celestial Navigation	3	3			MSN 240
16	MSN	334	Ship Stability	3	3			PHYS 204
17	MSN	340	Voyage Passage Planning	3	3			MSN 330
18	MSN	341	Ship Tracking Systems	3	3	2		MSN 332
19	MSN	342	Maritime English Language	2	2	2		ELS 102
20	MSN	343	International Maritime Law	2	2			
21	MSN	344	Dry Cargo Handling	3	3	2		MSN 331
22	MSN	391	Leadership& Physical Education 2	1	2			
23	MSN	430	Liquid Cargo handling	3	3	2	3	MSN 334
24	MSN	431	Technical Reporting & Methodology	2	2		2	MSN 342
25	MSN	432	Maritime Meteorology Applications	2	2	2	2	MSN 245
26	MSN	441	Safe Operation of Petroleum Tanker	2	2	2	2	MSN 430
27	MSN	442	Maritime Convention	2	2		2	
28	MSN	444	Graduation Project	3	3			MSN 431
			Total	**71**	**70**	**34**	**24**	

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Electives for Nautical Science: (Credit Hours)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MSN	434	Special Topics	2	2			
2	MSN	435	Shipyard Operations Technology	2	2			MSN 244
3	MSN	440	Maritime Safety & Security Management	2	2			MSN 343
4	MSN	443	Maritime Transport Economics	2	2			
5	MSN	445	Maritime Traffic System	2	2			
6	MSN	446	Maritime Search and Rescue	2	2			
7	MSN	447	Sea Ports Management	2	2			
8	MSN	448	Maritime Accidents and Incident Investigation	2	2			MSN 342
9	MSN	449	Ships and Cargo Marine Insurance	2	2			MSN 343
10	MSE	580	Automatic Control	2	2	2		PHYS 204
			Total	**20**	**20**	**2**		

Summer Training for Nautical Science (Credit Hours 4)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MSN 293	434	Summer Training on Board Ship (3 months)	2	2			
2	MSN 393	435	Summer Training on Board Ship (3 months)	2	2			
			Total	**4**	**4**			

Long Sea Training Credit Hours: 8 (Semester 9 and 10)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MSN	593	Long Sea Training on Board Ship (8 months)	8	8			
			Total	**8**	**8**			

Refreshment Courses Credit Hours:

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MSN	541	Terrestrial Navigation		3	2	2	MSN 593
2	MSN	542	Celestial Navigation Applications		3	2	2	MSN 593
3	MSN	543	Cargo Handling		3		2	MSN 593
4	MSN	544	Watch keeping and Deck Work		3		2	MSN 593
5	MSN	545	Ship Stability and Construction		3		2	MSN 593
6	MSN	546	Proficiency in survival crafts and rescue boats		2		2	MSN 593
			Total		**17**	**4**	**12**	

Course Descriptions:

MSN 230: Fundamentals of Marine Safety
Students will satisfactory understand the basic knowledge of basic marine safety to obtain the required certificates of the mandatory courses in personal survival, firefighting, medical first aids and Personal safety and social responsibilities as mentioned in STCW Convention and IMO Module Courses 1.19, 1.20, 1.13 and 1.21.
Contents: include an introduction to the emergency situations, Safety equipments and its requirements, Personal life saving appliances, distress signals, survival crafts. An introduction to the fire and its causes on board ships, definitions of hazards, classification of fires, firefighting equipment, Medical first aid on board, health care and persons medical rescue, radio medical advice; medicines and sterilization, Life onboard ships, Contribution to human relationships on board ship., care of seaman's social life issues. Safe Working Practice, Communication skills and the understanding of orders in relation to shipboard duties,

MSN 240: Fundamentals of Marine Safety
Introduction to marine navigation. Topics include: basic knowledge of terrestrial and celestial navigation, mathematical sailing problems, concepts and basics of terrestrial navigation (shape of the earth; terrestrial coordination system; sailing definitions; types and calculations).
Prerequisites: MATH 201 PHYS 204

MSN241: Seamanship
Study of the duties of the Officer Of the Watch (OOW), basic knowledge and skills required in cases of emergency and the respond procedures.Topics include international rules of the road for preventing collisions at sea (COLREG); IALA buoyage systems and their applications; duties of the OOW according to the STCW convention / table 1/2/A and International Ship and Port Security

(ISPS) Code; emergencies; contingency plans; towing and salvage practices; distress procedures; maritime search and rescue.

MSN 242: Navigation Instruments
Students will gain knowledge of and ability to operate navigational equipment. Topics include basic Lecture of the earths' and the ships' magnetism; Lecture and applications of the navigational watchkeeping electronic instrument such as magnetic and gyro compasses; echosounder, speed and distance logmeter, steering control systems, course recorder and rate of turn indicator.
Prerequisites: PHYS 204

MSN 243: Maritime Communication
Students will gain knowledge of and ability to use and operate Global Maritime Distress Safety System GMDSS subsystems and equipment; transmit and receive signals by Morse light and the International Code of Signals. Topics include general principle of maritime radio communication, distress and safety communications ("GMDSS applications"; operation procedures of radiotelegraph and radio telephone transmitters and receivers, AMFMSSB; autoalarms; lifeboat portable transceivers; radio communication regulations, Morse light signaling and the use of International Code of Signal)
Prerequisites: PHYS 204

MSN 244: Ship Construction
On completion of the course, students will gain general knowledge of the principal structural components of a ship and the proper names of the various parts. Topics include introduction to ship construction; materials used in ships; ship stresses; types of keel; double bottom structure; different types of merchant ships and the names of their structural members; fore peak structure; aft peak construction; ship construction plans; tonnage measurements and load line assignment; dry dock works; maintenance of ship's hull; cargo holds' hatches and water tight doors.

MSN 245: Marine Meteorology
Students will gain knowledge of the characteristics of the various weather systems, ability of using and interpreting information obtained from ship borne meteorological instruments. Topics include weather elements; atmospheric thermodynamics; wind systems; cyclones and anticyclones; air masses and fronts, tropical cyclonic storms; the synoptic weather map; weather service for merchant shipping; weather forecasting; motion of ocean waves; sea ice; the meteorological observations and instruments, marine meteorological information sources and its international standards.

MSN 291: Leadership and Physical Education (1)
This course focuses on leadership skills and physical education. Topics include elementary instruction in gaining commitment, responsibility, discipline and obedience skills developing of leadership and teamwork skills enhancing the performance of student's physical fitness gaining various swimming techniques.

MSN 330: Coastal Navigation
Students will be able to use navigational charts, determine the ship's position by various methods and tide applications. Topics include use of navigational charts; symbols and abbreviations on the navigational charts; plotting tools and techniques; directions by using gyro and magnetic compasses; compass error; different types of positions and position lines; methods of fixing; wind, current and tidal stream effects; Tide calculations and applications for standard and secondary ports.
Prerequisites: MSN 240

MSN 331: Deck Operation
Students will gain basic knowledge and practical skills that are essential to carrying out shipboard operations routine as well as create solutions at sea. Topics include rigging; rope and wire work; ships' derricks; maintenance; line handling and safe working practices onboard; anchor and shackles works; ship maneuvering, ship to ship interaction, channel effects and shallow water effect.
Prerequisites: MSN 241

MSN 332: Electronic Navigation Systems
Students will gain working knowledge and eor and applications skills in determining the ship's position by using electronic navigational aids. Topics include introduction, theories and marine applications of Electronic Navigational Aids (satellite navigation systems; radio navigation systems).
Prerequisites: PHYS 204

MSN 333: Celestial Navigation
Students will gain knowledge and application skills in determining the ship's position by using celestial bodies. Topics include the basic practices of celestial navigation; PZX spherical triangle solutions for various celestial navigation calculations involving the Sun, Moon, Planets and stars; the nautical almanac, meridian passage and pole star sights, compass error at sun rising and setting times.
Prerequisites: MSN 240

MSN 334: Ship Stability
Students will gain basic knowledge of ship stability for officers in charge and practical: applications of ship stability. Topics include forces and moments; centroids and centre of gravity; laws of flotation; density and specific gravity; calculation of areas; volumes; moment, and displacement for box shaped vessels. Tonnes Per Centimeters (T.P.C), Dock Water Allowance (DWA) and Fresh Water Allowance (FWA) calculations, various equilibrium conditions, effect of cargo operations on centre of gravity, free surface effect, list, heel and trim calculations of ships, using of hydrostatic curves and tables of a ship.
Prerequisites: PHYS 204

MSN 340: Voyage Passage Planning
Students will gain knowledge and applications of planning and conducting coastal and ocean navigational passage. Topics include principles of coastal passage planning and execution; approaches and anchorages in clear weather; using radarresponsive targets; using the nautical publications; principles of ocean passage planning and execution taking in consideration the different weather statues; keeping log.
Prerequisites: MSN 330

MSE 389: Voyage Passage Planning
Students will gain knowledge and application of principles of marine engineering. Topics include terms used in machinery spaces; operating principles of marine power plants; ship's auxiliary machinery; enginepropeller matching; mechanical transmission of power; thrust bearing; shafting and alignment; stern tube; propeller; different type of pumps; heat exchangers; drainage and ballasting systems.

