



**State University of New York**  
**MARITIME COLLEGE**  
**COURSE DESCRIPTIONS**

As of 01/21/2008

## COURSE DESCRIPTIONS

*Note: The course numbering prefixes for all disciplines are listed below. All courses appear in alphanumeric order according to prefixes and course number. Left click on the appropriate link below to jump directly to courses for that discipline.*

<a href="#">Accounting: GBAC</a>	<a href="#">Management: GBMG</a>
<a href="#">Astronomy: ASTR</a>	<a href="#">Marine Transportation: MT</a>
<a href="#">Biology: BIO</a>	<a href="#">Mathematics: MATH</a>
<a href="#">Chemistry: CHEM</a>	<a href="#">Metallurgy: METL</a>
<a href="#">Computer Science: CS</a>	<a href="#">Meteorology: METE</a>
<a href="#">Economics: GBEC</a>	<a href="#">Nautical Science: NAUT</a>
<a href="#">Engineering: ENGR</a>	<a href="#">Naval Science: NVSC</a>
<a href="#">English: ENGL</a>	<a href="#">Navigation: NAVG</a>
<a href="#">Environmental Science: ES</a>	<a href="#">Oceanography: OCEA</a>
<a href="#">Finance: GBEC</a>	<a href="#">Physical Education: PE</a>
<a href="#">General Business: GBUS</a>	<a href="#">Physics: PHYS</a>
<a href="#">Geology: GEO</a>	<a href="#">Professional Studies: PS</a>
<a href="#">History: HIST</a>	<a href="#">Social Science: SS</a>
<a href="#">Humanities: HUMN</a>	<a href="#">Spanish: SPAN</a>
<a href="#">Law: GBLW</a>	<a href="#">Transportation Systems: GBTT</a>

### **ASTRONOMY**

#### **ASTR 202 Descriptive Astronomy**

3 class hours, 3 credits.

Celestial sphere; solar system; theories of the evolution of the solar system: star identification; physics of the stars; star clusters and nebulae; galactic systems; evolution of the universe.

### **BIOLOGY**

#### **BIO 201 General Biology**

3 class hours, 2 laboratory hours, 4 credits.

Unity and diversity of living organisms. The cell. Hierarchical organizations of organisms. Taxonomy. Reproduction and development. Survey of animal and plant kingdoms. Concepts of evolution, behavior, and ecology.

**BIO 210 Ecology**

3 class hours, 3 credits.

Population and community structure. Nutrient cycling, intra- and inter-specific interactions. Diversity. Habitats. Man and the environment. Pollution.

Prerequisite: BIO 201.

Corequisite: MATH 251.

**BIO 315 Marine Biology**

3 class hours, 3 credits.

The marine environment. Classification of marine animals. Marine plants. Biological productivity & energy transfer. Animal life in the sea. Human interaction with the sea.

Prerequisite: BIO 201.

**BIO 320 Invertebrate Zoology**

3 class hours, 2 laboratory hours, 4 credits.

The invertebrate fauna will be explored in terms of their morphology, physiology, and ecology. The evolutionary relationships among these groups will be investigated. Laboratory exercises will provide for the examination of preserved and/or live specimens of representative members of various phyla.

Prerequisite: BIO 201.

**BIO 415 Ichthyology**

3 class hours, 3 credits.

An extensive study of fishes. Emphasis will be placed on their morphological and physiological characteristics and how adaptations of these help fish meet the challenges presented to them by the aquatic environment.

Prerequisites: BIO 201 and 315.

**BIO 416 Fisheries Science**

3 class hours, 3 credits.

A study of the models used for the evaluation of data relevant to the assessment and management of fish stocks. Concepts of population size, growth and mortality will be explored along with the fisheries management concepts of maximum sustainable yield, catch per unit of effort, and conservation measures and policies.

Prerequisites: MATH 251, BIO 201 and 315.

**BIO 420 Ecotoxicology**

2 class hours, 4 laboratory hours, 4 credits.

An experimental approach to ecotoxicology. Techniques to be learned include: heavy metal determination by atomic absorption spectrophotometry, tissue and cell culturing, various field-sampling techniques. Students will design and carry to completion independent research projects and will present their results orally and in the form of a scientific paper.

Prerequisite: Permission of the instructor.

## **CHEMISTRY**

### **CHEM 100 Introductory Chemistry**

3 class hours, 3 credits.

An introductory course focusing on measurement, structure of matter, stoichiometry, solutions, gases, electronic structure of atoms and chemical bonding.