MSN 341: Ship Tracking Systems
Students will gain knowledge of and ability to operate, interpret and use of information obtained from different ship tracking systems. Topics include general principles and applications of marine Radar and Automatic Radar Plotting Aid (Lecture, design and Practical: handson application, IMO Rader Observation and ARPA training requirement); Lecture and operation of Electronic Charts Display and Information System (ECDIS), Automatic Identification System (AIS); survey of advanced stateoftheart techniques (computerization, automation, integration of ship control and maneuvering systems such as IBS/INS).
Prerequisites: MSN 332

MSN 342: Maritime English
Students will be able to use the English language in written and oral form during their duties onboard ship, According to the requirement of STCW Code, Table AII/1. Topics include terminologies related to charts and other nautical publications; terminologies of meteorological information messages concerning ship's safety and operation; basic communication terms using in ship to ship and ship to coast stations communications; terminologies using in navigational watch to communicate with other parts onboard the ship; use and understand the IMO Standard Marine Communication Phrases (SMCP).
Prerequisites: ELCS 102

MSN 343: International Maritime Law
Students will gain knowledge of international maritime law embodied in international agreements and conventions (certificates, documents, responsibilities and national legislation for implementation). Topics include historical brief; sources of international law; sovereignty and jurisdiction of the state; United Nations (UN) and its organizations, territorial water and borders, UN International Convention for law of the sea (UNCLOS); innocent passage right; freedom of navigation; rights of seamen (related ILO Conventions); collision at sea; maritime contracts; carriage of goods by sea; salvage; limitation of liability.

MSN 344: Dry Cargo Handling
Students will gain knowledge and application of various dry cargo handling equipments and techniques onboard. Topics include cargo handling responsibility; Fundamentals objectives of cargo stowage; a survey of cargo gear; preparation of cargo hold, staffing, loading, discharging and securing of different types of dry cargo including dangerous goods and IMDG code
Prerequisites: MSN 331

MSN 391: Leadership and Physical Education (2)
A continuation of Leadership and Physical Education I. Students will gain leadership skills in addition to further enhancement of physical fitness especially in terms of different swimming skills. Topics include elementary instruction in gaining commitment, responsibility, discipline and obedience skills developing of leadership and teamwork skills enhancing the performance of students physical fitness gaining various swimming techniques.

MSN 430: Liquid Cargo Handling
Students will gain knowledge and skills in liquid cargo handling as required by STCW code, chapter 5, and section AV/1, Tanker Familiarization Course. Topics include an introduction to the Fundamentals of bulk liquid cargo transportation on a tanker ship; characteristics of petrochemicals, cargo loading systems, cargo pumps, loading/discharge operations, ballasting/deballasting, tank cleaning, gas freeing certificate to enter enclosed space, inert gas systems, crude oil washing operations, tanker safety and oil pollution regulations/control (SOPEP). This course covers the requirements of IMO Module Course 2.06.
Prerequisites: MSN 334

MSN 431: Technical Reporting and Methodology
Upon the completion on this course, students will be capable to communicate with others about ship operation by using different methods of reporting and demonstrations, as well as enhance their research methodology skills. Topics include basic writing skills; report writing and research methodology; ability to explain in writing, orally and with presentation the different situations and needs of ship operations.
Prerequisites: MSN 342

MSN 432: Maritime Meteorology Applications
Upon completion of this course, students will be trained on weather conditions prediction; actions to be taken to maintain safety of navigation during various weather conditions. (As mentioned in STCW code, Table AII/2). Topics include plotting and analysis of weather maps; ship weather routing; tropical storm avoidance; use and interpret various weather information sources (Facsimile charts internet meteorological computer applications).
Prerequisites: MSN 245

MSN 441: Safe Operation of Petroleum Tanker
Students will gain the various knowledge and skills of handling of oil crude and products, advanced safety precautions for tankers according to the requirements of STCW Convention, and IMO (Model Course 1.02). Topics include evolution of the petroleum tanker, Regulations and Codes of safe Practice, Safety Practices and Equipment, Safety in Terminal Operations, The petroleum tanker and the ship/jetty interface, Operating Procedures, Preplanned loading/discharging procedures, important physical and chemical properties of crude oil and distillates carried in bulk, Crude flow, Principle of controlled cargo tank atmosphere, Sources of ignition, Static electricity, gas freeing, Inert Gas System, Safety in Tank Cleaning, COW, Emergencies Procedure, Emergency Management during Cargo operation, action to be taken in case of Oil Pollution at Sea , Health Care
Prerequisites: MSN 430

MSN 442: Maritime Conventions
Students will gain knowledge of international maritime conventions and other international issues related to ship operation. Topics include an introduction to the United Nation (UN), International Maritime Organization (IMO) and UN agencies; review of the international conventions related to the maritime industry and its implementation to ship's operations.

MSN 444: Graduation Project
Students will practice the principals of research, data collection and analysis to connect the theoretical studies with maritime field applications in topics related to the graduates working field, through brainstorming. Students will be trained to apply scientific concepts in marine operation and maritime transportation fields. Projects will motivate them to cooperate with others graduates in the job field. Students(s) will carry out a research project related to the subject and approved by the department council. The results will be recorded with the analysis of data and discussion in a formal printed report and presented in an open seminar.
Prerequisites: MSN 431

MSN 434: Special Topics (Elective 1)
Students will gain t new and updated knowledge and applications in maritime industry. Topics for the course will be selected according to new and updated techniques, rules and equipment in the field of maritime industry.

MSN 435: Shipyard Operations Technology (Elective 1)
The aim of this course is to provide studentss with a better understanding of modern concepts of ship production, ship production planning, and ship repair technology. Topics include introduction to shipyard. Shipbuilding and repair history. Shipyard layout and material flow. Shipyard facilities. Ship building stages. Modern building techniques (group technology). Ship lifting techniques. Hull maintenance and repairs. Ship preparation before docking. Welding techniques and inspection. Marine paints. Sea trials and delivery. Underwater survey. Hazard and protection.

MSN 440: Maritime Safety& Security Management (Elective 2)
Students will understand measure and concepts of Safety Management System (SMS) and port/ship security system. Topics include an introduction to The International Safety Management (ISM) Code, The International Ship and Port Facility Security Code (ISPS Code); framework for proper development, implementation and assessment of safety and pollution prevention management, the existing international instruments; impact of the ISM Code implementation, role of safety management to prevent human injury or loss of life, and to avoid damage to the environment.
Prerequisites: MSN 343

MSN 443: Maritime Transport Economics
Students will understand how the shipping market is organized, how it works, to recognize the determinants of the prices & freight, and the factors influencing ship design. Topics include seaborne trade shipping market organization Shipping market supply and Demand The International Framework of Maritime Economics Economics of General Cargo Economics of Bulk Cargo types of ships and their economics.

MSN 445: Maritime Traffic Management (Elective 3)
Students will gain knowledge of maritime traffic (vessels, passengers and cargo) with its applications in the port. Topics include historical introduction of Vessel traffic services (VTS) and maritime traffic, the international issues on VTS and maritime traffic, Convention on Facilitation of International Maritime Traffic (FAL convention); functions of VTS; maritime communications adaptable to maritime traffic facilitation (EDI)
Prerequisites: MSN 342

MSN 446: Maritime Search and Rescue "SAR" (Elective 3)
Students will gain elementary knowledge and applications of maritime Search and Rescue (SAR) operations according to (SAR 1979) Convention and "IAMSAR Manuals". Topics include introduction to Maritime SAR Operations, the role of the different anticipated parties in Local , Regional and International SAR Plans, the Contents: of IAMSAR Manuals, responsibilities of SAR centers, ship reporting systems, cases study to have the lessons learned.

MSN 447: Sea Ports Management (Elective 4)
The aim of this course is to understand the organizational concept of ports and different types of port ownership and methods of management. Topics include organization concept of port port authority's functions and organizational structure Types of port's ownership organization of Public and private ports Labour management Legal system in ports Port users Port marketing.

MSN 448: Marine Accident and Incident Investigation (Elective 4)
Students will gain elementary knowledge and applications of maritime accidents investigations as mentioned in IMO model course 3.11 and incident investigation training manual. Content: Introduction to various types of maritime accidents; legal obligations and responsibilities of ship's owner(s) and master; Limit of Liability (LL) Convention; casualty investigation systems; TOVALOB, CRYSTAL and Intertanko organizations; P&I Clubs; collision at sea; distribution of the accident responsibilities; cases study "famous collision accidents" and lessons learned.
Prerequisites: MSN 442

MSN 449: Ships and Cargoes Marine Insurance (Elective 5)
To understand the main principles of insurance The basic rules of marine insurance Conditions, forms and documents of marine cargo insurance and hull insurance. Topics include the main principles of insurance The emerge of marine insurance The rules of marine insurance Protection and indemnity clubs Marine insurance documents Marine lossesHull and Machinery insurance ClCourse objectives' Conditions of marine cargo insurance Kinds of cargo insurance policies Role of surveyor The general average.
Prerequisites: MSN 343

MSE 580: Automatic Control (Elective 5)
Students will gain knowledge and basic principles of automatic control systems. Topics include definitions and concepts of automatic control, Principles of measurement, Measuring methods and equipment for automation of ship systems, Construction and Practical: operations of DC and AC equipment (transformers, Radars, and motors), Marine electrical power distribution and

control, Shipboard automatic control systems of a modern diesel propulsion unit and various Bridge Systems.
Prerequisites: PHYS 204

MSN 293: Summer SeaTraining (1) (3 months)
Students will apply knowledge and skills which have been gained during previous theoretical coursework onboard training ship. Topics include deck operations, Scraping, hull maintenance, Painting process, application of Various emergency procedure plans (Abandon ship drill, Fire drill, oilpollution, etc,..), elementary instructions of the bridge operations (Helm Control and orders, Engine Telegraph, Mooring Rope terms, Anchor orders and terms..)

MSN 393: Summer Sea Training (2-3 Months)
Students will apply knowledge and skills which have been gained during previous theoretical coursework on board a training ship. Topics include applying the elementary instruction in the skills of implementing Rules of the road, various deck operations, Scraping, hull maintenance, Painting process, application of Various emergency procedure plans (Abandon ship drill, Fire drill, oilpollution, Manoverboard, etc,..), The officer Duties during sea watch (ship's maneuvers, Fixing of ship's positions by different means, etc.,.), Cargo operations, loading, discharging, staffing and lashing, administrative relationship among various labors onboard.

MSN 593: Long SeaTraining (3) (6 months)
Students will apply knowledge and skills which have been gained during the previous theoretical classes to have the optimum benefit of being onboard. Topics include deck operations, Scraping, hull maintenance, Painting process, application of Various emergency procedure plans (Abandon ship drill, Fire drill, oilpollution, etc,..), elementary instructions of the bridge operations (Helm Control and orders, Engine Telegraph, Mooring Rope terms, Anchor orders and terms..), Concentrating on the duties of officer of the watch in various levels of the sea voyage.
Prerequisites: MSN 293, MSN 393

MSN 541: Terrestrial Navigation
Students will revise the basic knowledge of terrestrial navigation, revise the applications of: Sailing Coastal Navigation and Chart Projections Tide use of Nautical Publications. Topics include revise the concepts and basics of terrestrial navigation definitions, types and calculations of Sailing definitions definitions types and applications of navigational charts definitions, types and applications of coatstal navigation types and applications of tide nautical publications and its' use.
Prerequisites: MSN 593

MSN 542: Celestial Navigation Applications
Students will revise the basic knowledge and application skills in celestial navigation and its different applications. Topics include revise the principles and basics of celestial navigation. The basic practices of celestial navigation; PZX spherical triangle solutions for determining the ship's position by using celestial bodies and various celestial navigation calculations involving the Sun, Moon, Planets and stars; the nautical almanac, meridian passage and pole star sights, compass error at sun rising and setting times.
Prerequisites: MSN 593

MSN 543: Cargo Handling
Students will revise basic knowledge and application of various dry and liquid cargo handling equipments and techniques onboard, which were studied in previous terms according to the requirements of STCW convention. Topics includecargo handling responsibility; Fundamentals objectives of cargo stowage; a survey of cargo gear; preparation of cargo hold, staffing, loading, discharging and securing of different types of dry cargo including dangerous goods and IMDG code. An introduction to the Fundamentals of bulk liquid cargo transportation on a tanker ship; characteristics of petrochemicals, cargo loading systems, cargo pumps, loading/discharge operations, ballasting/deballasting, tank cleaning, gas freeing certificate to enter enclosed space, inert gas systems, crude oil washing operations.
Prerequisites: MSN 593

MSN 544: Watch keeping and Deck Work
Students will revise the basic knowledge and Practical skills that are essential to carrying out routine shipboard operations as well as create solutions at sea and the duties of watch keeping officers which were studied in previous courses. Topics include rigging; rope and wire work; ships' derricks; maintenance; line handling and safe working practices onboard; anchor and shackles works; ship maneuvering, ship to ship interaction, channel effects and shallow water effect. The international rules of the road for preventing collisions at sea (COLREG); IALA buoy age systems and their applications; duties of the OOW according to the STCW convention / table 1/2/A, emergencies; contingency plans; distress procedures.
Prerequisites: MSN 593

MSN 545: Ship Stability and Construction
Students will revise the general knowledge of the principal structural components of a ship and the basic stability knowledge of officers in charge and practical: applications of ship stability which were studied in previous courses. Topics include ship stresses; types of keel; double bottom structure; fore peak structure; aft peak construction; ship construction plans; tonnage measurements and load line assignment; dry dock works; maintenance of ship's hull; cargo holds' hatches and water tight doors; forces and moments; cancroids and centre of gravity; laws of flotation; density and specific gravity; calculation of areas; volumes; moment, and displacement for box shaped vessels. Dock Water Allowance (DWA) and Fresh Water Allowance (FWA) calculations, various equilibrium conditions, effect of cargo operations on centre of gravity, free surface effect, list, heel and trim calculations of ships, using of hydrostatic curves and tables of a ship.
Prerequisites: MSN 593

MSN 546: Proficiency in survival crafts and rescue boats
An indepth study of the basic knowledge of marine safety needed to obtain the required certificates in Proficiency in Survival Craft and rescue boats, according to the training requirements of Section AVI/2 and Table AVI/21 of the STCW Code and IMO Module Courses 1.23. Topics include ship emergency situations, types of survival craft and rescue boats, launching arrangements for survival craft, action to be taken at lifeboat muster stations to prepare for launching,, abandoning ship launching lifeboats / life rafts, search and rescue organization and procedures, sur-

vival management routines when in a survival craft, handling of survival craft on water, recovery of survivors from water into survival craft and rescue boat, use of locating devices
Prerequisites: MSN 593 MSN 230

Core Courses **Hydrographic Surveying** (Mandatory) (Credit Hours 67)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MATH	201	Mathematics for Maritime Studies	4	3	2		MATH 110
2	MATH	241	Linear Algebra I	3	3	-		MATH 201
3	PHYS	204	Physics 204	4	3	3		PHYS 110
4	PHYS	281	Physics (Practical)	1		3		PHYS 110
5	CPIT	201	Introduction to Computer Science	3	2	2		CPIT 100
6	MSN	243	Maritime Communication	2	2	2		PHYS 204
7	MSN	245	Marine Meteorology	2	2	2		
8	MSS	220	Fundamentals of Surveying	3	2	3		MATH 201
9	MSS	310	Fundamentals of Nautical Science	3	2	3		
10	MSS	311	Positioning and Navigation Systems I	3	2	3		MATH 241 MSS220
11	MSS	312	Estimation and Uncertainty Management	3	2	3		STAT 110 MATH 241 MSS 220
12	MSS	313	Geodesy and Map Projections	3	2	3		MATH 241
13	MSS	320	Water Level Measurements and Prediction	3	2	3		MS 201
14	MSS	321	Positioning and Navigation Systems II	3	2	3		MSS 311, 312, 313
15	MSS	322	Underwater Imaging and Mapping I	3	2	3		PHYS 204,Co-requisite: MSS 320+321
16	MSS	323	GIS and Database Management	3	2	3		CPIT 201, MSS 313
17	MSS	410	Marine Law and Policy	3	3	-		
18	MSS	411	Underwater Imaging and Mapping II	3	2	3		MSS 322
19	MSS	412	Photogrammetric and Photo Interpretation	3	2	3		MSS 322
20	MSS	413	Remote Sensing for Marine Applications	3	2	3		MSS 322
21	MSS	420	Nautical Charting	3	2	3		MSS 323,412, 413 Co-req. 421
22	MSS	421	Hydrographic Data Management & Presentation	3	2	3		MSS 323, 411 Co-req. 420
23	MSS	429	Graduation Project	3				MSS 221Permission of the Department
			Total	**67**	**48**	**56**		

Hydrographic Surveying Track (Credit Hours 8)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Training	
1	MSS	221	Technical Communication	2	2			ELCS 102
2	MSS	414	Marine Geology for Hydrographers	3	2	3		
3	MSS	422	Offshore Geophysical Surveying	3	2	3		MSS 411 414
4	MSS	423	Operational Use of Nautical Charts	3	2	3		MSS 310
5	MSS	424	Special Topics in Hydrography	3	2	3		
			Total	**14**	**10**	**12**		

Summer Training (Credit hours 4)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Trainning	
1	MSS	390	Hydrographic Surveying Practice I	2			2	MSS 322
2	MSS	490	Hydrographic Surveying Practice II	2			2	MSS390, 411, 420
			Total	**4**			**4**	

MSS 220: Fundamentals of Surveying
To provide a basic understanding of conventional surveying methods and techniques. Topics include basic survey measurements, angle measurements using sextants and theodolites, balancing angles; taping, tacheometry, electronic angle and distance measurements, total stations and reflector less EDM (Electronic Distance measurements) ; traverses; coordinate geometry; differential leveling, Barometric and trigonometric heighting, effects of curvature and refraction; geodetic control surveys.
Prerequisites: MATH 201

MSN 245: Marine Meteorology
To gain knowledge of the characteristics of the various weather systems, ability of using and interpreting information obtained from ship borne meteorological instruments. Topics include weather elements; atmospheric thermodynamics; wind systems; cyclones and anticyclones; air masses and fronts, tropical cyclonic storms; the synoptic weather map; weather service for merchant shipping; weather forecasting; motion of ocean waves; sea ice; the meteorological observations and instruments, marine meteorological information sources and its international standards.