Prerequisite: MATH 80.

### **CHEM 121 General Chemistry I**

3 class hours, 3 credits.

A study of the structure, composition and transformations of matter in the aqueous, gaseous and solid states. Stoichiometry, precipitation and oxidation-reduction reactions, thermochemistry, chemical bonding, gas laws, and molecular geometry.

Prerequisite: MATH 80.

### **CHEM 122 General Chemistry I Laboratory**

2 laboratory hours, 1 credit.

Corequisite: CHEM 121.

### **CHEM 123 General Chemistry II**

3 class hours, 3 credits.

This class is the continuation of CHEM 121. Kinetics, acid-base and solubility equilibria, buffers, pH, chemical thermodynamics, electrochemistry, nuclear chemistry and introductory organic chemistry.

Prerequisite: CHEM 100 or 121.

### **CHEM 124 General Chemistry II Laboratory**

2 laboratory hours, 1 credit.

Prerequisite: CHEM 122.

Corequisite: CHEM 123.

### **CHEM 212 Materials Science**

3 class hours, 3 credits.

A course detailing the structures and properties of solid materials. Bonding mechanisms, crystalline structures and imperfections, solidification. Mechanical properties and their dependence on atomic-scale structure. Electrochemical properties including corrosion. Thermal aspects: phase diagrams, isothermal transformation diagrams, heat treatments. Engineering alloys.

Prerequisite: CHEM 100 or 121.

Corequisite: MATH 101 or 111.

**CHEM 220 Environmental Chemistry**

3 class hours, 3 credits.

Natural and pollution-related atmospheric, aquatic and soil chemistry. Mechanisms of smog formation, ozone depletion and global warming; fresh and salt water chemistry and biochemistry, water pollution; soil chemistry, and ground water contamination. Chemical monitoring techniques and pollution-control technology.

Prerequisite: CHEM 100 or 121.

**CHEM 221 Organic Chemistry**

3 class hours, 3 credits.

A first semester course in Organic Chemistry. Nomenclature, structure, synthesis, and reactions of aliphatic organic compounds emphasizing reaction mechanisms and stereochemistry.

Prerequisite: CHEM 123.

**CHEM 222 Organic Chemistry Laboratory**

3 laboratory hours, 1 credit.

Organic Chemistry Lab is intended to be taken simultaneously with the lecture class. The majority of laboratory experiments cover the same content as the Organic Chemistry lecture class however spectroscopic techniques are also included.

Prerequisite: CHEM 124.

Corequisite: CHEM 221.

**CHEM 420 Chemistry of Hazardous Materials**

3 class hours, 3 credits.

Physical and chemical properties of hazardous materials; flammability principles; compressed gases; cryogenics; chemistry of combustion; chemistry of fire extinguishment; common substances; corrosives; water reactive materials; toxic materials; radioactive materials; radiation hazards.

**CHEM 610-611 Special Topics in Chemistry I-II**

1, 2, or 3 credits per term.

Theoretical or experimental investigation of special problems in either chemistry or metallurgy. Credits vary with problems.

**COMPUTER SCIENCE****CS 100 Introduction to Business Computing**

2 class hours, 2 credits.

General computer literacy, including topics such as computer hardware, microcomputer operating systems, database management, and telecomputing with microcomputers.

**CS 101 Computer Laboratory**

2 laboratory hours, 1 credit.

A laboratory course covering word processing, spreadsheets, and graphics.

**CS 131 Introduction to Computer Programming**

4 hours, 3 credits.

An introduction to computer programming in an object-oriented language (such as Java). Topics include: an overview of computer organization; program compilation and execution; primitive data types and operations; branching and looping; static methods; introduction to objects via strings; user-written object-oriented methods and encapsulation; arrays and basic searching/sorting algorithms. Other possible topics include exception handling and introduction to graphical user interfaces.

Prerequisites: MATH 101 or 111, CS 101.

**CS 301 Data Structures**

4 hours, 3 credits.

Techniques and algorithms for organizing and processing data. Data structures considered may include: text and binary files; contiguous and linked lists; stacks and queues; linked lists; trees; graphs. For each data structure, relevant processing algorithms (e.g., for traversing, searching, and sorting) will be considered, including recursive methods. Throughout the course, an object-oriented viewpoint via the concepts of encapsulation, inheritance, and polymorphism will be emphasized.

Prerequisite: CS 131.

**CS 401 Database Systems**

4 hours, 3 credits.