MSS 310: Fundamentals of Nautical Science
To acquire a basic level of knowledge of nautical science and navigation publications. Topics include introduction to navigation and charting, rule of the road, conventional aids to navigation, navigational warnings, nautical charts and navigation publications; maritime safety and seamanship, safe practice, ropes and wires, ship behaviour, anchoring; pilotage; small boats.

MSS 311: Positioning and Navigation Systems I
To acquire a basic knowledge of various marine positioning and orientation methods and systems (both surface and undersea). Topics include terrestrial radio navigation, celestial navigation, shorebased, satellitebased and undersea positioning systems, orientation systems
Prerequisites: MATH 241 MSS 220

MSS 312: Estimation and Uncertainty Management
To provide a fundamental level of understanding of Geomatics data estimation, filtering, analysis and interpretation. Topics include basic concepts of estimation and uncertainty, analysis of survey measurements, measures of central tendency, introductory probability Lecture, univariate statistical testing; covariance and correlation, geometrical interpretation of covariance matrix confidence regions; functional and stochastic models, principles of leastsquares methods, parametric, condition and combined cases, partitioning, weighted and functional constraints, sequential solution; analysis of residuals; introduction to filtering and smoothing.
Prerequisites: STAT 110 MATH 241 MSS 220

MSS 313: Geodesy and Map Projections
To provide a basic understanding of the shape, motion, and gravity field of the earth; to describe the various datums and coordinate systems and their use in practice; and to understand the basic principles of map projections and height systems. Topics include earth and its motions; gravity field of the earth, normal gravity field, the geoid; classical geodetic positioning, celestial, geodetic and orbital coordinate systems, the datum issue, coordinate transformation; direct/inverse geodetic problems, boundary delimitations; relative positioning on mapping plane map projections; height systems.
Prerequisites: MATH 241

MSS 320: Water Level Measurements and Prediction
To understand tidal phenomenon, tidal analysis and prediction at the local, regional and global levels. Topics include tideproducing forces, earthmoonsun system; classification of tides; tidal analysis and prediction, harmonic analysis of tides, tidal constituents, cotidal charts, tide tables, numerical modelling of tides; meteorological and nontidal influences; tidal streams and currents; instruments and procedures, establishment of temporary water level gauge, tidal datum; gauge calibration and inspection.
Prerequisites: MS 201

MSS 321: Positioning and Navigation Systems II
To provide a thorough understanding of global navigation satellite systems, augmentation and integrated systems. Topics include overview of satellite positioning methods; description of GPS satellite orbit, broadcast and precise ephemeris; characteristics of the GPS signals, GPS signal propagation, GPS measurement errors; GPS observables, linear combination of GPS observables; singlesite GPS models, precise point positioning; GPS models for short, medium and long distances; integer ambiguity determination; communication links; GNSS data and correction services; other GNSS systems, GLONASS system, Galileo system; augmentation and integrated systems.
Prerequisites: MSS 311 MSS 312 MSS 313

MSS 322: Underwater Imaging and Mapping I
To understand the physical principles and propagation of acoustic signals; and to provide basic understanding of acoustic and nonacoustic bathymetric techniques. Topics include wave propagation fundamentals, acoustic waves, propagation losses, multiple paths, sound velocity, ray tracing, underwater acoustic noise, reflection and scattering; acoustic devices, transducers and array processing; singlebeam sounders, recording, sounder calibration, sounding reduction and accuracy, acoustic sweeps; sidescan sonar; multibeam sonar; nonacoustic bathymetric techniques, laser bathymetry, remote sensing bathymetry, mechanical techniques, inspection techniques.
Prerequisites: PHYS 204 coreq. MSS 320 MSS 321

MSS 323: GIS and Database Management
To understand the basic principles of marine GIS and to provide a fundamental level of knowledge of spatial databases and database management systems. Topics include basic concepts of Geographical Information Systems (GIS). Functions and architecture of GIS. Database management systems for raster and vector data. Algorithms used for spatial data selection, filtering, smoothing, approximation, estimation, correlation and analysis. Marine applications.
Prerequisites: CPIT 201 MSS 313

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MSS 410: Marine Law and Policy
To provide a basic understanding of the legal aspects of hydrographic surveying, as required by both the International Hydrographic Organization (IHO). Topics include historical development of the Law of the Sea, United Nations Convention on the Low of the sea (UNCLOS); nature and characteristics of various delimitation zones; boundaries between states with opposite or adjacent coasts. Contracts and liability of hydrographic products and services. Marine accident investigations and court cases in relation to hydrographic issues.

MSS 411: Underwater Imaging and Mapping II
To provide a thorough understanding of multibeam echosounding surveys and bathymetric side scan. Topics include signal processing fundamentals; fundamentals of sonar's, angular spectrum, radiation pattern, beamwidth, mainlobes and sidelobes, nearfield and farfield concepts; spatial and temporal resolution, resolution in range and angle; choice of acoustic frequency; Sides can Sonar's, sides can sonar geometry and resolution, sides can image formation, bathymetric sides can; multibeam echo sounders, transmission and reception arrays, beam forming, spatial aliasing, beam steering, array geometries, flat vs. curved arrays, transmit steering for yaw/pitch/roll compensation, FFT beamforming; depth coverage; ancillary sensors, positioning and orientation requirements, sound refraction in water column, uncertainty estimation in swath sounding, IHO survey specifications; seabed acoustic backscatter, acoustic seabed interaction, acoustic backscatter data interpretation, normal and oblique seafloor characterization.
Prerequisites: MSS 322

MSS 412: Photogrammetry and Photo Interpretation
To provide a fundamental level of understanding of Photogrammetry and its marine applications. Topics include principles of Photogrammetric techniques and systems. Mathematical relationships and models. Stereomodel formation. Orthorectification of aerial photographs. Rectification of digital imagery. Photogrammetric project planning. Closerange underwater Photogrammetry. Land applications, topography. Marine applications, Coastline delineation using photogrammetric methods.
Prerequisites: MSS 322

MSS 413: Remote Sensing for Marine Applications
To provide a fundamental level of understanding of remote sensing and its marine applications. Topics include basic concepts of remote sensing. Electromagnetic spectrum; energy interactions with the atmosphere, earth and sea surfaces. Sensors and recording devices. Airborne and spaceborne systems. Geometric and radiometric rectification, image enhancement and classification. Marine applications (bathymetry, coastline delineation, coastal zone management, water surface mapping, wind speed, sea surface temperature, water column properties, search and rescue operations, and oil spill mapping).
Prerequisites: MSS 322

MSS 420: Nautical Charting
To provide an indepth knowledge of chart compilation, ENC and Electronic Chart Display and Information System (ECDIS) production, and ancillary nautical publications. Topics include characteristics of nautical charts, features and ancillary nautical publications. Hydrographic data thinning and preparation for nautical chart production. Soundings and features selection. Digital data storage and formats, IHO S57 data standards, S52 specifications for chart Contents: and display; merging multiple data sets, uncertainty and topological considerations. Nautical chart production.
Prerequisites: MSS 310 MSS323 MSS 412-413. MSS 421

MSS 421: Hydrographic Data Management and Presentation
To provide fundamental level of understanding of management, visualization and presentation. Topics include hydrographic data acquisition and processing, spatial data selection and analysis; data cleaning, filtering and smoothing; digitization and scanning processes; digital data storage and formats, spatial databases and database management systems, merging multiple data sets, uncertainty considerations; digital elevation models, data plotting and contouring, 3D modelling and visualisation, visualization requirements and standards; data thinning and preparation for navigational chart production.
Prerequisites: MSS 323 MSS 411, co-req, MSS 420

MSS 429: Graduation Project
To develop skills required for effective data collection, analysis, drawing conclusions and making recommendations, on a hydrographyrelated project. Students must carry out a research project on a suitable topic, which must be approved by the department. The work will comprise a literature review, study plan, data collection and analysis, drawing conclusions and making recommendations, on a hydrographyrelated project. Studentss are required to prepare a final thesis document and make an oral presentation of their research project at the end of the course.
Prerequisites: MSS 221 Permission of the Department

MSS 221: Technical Communication
To communicate technical and scientific information in an effective manner. This course focuses on building technical and scientific writing skills and effective oral communication.
Prerequisites: ELCS 102

MSS 414: Marine Geology for Hydrographers
To provide a fundamental level of understanding of marine geology and seafloor morphology. Topics include earth's magnetic field and internal structure. Identification of earth's structure and interior using seismic waves, classification and description of marine provinces, theories of the origin of ocean basins; continental drift, seafloor spreading and plate tectonics, seafloor morphology, identification of the composition and structure of the oceanic crust, marine sediments and their distribution and patterns; tools for sample collections, including dredges, grab samplers, cores and drilling rigs.

MSS 422: Offshore Geophysical Surveying
To understand the principles of offshore geophysical surveying for commercial and scientific purposes. Topics include geomagnetic surveys, Gravity surveys, Digital seismic techniques, Digital seismic data acquisition, Digital seismic data processing, Analogue equipment.
Prerequisites: MSS 411 MSS 414

MSS 423: Operational use of Nautical Charts
To provide a basic understanding of nautical chart production, its use with navigation sensors, capability and limitations. Topics include geodetic principles, map projections, hydrographic considerations, chart compilation, paper charts, electronic charts, raster and vector charts, Electronic Chart Display and Information System (ECDIS), navigational functions, integration of ECDIS with other navigational systems, updating of charts, uncertainty and safety considerations, regulatory and legal implications.
Prerequisites: MSS 310

MSS 424: Special Topics in Hydrography
To provide an indepth treatment of a special topic in areas of interest to students enrolled in the hydrographic surveying program. Topics will be based on new and updated information in the field of Hydrography and on the topics selected by students.

MSS 390: Hydrographic Surveying Practice I
To provide hydrographic field training, as required by the International Hydrographic Organization (IHO). Topics include field calibration of singlebeam echosounder and multibeam system patch test and reference systems; survey design and planning; hydrographic surveying specifications; types of hydrographic surveys. Six weeks a hydrographic survey vessel, immediately after final examinations. Studentss will be involved in all aspects of hydrographic surveying operations, including planning, conducting and processing hydrographic surveying data.
Prerequisites: MSS 322

MSS 490: Operational use of Nautical Charts
To provide hydrographic field training, as required by the International Hydrographic Organization (IHO). Topics include field calibration of echosounder and sidescan systems patch test and reference systems; survey design and planning; hydrographic surveying specifications; types of hydrographic surveys. Six weeks on a hydrographic survey vessel, immediately after final examinations. Studentss will be involved in all aspects of hydrographic surveying operations, including planning, conducting and processing hydrographic surveying data.
Prerequisites: MSS 390 MSS 411 MSS 420

Specialization Tracks: Ports and Marine Transportation: 129 Credit hour **Core Courses** (Mandatory) Credit Hours: 68

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	PHYS	281	Physics (Practical)	1		3		PHYS 110
2	ACCT	101	Principles of Accounting	3	3			
3	ACCT	351	Cost Accounting (1)	3	3			ACCT 101
4	BUS	101	Principles of Business	3	3			
5	BUS	211	Principles of Marketing	3	3			BUS 101
6	BUS	231	Human Resource Management	3	3			BUS 101
7	ECON	101	Principles of Microeconomics	3	3			
8	ECON	102	Principles of Macroeconomics	3	3			ECON 101
9	ECON	320	International Economics	3	3			ECON 102
10	MSE	379	Basics of Ship Construction and Naval Architecture	2	2		1	
11	MST	351	Principles of Ship Operations	2	2		1	
12	MST	352	Maritime Economics	3	3			ECON 102
13	MST	353	Maritime Law	2	2			
14	MST	354	Port Management	3	3		1	
15	MST	355	Cargo Operations	2	2		1	
16	MST	361	Law of Carriage of goods	2	2			MST 353
17	MST	362	Port Operations	3	3		1	MST 354
18	MST	363	Marine Insurance	3	3			MST 352
19	MST	451	Ship Chartering	2	2			MST 352
20	MST	452	MultiModal Transport	3	3			MST 352
21	MST	453	Logistics	3	3			
22	MST	454	Ports Economics	2	2			MST 352
23	MST	461	Economics of Tanker Operations	2	2			MST 352
24	MST	462	Applied Statistics	2	2		1	STAT 110
25	MST	463	Shipping Accounting	2	2			ACCT 101
26	MST	464	Container Terminal Management	2	2			MST354
27	MST	467	Graduation Project	3				
			Total	**68**	**64**		**6**	

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Elective Couse: Ports and Marine Transportation (Credit Course 7)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequi-site
					Lecture	Lab	Trainning	
1	MST	350	Law of Commercial Transactions	2	2			
2	MST	357	Economic Geography	2	2			
3	MSN	435	Shipyard Operations Technology	2	2		1	
4	MSN	445	Marine Traffic Management	2	2		1	
5	MST	455	Oil Terminal Management	2	2			
6	MST	456	Maritime Safety and Security Management	2	2			
7	MST	457	Special Topics	2	2			MST 352
8	MST	458	Maritime Feasibility Studies	2	2			MATH 110,
9	MST	465	Economics of Liner Shipping	2	2			STAT 110
10	ECON	204	Quantitative Analysis	3	3			ACCT 101,
11	BUS	340	Corporate Finance	3	3			STAT 110
			Total	**24**	**24**		**2**	

Summer Training (Credit Hours: 4)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Trainning	
1	MSN	291	Cooperative Summer Training	2	Summer Training			
2	MSN	391	Cooperative Summer Training	2				
			Total	**4**				

Course Descriptions:

MST 351: Principles of Ship operations
A study of the basic principles of managing and operating the ship. Topics include ship's crew Captain's responsibilities and crew's duties The relations between the ship and different ports bodies Human relations on board the ship Procedures of entering and leaving port Navigational and watch keeping concepts.

MST 352: Maritime Economics
To understand how the shipping market is organized and how it works and to recognize the determinants of the prices and freight, as well as the economic factors influencing ship design. Topics include international Seaborne trade shipping market organization Shipping supply and Demand shipping Costs and revenues The International Framework of Maritime Economics General Cargo Bulk Cargo economics of different types of ships Liner Shipping Economics Supply and Demand of liner shipping The Effects and impacts of Shipping Conferences toward shipping liner performance.

MST 353: Maritime Law
Students will gain knowledge of international maritime law embodied in international agreements and conventions (certificates, documents, responsibilities and national legislation for implementation). Topics includeorganization concept of port port authority's functions and organizational structure Types of port's ownership and its organizational structures of Public and private ports Labour management Legal system in ports Port users Port marketing The effects of Centralization Operations toward increase maritime performance Rate of return The management of Container Terminal The Influence of containers types developing industry and its effects on Planning port The Financial Performance execution of container terminal.

MST 354: Port Management
To understand the organization concept of port and different types of port ownership and methods of management. Topics include organization concept of port port authority's functions and organizational structure Types of port's ownership and its organizational structures of Public and private ports Labour management Legal system in ports Port users Port marketing The effects of Centralization Operations toward increase maritime performance Rate of return The management of Container Terminal The Influence of containers types developing industry and its effects on Planning port The Financial Performance execution of container terminal.

MST 355: Cargo Operations
A study of types of cargo shipped by sea and methods of their handling on board the ship and in ports. Topics include types of cargo cargo plans Methods of loading and discharging Methods and equipments of cargo handling on board ship and in port Procedures and precautions of cargo handling on board ship and in port Ship Crew's responsibilities during cargo handling operations.

MST 361: Law of carriage of goods
To understand the laws and the international conventions related to the international carriage of goods by land, sea and air. Topics include contract of carriage Documents related to the contract of carriage The bill of lading Transporting goods by sea carrier's liabilities according to the international conventions international carriage of goods by land and carrier's liabilities carriage of goods by air and the carrier liabilities.
Prerequisites: MST 353

MST 362: Port Operations
To understand the methods of planning, operating and navigating in port. Topics include technical procedures in port planning, Industrial ports, planning and operating of different cargo terminals, Performance evaluation of quays, Factors affecting the performance of ports, cargo operation, Marine traffic control, Navigational and pilotage planning, port and environment, Electronic Data Interchanging (EDI), Port statistics.
Prerequisites: MST 353

MST 363: Marine Insurance
To understand the main principles of insurance and the basic rules of marine insurance. Topics include the main principles of insurance The emerge of marine insurance The rules of marine insurance Protection and indemnity clubs (P & I) Marine insurance documents Marine lossesHull and Machinery insurance Cls Conditions of marine cargo insurance Cargo insurance policies Role of surveyor The general average.
Prerequisites: MST 352 MST 353

MSE 379: Basics of Ship Construction and Naval Architecture
To provide the basic knowledge required to maintain sea worthiness of the ship by studying the principal structural components of ships, the names for the various parts and applications of ship stability. Topics include ship's main particulars. Some ship terminologies. Materials used in ship construction. Framing Systems. Importance and function of bulkheads. General arrangement of general cargo, tankers, bulk carries, container, roro and passenger. Classification societies and its role in the design, building and operation of ships. Ship principal dimensions. Principles of floatation. Archimedes principle, Displacement (Δ), Deadweight, Coefficient of form, Tonnes Per Centimeter Immersion (TPC). Center of gravity. Introduction to transverse stability at small angle of inclination.