Survey of standard file organizations; introductory database concepts; the relational model and normalization; use of a relational database management system; object-oriented model; transaction management; distributed databases; database security.

Prerequisite: CS 131.

**CS 480 Computer Engineering I**

2 class hours, 2 laboratory hours, 3 credits.

An introduction to the design, construction, programming and operation of a micro-computer system; topics include: overall computer organization, CPU group, memory interfacing, assembly language programming, testing and debugging techniques; the initial phases of the design and construction of a microcomputer are included.

Prerequisite: ENGR 388.

**CS 490 Computer Engineering II**

2 class hours, 2 laboratory hours, 3 credits.

Continuation of Computer Science 480. The input/output sections of a computer; types of I/O devices; interfacing and programming; design projects including the design and construction of the I/O portion of the computer, the interfacing of the display, keyboard and robot arm.

Prerequisite: CS 480.

**ENGLISH****ENGL 90-95 Practice in Writing and Reading I-II**

3 class hours, 3 credits each semester.

Intensive preparation for college level writing and reading.

**ENGL 101 Freshman English I**

3 class hours, 3 credits.

Expository writing and analytic reading of selected texts: ENGL 101 emphasizes writing.

Prerequisite: Satisfactory grade on the freshman English placement examination or satisfactory completion of ENGL 90 or 95.

**ENGL 102 Freshman English II**

3 class hours, 3 credits.

Expository writing and analytic reading of selected texts: ENGL 102 emphasizes reading.

Prerequisite: ENGL 101.

**ENGL 407 Poetry**

3 class hours, 3 credits.

Reading and discussion of several major poets. Consideration of poetry as a genre.

Prerequisite: HUMN 201 or 202.

**ENGL 408 Modern Poetry**

3 class hours, 3 credits.

A study of modern poetry. This course traces the development of English and American poetry since World War I, from the formalism of the early 20th-century through the emergence of free-verse, and including recent developments in post-modern poetry.

Prerequisite: HUMN 201 or 202.

**ENGL 409 Drama**

3 class hours, 3 credits.

Reading and discussion of several major playwrights. Consideration of the drama as a genre.

Prerequisite: HUMN 201 or 202.

**ENGL 410 Greek Drama**

3 class hours, 3 credits.

Reading and discussion of plays from the Athenian Golden Age. Works to be studied include the two classic tragic trilogies, plus several comedies. Includes re-enactments of scenes and plays.

Prerequisite: HUMN 201 or 202.

**ENGL 411-412 The Novel I-II**

3 class hours, 3 credits each semester.

Reading and discussion of major novelists. Consideration of the novel as a genre.

Prerequisite: HUMN 201 or 202.

**ENGL 413 Novels of Latin America**

3 class hours, 3 credits.

Latin America has produced several recent Nobel Prize winners in literature. The writing of the region reflects both the extreme political conflicts of today and the lingering effects of the region's historical and cultural past. Reading and discussion focus on both the historical and the magic realist schools of prose fiction.

Prerequisite: HUMN 201 or 202.

**ENGL 415 Literature of Colonialism**

3 class hours, 3 credits.

How does colonialism affect those who have been colonized, and those who are doing the colonizing? This course studies colonialism, as it is expressed in two sets of literary works: those written from the viewpoint of colonizers, and those written from the viewpoint of corresponding colonized peoples. Areas focused on include Africa, India, and Southeast Asia.

Prerequisite: HUMN 201 or 202.

**ENGL 416 Literature of the Sea**

3 class hours, 3 credits.

Reading and discussion of works by important European and American authors dealing with maritime themes.

Prerequisite: HUMN 201 or 202.

**ENGL 418 Contemporary Literature**

3 class hours, 3 credits.

A study of literature written during the past eighty years, leading to the many styles of today. The movement from modernism to post-modernism will be traced through novels and short stories from around the world. Emphasis is placed on introducing new voices, from a diversity of cultures.

Prerequisite: HUMN 201 or 202.



**ENGL 420 Comedy**

3 class hours, 3 credits.

Reading of comic works by several major authors. Consideration of the range and nature of comedy and of comedy as a genre.

Prerequisite: HUMN 201 or 202.

**ENGL 423 Shakespeare**

3 class hours, 3 credits.

Reading and discussion of a representative selection of Shakespeare's plays.

Prerequisite: HUMN 201 or 202.

**ENGL 426 Science and Literature**

3 class hours, 3 credits.

A discussion of works of several major scientists and the effects of their work and thought on our culture. Special emphasis on developments which have most influenced modern life. Scientists studied are Galileo, Newton, Darwin, Freud, and Einstein.