MST 451: Ship Chartering
To study the legal, operational, and economic aspects of different types of charter parties.Topics include voyage Chartering Time chartering Different Charters forms Responsibilities of owner and chatterer Chartering rules and regulations concerning loading and discharging.
Prerequisites: MST 352

MST 452: MultiModal Transport
To understand the multimodal transport concept and its economic impact and the commercial and legal aspects of the system. Topics include historical background Definitions United nations convention of multimodels of transport of goods 1981 (UN) Commercial and legal aspects of the system Modes of transport Land bridge concept Electronic Data Interchanging Concept (EDI) The role of MultiModal Transport Operator and responsibilities (M.T.O) International conventions related to containers movements.
Prerequisites: MST 352

MST 453: Logistics
To understand the economic importance of logistics. Topics include historical background Definitions Concept and the role of logistics Elements of logistics Types of warehouses Inventory management logistics planning Information maintenance Scheduling of production Purchasing selecting Modes of Transport Distribution and logistics centres.

MST 454: Port Economics
To understand the role of ports in the national economy and methods of their developments. Topics include the role of ports in national economy Principles of port planning Master plan Required data for port planning Economics of industrial ports Storage areas design Technological changes in maritime transport and its impact on ports Calculation of productivity Port performance indicators Container terminal planning Multipurpose terminal Dry bulk terminal Port Pricing.
Prerequisites: MST 352

MST 461: Economics of Tanker Operations
To understand the principles of managing and operating tankers. Topics include a review of oil industry Tankers types design and construction of tankers Aspects of operations (types of cargoes carried, process of loading / discharging, ballasting and tank cleaning) Regulations, conventions and international bodies related tanker operations Oil Spills Tankers charter Parties sources World Scale of Tanker's Tanker's economic Performance.
Prerequisites: MST 352

MST 462: Applied Statistics
Objectives: To apply advanced statistical knowledge and methods and analysis of data in maritime sector. Topics include arrangement and presentation of data, descriptive of variable, measurements of central tendency deviation, standard numbers, measurements of dispersion, normal distribution, relation between variables, linear regression and correlations time series forecasting models.
Prerequisites: STAT 110

MST 463: AShipping Accounting
Objectives: An advanced study of systems and methods of shipping accounting. Topics include cycle accounting of vessel; classifications of shipping accounts; balance trial of shipping companies.
Prerequisites: ACCT 101

MST 464: Container Terminal Management
To understand the economic importance of containerization and study the general layout of the terminal its components and management concept. Topics include containerization concept Containers types the impact of Containerization on the multimodal Terminal planning and Equipments The role of information System in the container terminal Measuring performance of Container terminal The financial performance of the terminal Container ships developments.
Prerequisites: MST 354

MST 467: Graduation Project
To understands the concept of research methodology. Students will carry out a research project related to a subject approved by the department committee. It will be presented in dissertation form and discussed in an open seminar.

MST 350: Law of Commercial Transactions
To understand the legal framework of commercial business environment. Topics include the commercial activities, and their differentiated criteria. The merchant and his responsibilities. Different types of the commercial firms. The commercial papers, their conditions and methods of dealing with them.

MST 357: Economic Geography
To understand the geographical distribution of production and consumption centers, with emphasis on oil production, to study the economic importance of transportation The economic characteristics of different modes of transport. Topics include the economic geography (concept divisions methodology) Different aspects for natural resources Oil formation Statistics concerning world oil quantities Oil extraction from land Oil extraction form sea Future developments of oil extraction The economic importance of different modes of transport The main routes in the world The main canals and navigational passages in it's world.

MSN 435: Shipyard Operations Technology
The aim of this course is to provide students with a better understanding of modern concepts of ship production, ship production planning, and ship repair technology. Topics include introduction to shipyard. Shipbuilding and repair history. Shipyard layout and material fLaw. Shipyard facilities. Ship building stages. Modern building techniques (group technology). Ship lifting techniques. Hull maintenance and repairs. Ship preparation before docking. Welding techniques and inspection. Marine.

MSN 445: Marine Traffic Management
Students will gain knowledge of maritime traffic (vessels, passengers and cargo) with its applications in the port departments. Topics include historical introduction of Vessel traffic services (VTS) and maritime traffic, the international issues on VTS and maritime traffic (FAL convention); functions of VTS; maritime communications adaptable to maritime traffic facilitation (EDI)

MST 455: Oil Terminal Management
To understand the managerial, technical and operational principles of oil terminal operations. Topics include general terminal design Tank types and design Terminal pipes, pumps and systems Inventory control Tank maintenance Ship shore coordination Environmental issues Measurement systems Safety issues.

MST 456: Maritime Safety and Security Management
Students will understand measure and concepts of Safety Management System (SMS) and port/ship security system. Topics include an introduction to The International Safety Management (ISM) Code, The International Ship and Port Facility Security Code (ISPS Code); framework for proper development, implementation and assessment of safety and pollution prevention management, the existing international instruments; impact of the ISM Code implementation, role of safety management to prevent human injury or loss of life, and to avoid damage to the environment.

MST 457: Special Topics
Students will gain new and updated knowledge and applications in maritime industry. The topic of the course will be subject to new developments techniques, rules and equipment in the field of maritime industry and ports.

MST 458: Maritime Feasibility Studies
To understand the fundamentals of feasibility studies, how to prepare the feasibility and its applications on ports and maritime sector. The use of data bases related to foreign trade. Topics include studying and surveying of the market and its requirements, determining the demand of production or services , analysis of imports & exports (Foreign trading), determination of the marketing gap, technical studies of project , type of service and its characteristics, the potential production, stages of service, the achievement time of study, descriptive of finance & human requirements of the project , financial studies of project , financial analysis , future financial& economic indicators.
Prerequisites: ECON 102

MST 465: Economics of Liner Shipping
To understand the operational concept of liner shipping, and elements of supply and demand of the market. Topics includeshipping conferences system Shipping conferences organization Elements of Demand and supply Freight calculation Alliances concept container terminal and its operations.
Prerequisites: MST 352

Training Courses Description of Ports and Marine Transportation Program

MST 291: Cooperation training (1)
To recognize the main components of a general port and it's functions and objectives. Topics include field training at specialized terminals (container terminal dry bulk terminal oil terminal other specialized terminal such as a livestock terminal and in order to understand their functions, components and objectives.

MST 391: Cooperation training
To apply the knowledge students have gained during their academic studies to different aspects of shipping industries. This is a practical training course that requires students to work in different departments in both port authority (security department traffic management and other technical departments) and at specialized terminals of the port, also, at different departments of shipping companies such as commercial, financial and technical department.

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Core Courses (Mandatory) Credit Hours 84, Specialization/track: Marine Engineering: 156 credit hour

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Prac	
1	MATH	202	Calculus II	3	3		2	MATH 110
2	MATH	203	Calculus III	3	3		2	MATH 202
3	PHYS	281	Physics – Practical	1	-	3		PHYS 110
4	MENG	102	Engineering Graphics	3	2		4	
5	MENG	130	Basic Workshop	2	1	3		
6	EE	201	Structured Computer Programming	2	3		1	CPIT 100
7	CE	201	Mechanics (1)-Statics	3	2		2	PHYS 110
8	CE	202	Strength of Materials	4	3		3	CE 201
9	MEP	261	Thermodynamics	3	3		2	PHYS 110
10	MEP	290	Fluid Mechanics	3	3	3		MATH 203
11	MEP	360	Heat Transfer	3	2	3		MEP 261
12	MSE	281	Engineering Chemistry	2	2	2		CHEM 110
13	MSE	290	Physical Training and Leadership	1	-		2	
14	MSE	282	Engineering Mechanics-Dynamics	2	2		2	CE 201
15	MSE	370	Electrical Engineering and Electronics	3	3	2		MATH 203
16	MSE	371	Basics of Ship Construction & Naval Architecture	3	3		2	
17	MSE	390	Physical Training and Leadership	1			2	
18	MSE	380	Electric Machines	2	2		2	MSE 370
19	MSE	381	Naval Architecture	3	3		2	MSE 371
20	MSE	382	Marine Engineering (1)	3	3	2		
21	MSE	383	Marine Diesel Engines (1)	3	3	2		MEP 360
22	MSE	470	Instrumentation & Measurements	2	2	-	2	MSE 380
23	MSE	472	Marine Engineering. (2)	3	3	2		MSE 382
24	MSE	473	Marine Diesel Engines (2)	3	3	2		MSE 383
25	MSE	480	Ships Electric Power	3	3		2	MSE 470
26	MSE	481	Ship Design	3	3		2	MSE 381
27	MSE	482	Marine Engineering (3)	3	3	2		MSE 472
28	MSE	483	Marine Diesel Engines (3)	3	3	2		MSE 473
29	MSE	580	Automatic Control	3	3		2	MSE 480
30	MSE	581	Maritime Law and Insurance	2	2			
31	MSE	582	Shipyard Technology	3	3	2		
32	MSE	582	Graduation Project	3				
			Total	**84**	**74**	**30**	**36**	

Elective Courses: Marine Engineering (Credit Hours 9)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Trainning	
1	MSE	384	Materials Science	3	3	2		
2	MSE	471	Steam Power Plants	3	3		2	ChE332
3	MSE	484	Refrigeration and Air Conditioning	3	3		2	MSE471
4	MSE	485	Structural Design of Ships	3	3		2	MSE371
5	MSE	584	Machine Design	3	3			CE 202
6	MSE	585	Management and Leader ship	3	3			
7	MSE	586	Planned Maintenance	3	3			
8	MSE	587	Gas Turbines	3	3		2	MSE471
9	MSE	588	Introduction to Offshore Engineering	3	3			
10	MSE	589	Special Topics	3	3			
			Total	**30**	**30**	**2**	**8**	

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Lecture	Lab	Tra	
1	MSE	391	Summer Practical Training	2			2	
2	MSE	590	Sea Training On board Ships for 6 months (Semester 9)	6			6	MSE 480, 482, 483 MSN 230
			Total	**8**			**8**	

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Courses Descriptions:

MSE 281: Engineering Chemistry

This course aims at expanding students knowledge of electro chemistry, so as to l promote the safety of life and the protection of marine environment when planning and performing maritime operations, as well expanding their use of English terms related to chemistry in written and oral form. Topics include electrochemical reactions, Electrochemical cells, Electrochemical series, Corrosion Lecture, Types of corrosion (uniform, galvanic, pitting, stress and erosion corrosion), Cathodic protection, Physical and chemical properties of fuel, Combustion of fuel, Purpose of lubrication, Types of lubricants, Oil analysis and natural gases, Nature of impurities in water, Water treatment and water analysis.

Prerequisites: CHEM 110

MSE 282: Engineering MechanicsDynamics

The aim of this course is to provide Students with basic theoretical knowledge of engineering mechanics to enable them to analyze engineering problems involving force and motion in the mechanical systems. Topics include motion and force analyses for particles and rigidbodies, Rectilinear motion and curvilinear motion, Scalar and vector solutions of relative linear velocities and acceleration, Moment of inertia, Kinetic energy, Dynamics of translation and rotation, Work and Energy, Conservation of energy, Application of impact and momentum to engineering systems components.

Prerequisites: CE 201

MSE 290: Physical Training and Leadership

This course aims to provide students with leadership skills and to enhance their level of motivation, commitment, discipline and responsibility. Emphasis is on the students's physical fitness especially their swimming skills. Topics includes

MSE 370: Electrical Engineering and Electronics

This course provides studentss with basic electrical knowledge and skills and enables them to use basic theoretical knowledge of electricity, electrical and electronic measuring and test equipment for fault finding, maintenance and repair operations. Topics include principles and applications of DC and AC circuit, Basic circuits (Ohm's law, Kirchoff's laws, voltage and current sources, parallel & series resistances, superposition, source transformations, node and mesh equations). Magnetism & Electromagnetism (magnetic quantities, definitions and relations of magnetic circuits).

Prerequisites: MATH 203

MSE 371: Basics of Ship Construction and Naval Architecture

This course aims at providing students with the basic knowledge of the principal structural components of ships and some applications of ship stability. Content: shipping terminologies, Materials used in ship construction, Standard steel sections, Framing Systems, Double bottom structure, Bilge keels, Bulkheads (stiffened and corrugated), Fore peak structure, Aft peak structure. General arrangement of general cargo, tankers, bulk carries, container, Ro-Ro and passenger. Classification societies and its role in the design, building and operation of ships. Introduction to transverse stability.

MSE 380: Electric Machines

This course aims at providing students with basic electrical knowledge and skills to enable them to prepare, start, couple and change over alternators or generators. Topics include principles and application of magnetic circuits. DC machines principles. Construction of simple generator (Stator, rotor, commutation & brushes, armature windings).Equation of induced voltage. Noload & external characteristics of generators. Types of DC generators. Lecture, kinds and characteristics of DC motors (Starters, speed control techniques, breaking). Alternators: characteristics, automatic voltage regulators, governors, parallel operation. Synchronous motors: characteristics, automatic voltage regulators, governors, parallel operation. Transformers: Kinds and construction; equivalent circuits, tests, voltage regulation.

Prerequisites: MSE 370

MSE 381: Naval Architecture

This course aims to provide students with the required knowledge to become proficient in naval architecture to enable them to control stability and trim in normal and critical situations. Topics include free surface effect. Intact stability of ships at large angles of heel. IMO requirements of the standards of stability (SOLAS convention, Load lines convention, Tonnage convention). Reserve buoyancy. Relation between free board and reserved buoyancy. Curves of statical stability. Angle of loll. List and its correction. Damage stability and its requirements for vessels. Equilibrium condition after flooding. Trim. Ship resistance components and powering, Twodimensional airfoil Lecture. Propeller Lecture.

Prerequisites: MSE 371

MSE 382: Marine Engineering (1)

Understanding of the basic principles of marine auxiliary machinery. Topics include terms used in machinery spaces and names of machinery and equipment. Operating principles of marine power plants. Ship's auxiliary machinery. Mechanical transmission of power to marine loads. Thrust block. Stern tube. Different types of pumps. Heat exchangers. Fuel and oil handling.

MSE 383: Marine Diesel Engines (1)

This course provides students with the basic principles of marine diesel engines, cycles of operation and construction details. Topics include basic principles of two and fourstroke diesel engines. Cycles of operation. Construction details of diesel engines. Diesel engines fixed and moving parts. Intake, scavenging and exhaust systems. Pressure charging and turbo chargers. Marine fuels and fuel injection systems. Engine preparation, starting and reversing methods. Operation of diesel engines. Cooling and lubricating systems.

Prerequisites: MEP 360

MSE 390: Physical Training and Leadership

Students will gain leadership skills and enhance their level of motivation, commitment, discipline and responsibility. Emphasis is on students physical fitness especially their different swimming skills.

MSN 230: Fundamentals of Marine Safety

Students will understand the basic knowledge of marine safety. Topics include an introduction to emergency situations, Safety equipments and their requirements, Personal lifesaving appliances, distress signals, survival crafts. An introduction to fire

and its causes on board ships, definitions of hazards, classification of fires, fire fighting equipment, Medical first aid on board, health care and persons medical rescue, radio medical advice; medicines and sterilization, Life onboard ships, Contribution to human relationships on board ship., care of seaman's social life issues. Safe Working Practice, Communication skills and the understanding of orders in relation to shipboard duties.

MSE 470: Instrumentation and Measurements
Understanding of the types and fundamentals of instrumentation systems. Topics include introduction to instrumentation devices and their uses in monitoring processes. Instrumentation used for process measurements: pressure, temperature, flow, level, and motion. Instrumentation used for measuring electrical quantities: ammeter, voltmeter, wattmeter, megger. Instrumentation used for different control components: comparators, sensors, transducers, amplifiers and actuators.
Prerequisites: MSE 380

MSE 472: Engineering Chemistry
Understanding of the layout of the vessel's auxiliary systems. Topics include auxiliary firedboilers. Ship piping systems. Fuel oil storage and transfer. Drainage, ballasting systems. Centrifugal and positive displacement pumps and their maintenance. Packing and mechanical seals. Fresh water and salt water hydrophore systems. Types of bearing. Separation and filtering. Bilge oilwater separator.

MSE 473: Marine Diesel Engines (2)
This course provides students with the necessary skills required to prepare, operate, monitor and evaluate engine performance. Topics include introduction to diesel propulsion plants, Applications of diesel engines onboard ships, Directdrive low speed diesels, Geared medium and high speed diesel engines, Combustion process in a diesel engine and diesel knock, Governors, Speed controls, Heavy fuel processing, Waste heat recovery systems, Exhaust emission control.
Prerequisites: MSE 383

MSE 480: Ships Electric Power
This course expands student's knowledge of construction and operational characteristics of shipboard AC and DC electrical systems and equipment. Topics include marine switchboards: Main & emergency switchboards, components, power supply systems, Shipboard electric power generation and DC & AC distribution, Batteries types and its connections, Protection: Elements and applications, Maintenance and repair procedures, Electrical power system, AC and DC electric motor drives, Controllers and safety devices, Operation, maintenance and repair procedures and practices.
Prerequisites: MSE 470

MSE 481: Ship Design
This course provides students with a comprehensive grounding in the basic concepts of ship design to enable them to apply these concepts to the practical solutions of ship design problems. Topics include general design features of different marine vehicles. Principles of ship design. Preliminary estimation of displacement. Preliminary estimation of main dimensions. Ship hull form design. Preliminary weight estimation. Stability in ship design. Hull design using Autoship. Fuel consumption. Ship specifications and contracts.
Prerequisites: MSE 381