Prerequisite: HUMN 201 or 202.

**ENGL 450 Speech**

3 class hours, 3 credits.

A course combining theoretical study of speech communication with practical study of public speaking, conferences, and meetings. The class meets in the Television Studio.

Prerequisite: HUMN 201 or 202.

**ENGL 452 Technical Writing and Studies in Technology and Civilization**

3 class hours, 3 credits.

Practice in report writing, research and conference techniques. Reading and discussion of material on the influence of technology on modern civilization. Required for students in the MT and Facilities Engineering programs. Otherwise an elective course.

Prerequisite: ENGL 102.

**ENGL 453 Creative Writing**

3 class hours, 3 credits.

Writing and marketing prose fiction, with an emphasis on the short story. Students' works are read and discussed, as are works by professional authors.

Prerequisite: HUMN 201 or 202.

**ENGL 454 Journalism**

3 class hours, 3 credits.

An introduction to the principles and practices of journalism, this course will explore the role of media, focusing on print and on-line outlets. It will examine what constitutes various types of news stories, how they're conceived, developed, published and received. Students will draft and evaluate various news formats. The course also will examine the legal, ethical and business aspects of media, using print as the basis of comparison.

Prerequisite: HUMN 201 or HUMN 202.

**ENGL 456 Advanced Technical Writing**

3 class hours, 3 credits.

A course combining advanced study in technical writing with rigorous study of Web design and administration. Applications to both marketing and engineering are explored.

Prerequisite: ENGL 452.

**ENGL 468 Biography/Autobiography**

3 class hours, 3 credits.

An examination of biographies and autobiographies, the most popular genre in America. Students will study the difference between a life told from the outside, and one told by the person who lived it; they will also study two major developments of the Twentieth Century: changing expectations of readers, and a dramatic change in the balance between sincerity and authenticity.

Prerequisite: HUMN 201 or 202.

**ENGL 470 Major British Authors**

3 class hours, 3 credits.

Intensive reading of selected works by representative British authors.

Prerequisite: HUMN 201 or 202.

**ENGL 471 Major American Authors**

3 class hours, 3 credits.

Intensive reading of selected works by representative American authors.

Prerequisite: HUMN 201 or 202.

**ENGL 472 Major American Writers: 19<sup>th</sup> Century**

3 class hours, 3 credits.

This course will study the writers of the “American Renaissance,” and trace the different paths pursued by those who followed them. Readings include selections from the Transcendentalists, the Romantics, the Realists, and the first Modernists.

Prerequisite: HUMN 201 or 202.

**ENGL 474-475 Film I-II**

3 class hours, 3 credits each semester.

Studies in the history of film, in film as an art form, and in the relationship between film and literature.

Prerequisite: HUMN 201 or 202.

**ENGL 477 Film and Fiction Studies**

3 class hours, 3 credits.

Studies in the transformation of print texts into visual narrative form. Also, study of the phenomenon known as “novelization.” The tensions between traditional linear narrative form and post-modern complexity will also be analyzed.

Prerequisite: HUMN 201 or 202.

**ENGL 478 Asian Cinema**

3 class hours, 3 credits.

The study of major Asian filmmakers, with an emphasis on their inter-relations with Western culture. Examination of the historical and cultural backgrounds of films from Japan, China, Hong Kong, and Korea. Directors studied include Kurosawa, Ozu, Kobayashi, Yimou Zhang, John Woo, Tsui Hark, Wong Kar Wai, and Chan-wook Park.

Prerequisite: HUMN 201 or 202.

**ENGINEERING****ENGR 100 Engineering Graphics**

2 laboratory hours, 1 credit.

An introduction to standard computer-aided drafting software, and to basic drafting techniques. Students who can demonstrate proficiency based upon prior training may receive credit by completing a challenge examination.

**ENGR 102 Introduction to Engineering**

1 class hour, 1 credit.

Introduces students to the engineering profession, ethics, problem-solving techniques and tools. Engineering communications techniques are stressed. Design methodology is introduced.

**ENGR 242 Statics**

3 class hours, 3 credits.

Statics and introduction to strength of materials. Principles of statics and static equilibrium with vector and classical applications. Includes coverage of frames, trusses, three dimensional structures, friction, and moments of inertia.

Prerequisite: PHYS 102 or 211.

**ENGR 243 Transport Processes**

3 class hours, 3 credits.

An introduction to the properties, terminology, concepts and basic laws of fluid statics and dynamics, thermodynamics and heat transfer.