MSE 482: Marine Engineering (3)
This course provides students with a comprehensive grounding and proficiency of the operation and maintenance of marine auxiliary systems, cargo handling equipment and deck machinery. Topics include basic principles, construction and operation of hydraulic systems and equipment as used in shipboard applications (controllable pitch propellers, mooring winches). Enginepropeller matching. Shafting design and alignment. Steering gears. Manual and automatic control valves. Condition monitoring systems. Water, waist water and sewage treatment plants. Fresh water generation (distilling, major components, operation and maintenance, and interrelationship with other auxiliary systems).
Prerequisites: MSE 472

MSE 483: Marine Diesel Engines (3)
The aim of this course is to provide students with the appropriate skills to enable them to perform maintenance, locate the common faults, troubleshoot and repair marine diesel engines. Topics include diesel engins maintenance principales. Procedures of diesel engine parts disassembly. Inspection and assembly. Camshaft and camshaft drive. Stuffing box. Cross head. Diesel Electric system. Latest development of marine diesel engines. Engine room layout in modern vessels. Diagnostic and condition monitoring systems. Diesel engines trouble shooting.
Prerequisites: MSE 473

MSE 580: Automatic Control
The aim of this course is to expand students' knowledge, understanding and proficiency of the operation, testing and maintenance of the control equipment as well as analyse maritime electrical control equipment data. Topics include fundamentals of automation and control systems. Open & closed loop systems. Block diagram & transfer function. System identification, modeling, time responses, analysis, controllers, tuning. Marine main switchboards, components, power supply systems, generators, power sharing, electric subsystems, steering gear and emergency power supply. Starting control and regulation of motors. Plant documentation, rules and regulations. Design, control and surveillance of maritime control systems
Prerequisites: MSE 480

MSE581: Maritime Law and Insurance
This course provides students with knowledge of conventions, laws, rules and regulations relating to international shipping and faniliarizes them with Saudi Arabia's national legislation and the different forms of insurance. Topics include characteristics of Maritime Law. Judicial system and its function. Ship, nationality and registration. Salvage. Relevant international maritime law embodied in international agreements and conventions. Relevant IMO conventions concerning safety of life at sea and protection of the marine environment. Certificates and other documents required to be carried on board ships by international conventions (how they may be obtained and the period of their legal validity). Responsibilities under the relevant requirements of the International Convention on Load Lines, the International Convention for the Safety of Life at Sea, and the International Convention for the Prevention of Pollution from Ships.

MSE 582: Shipyard Technology
This course provide students with a better understanding of modern concepts of ship production, ship production planning, and ship repair technology. Topics include introduction to shipyard. Shipbuilding and repair history. Shipyard layout and material flow. Shipyard facilities. Ship building stages. Modern building techniques (group technology). Ship lifting techniques. Hull maintenance and repairs. Ship preparation before docking. Welding techniques and inspection. Marine paints. Sea trials and delivery. Underwater survey. Hazard and protection. Ship repair estimates.

MSE 583: Graduation Project
Students will practice the principles of research, data collection and analysis so as to integrate their basic engineering sciences and practical work in finding solutions to a marine engineering design problem. The project will motivate them to cooperate with others graduates in the job field. Students(s) will carry out a research project related to the marine field or marine design approved by the department council and under supervision of a staff member. Emphasis on the integration of basic engineering sciences and practical work in the study and solution of a marine engineering design problem.

MSE 384: Materials Science
This course provides students with sufficient understanding of the relation between materials internal structure and its properties, as well as the application of engineering materials in the marine field. Topics include modern classification of engineering matetrials, Atomic bonding and energy, Crystallyine structure and density, Mechanical properties of materials, Destructive tests of materials, Fatigue, Non destructive tests of materials, Phase diagrams, Equilbrium diagram for binary systems, Iron Iron Carbide phase diagram, Heat treatments of steel.

MSE 371: Steam Power Plants
This course provides studentss with sufficient understanding of steam propulsion plants. Topics include fossil fuel steam generators. Steam Boiler calculations. Heat balances. Internal fittings and fluid flow paths. Boiler waterfeed, water test and treatment. Steam boiler control systems. Steam machinery. Methods of checking water level in steam boilers and action necessary if water level is abnormal. Location of common faults in boiler rooms and action necessary to prevent damage
Prerequisites: ChE 261

MSE 484: Refrigeration and Air Conditioning
This course provides students with an overview and understanding of the use of air conditions & refrigeration in a shipboard environment. Topics include introduction to basic refrigeration and air conditioning principles and equipment, Refrigeration and the vapour compression system, Improved vapour compression system, The refrigeration cycle dimensioning and energy requirements, Refrigeration equipment (condenser evaporator compressor expansion device control), Different types of cooling media and carriers, Cooling load calculations, Psychrometric chart, Psychrometric process, Summer and winter air conditioning.
Prerequisites: MSE 471

MSE 485: Structural Design of Ships
This course enables students to design, make calculations and class drawings of large ship structural units by combining shipbuilding design and elementary structural mechanics in the strength analysis of typical structural elements in the ship hull. Topics include ship structural stresses, Details of different ship structures midship sections (general cargo tanker bulk carrier container), Classification societies, Ship structural design (obtaining ship scantlings from classification society's rules), Ship strength calculations (longitudinal and transverse strength of the hull girder), Tonnage calculations, Load lines and draught marks, Rudder Lecture and construction.
Prerequisites: MSE 371

MSE 584: Machine Design
Understanding the fundamentals of machine design, including analysis and design of mechanical component. Topics include fundamentals of machine design, Columns, Failure criteria for loaded columns, Cylinders design, Shafting, Shaft design procedure, Design of bearings (thrust and journal), Design of spur gears and helical gears, Fatigue failures, Design of springs, Brakes and clutches , Joining of members, Flexible machine elements (flat belts and Vbelts, ropes, and chains), Transferring of power.
Prerequisites: CE 202

MSE 585: Management and Leadership
This course assists students in acquiring knowledge necessary to make decisions in the practice of management. Topics include introduction to the engineering profession. Total quality management. Human resources management. Communication skills (fundamentals aims functions). Professional liability and ethics. Personnel management onboard ships, Organization and training onboard ships.
Leadership: Different approaches to the study of leadership. Attitude and management skills. Communications and briefings. Short term strategy. Judgement and decision making. Challenge and response. Authority and delegation. Workload. Human error. Leadership in emergencies.

MSE 586: Planned Maintenance
This course expands students knowledge of devising optimal strategy for maintaining marine machinery at the proper preventive maintenance according to the instructions of engine manufacturer and work with the basic aspects of spare part management according to the planned maintenance. Topics include maintenance terminology. Types of maintenance (preventive and predictive maintenance). Reliability and availability. Life cycle costs. Cost control. Condition monitoring . Methods for deciding optimal maintenance strategy. Regulatory requirements. Management functions. Maintenance management systems. Spare parts management. Vibration measurement.

MSE 587: Gas Turbines
This course provides students with an understanding of the basic principles of Marine Gas Turbines. Topics include requirements of marine gas turbines. Marine gas turbines plant configurations .Lecture and first principles of marine gas turbines. Gas turbines calculations. Gas turbine controls. Reduction gears. Line shafting.

Construction, maintenance and operation of marine gas turbines. Construction, maintenance and operation of marine gas turbine lubricating oil systems. Construction, maintenance and operation of marine gas turbine air systems. Construction, maintenance and operation of marine gas turbine base and enclosure. Regulatory requirements for safety device settings. System tests and inspections.
Prerequisites: MSE471

MSE 588: Introduction to offshore Engineering
To introduce students to the field of Offshore Engineering with a broad classification and description of the different types of structures, vehicles and systems used and the various advanced technologies applied in this developing field. Topics include offshore prospecting, Types of Offshore structures and vehicles, Categories of loads, (Environmental loads, Calculation of wave forces, Calculations of current forces), Oil and gas drilling technology (drilling operation, rig and its equipments, cementing operation), Production technology (process pressure vessels, gas processing, oil processing), Safety aspects of Offshore installations.

MSE 589: Special Topics
Students will gain new and updated knowledge and applications in maritime industry. Topics will be selected according to new and updated develeopments and techniques, rules and equipment in the field.

Training Courses Description For Marine Engineering Program

MSE 391: Summer Practical Session
The aim of this course is to introduce students to the different jobs and skills carried out in a shipyard and to enable them to corporate with craftsmen having a professional background different from their own, or diesel simulator training to simulate the operating conditions of a heavyfuel dieselpropulsion plant. The duration of the training is two months in the industry (shipyard workshops) under the supervision of a staff member. Training will concentrate on either the production of hull components, sections and fitting out work in hull sections or in the operation, practical maintenance of either heat engines or marine auxiliaries. Students should submit a final report about their achievement during training in addition to any other requirements as assigned by the department.

MSE 590: Sea Training
The aim of this semester is to expand the students' awareness of real working condition of sea farers and the practical application to the theoretical knowledge covered during their studies. Training will be conducted onboard a training ship. where students will study the following:the fundamentals of engineering systems operations and shipboard routine, including operation and monitoring techniques for diesel propulsion, electrical power generation, evaporators and support equipment. Duties during emergency situations such as fire, abandon ship, and rescue are also learned.
Prerequisites: MSE 480 MSE 482 MSE 483 MSN 230

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