Prerequisite: PHYS 201 or 214.

**ENGR 244 Dynamics**

3 class hours, 3 credits.

Principles governing motion resulting from applied forces. Provides a background in solid dynamics for use in areas such as robotics, vibration, and design from a vector formulation perspective. Topics include particle and rigid body kinematics, force and energy methods applied to particles and rigid bodies in plane motion, and the effects of friction.

Prerequisite: ENGR 242.

**ENGR 290 Electrical Engineering I**

3 class hours, 3 credits.

Linear electric circuits; introduction to the elements, laws, and analysis methods in electrical engineering techniques for examining DC, steady state AC, and transient phenomena. Laboratory work stresses concepts of electrical measurement and presentation of data to compare predicted and observed values. Lab assignments are self-paced .

Prerequisite: PHYS 201 or 214.

**ENGR 311 Kinematics**

3 class hours, 3 credits.

Introduction to kinematic analysis of mechanisms with a goal toward understanding of the properties of motion, relative motion, velocities, accelerations and the relationships to mechanisms in industry. Knowledge of these concepts lead to design of robot manipulators, gears, linkages and transmissions used in mechanical systems.

Prerequisite: ENGR 244.

**ENGR 312 Machine Design**

3 class hours, 3 credits.

Application of solid mechanics, dynamic system analysis and strength of materials leading to the selection and design of machine elements as components of a mechanical system. Screws, fasteners, joints, springs, bearings, gears, shafts and power transmission systems components are some of the elements considered.

Prerequisites: ENGR 244 and 347.

**ENGR 341 Fluid Mechanics**

3 class hours, 3 credits.

Covers the fundamentals of fluid mechanics, including fluid statics and fluid dynamics, and prepares students for the solution of engineering or naval architecture problems.

Prerequisite: PHYS 201.

**ENGR 343 Engineering Analysis**

3 class hours, 3 credits.

An introduction to mathematical and physical modeling of engineering differential systems. Analysis leading to solution of ordinary and partial differential equations by analytical and numerical techniques. Probability and statistics. The use of digital computers is stressed.

Prerequisite: MATH 212.

**ENGR 344 Thermodynamics**

3 class hours, 3 credits.

The study of problems for the following topics: First and Second Law of Thermodynamics; entropy, reversible and irreversible processes; irreversibility and availability; ideal gas processes, steady state, steady flow processes; power and refrigeration cycles; real gases and equations of state, gas mixtures, psychometrics; combustion processes and heat of reaction.

Prerequisites: MATH 211, PHYS 201.

**ENGR 347 Strength of Materials**

3 class hours, 3 credits.

Material stress-strain relationships under axial, biaxial, torsional and flexural loadings, Principal stress analysis. Statically indeterminate flexural stresses and deflection by integration, superposition and energy methods. Combines static modes of loading, dynamic loading and column stresses.

Prerequisite: ENGR 242.

**ENGR 348 Strength of Materials Lab**

2 laboratory hours, 1 credit.

Materials testing techniques: tension, compression shear, torsion, flexure, fatigue and impact test on structural materials. Engineering report of tests required. Analysis of data is emphasized. All students must complete a term project.

Corequisite: ENGR 347.

**ENGR 349 Transport Processes Laboratory**

2 laboratory hours, 1 credit.

Principles of transport processes and fundamental laboratory techniques demonstrated through formal laboratory experiments and lectures. Experiments may include diesel engine, gas turbine, conduction and convection heat transfer; pumps, dual-pipe heat exchanger, and flow devices.

Prerequisite: ENGR 243.

**ENGR 351 Heat Transfer**

3 class hours, 3 credits.

Analysis of steady state and transient conduction through plane walls and cylinders. Conduction with and without heat generation (applicable nuclear materials). Analysis and design of fins. Analysis of free and forced convection processes. Analysis of radiation processes for black and gray bodies. Introduction to heat exchanger design. Introduction to numerical methods.

Prerequisites: ENGR 344, MATH 212.

**ENGR 354 Marine Engineering Design I**

2 class hours, 2 laboratory hours, 3 credits.

Interrelationship between naval architectural and marine engineering design. Diesel, steam, and gas turbine propulsion system design, including thermal, mechanical and electrical considerations of system components. Laboratory study includes use of CAD system for ship machinery systems, arrangement drawings and projects associated with ship design and the ocean as an environment. Term design project required. Students cannot receive credit for this course and for ENGR 446 Marine Engineering Theory and Application.

Prerequisites: ENGR 344.

**ENGR 363 Ship Statics**

3 class hours, 3 credits.

Theory and calculation of transverse and longitudinal stability, trim, flooding, subdivision and damaged stability. Applications to surface ships, submersibles, and other special vehicle types. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: CS 101, ENGR 102 and 242.

Corequisite: ENGR 365.

**ENGR 365 Ship Form and Graphics**

2 class hours, 2 laboratory hours, 3 credits.

Principles of orthographic projection and descriptive geometry are applied to the special problems of naval architectural graphics, particularly the ship lines drawing. Computer-aided drafting and ship form (hydrostatic) calculations.

Prerequisites: CS 101, ENGR 100, 102 and 242.

**ENGR 366 Ship Structure**

2 class hours, 2 laboratory hours, 3 credits.

Longitudinal and local strength of ship structures. Analysis of framing, bulkheads, and : decks. Role of Regulatory Agencies in establishing structural requirements. Projects include calculation of ship's bending moment, midship section modulus, deck and bulkhead design. Introduction to the finite element method.

Prerequisite: ENGR 347.

**ENGR 368 Ship Design I**

2 class hour, 3 laboratory hours, 3 credits.

Techniques of conceptual and preliminary ship design based on economic profitability discussed and applied to a specific type of ship. Trade route analysis, principal dimensions, form, power requirement and stability are determined. Capital (building) costs, operating costs and economic measures of merit are estimated. Each student lays out preliminary lines of a ship to satisfy owner's requirement.

Prerequisite: ENGR 363.

Corequisite: ENGR 443.

**ENGR 371 Applied Naval Architecture**

3 class hours, 3 credits.

Covers the principles of intact and damaged stability and trim, longitudinal strength of ship structures. Also, introduces ship resistance and ship powering calculations. Covers basic ship stability requirements under STCW-95. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: ENGR 242.

(Open only to students not majoring in Naval Architecture.)

**ENGR 380 Electrical Engineering II**

2 class hours, 2 laboratory hours, 3 credits.

Introduction to electrical power systems: generation, transmission, distribution and utilization of electric power; DC and AC rotating machinery; laboratory emphasizes operating characteristics of rotating machines and transformers.

Prerequisite: ENGR 290.

**ENGR 383 Network Analysis**

2 class hours, 2 laboratory hours, 3 credits.

Follow up to ENGR 290 for EE majors. Polyphase circuits; complex frequency; network function and circuit synthesis; resonance; magnetically coupled circuits; two-port networks; Fourier analysis and Fourier transforms; Laplace transform techniques. Laboratory work emphasizes frequency response, circuit synthesis, and computer modeling and solution of network problems.

Prerequisite: ENGR 290 and MATH 212.

**ENGR 387 Electronics I**

3 class hours, 3 laboratory hours, 4 credits.

In depth coverage of ENGR 390 material for students concentrating in electrical-electronic systems, controls and instrumentation: electronic devices and systems, device characteristics and their applications in signal processing, controls and computing. Laboratory emphasizes applications of analog devices and IC's.

Prerequisite: ENGR 290.

**ENGR 388 Electronics II**

3 class hours, 3 laboratory hours, 4 credits.

Digital electronics; boolean algebra; arithmetic operations and circuits; analog and digital converters, and data acquisition circuits; three-bus architecture CPU; decoders and multiplexers.

Prerequisite: ENGR 387.

**ENGR 390 Electrical Engineering III**

3 class hours, 3 credits.

Introduction to electronic devices and systems: device characteristics and their applications in signal processing, controls, and computing; laboratory emphasizes applications of analog and digital devices and IC's. Lab assignments are self-paced .

Prerequisite: ENGR 290.

**ENGR 394 Electromagnetic Fields**

3 class hours, 3 credits.

Scalar and vector wave functions; transmission lines; Maxwell's equations; electromagnetic waves; waveguides; electrostatics and magnetostatics. Magnetic circuit design required.

Prerequisite: PHYS 201 and MATH 212.

**ENGR 412 Ocean Engineering**

3 class hours, 3 credits.

Survey of subjects important to engineers dealing with the ocean environment including soil mechanics, marine structures, corrosion, underwater acoustics, under water life support systems, power plants, and pollution. Selected design problems will be reviewed.

Prerequisite: Permission of the instructor.

**ENGR 418 Mechanical Engineering Design I**

3 class hours, 2 laboratory hours, 4 credits.

Introduction of the phases of the design process. Projects will include structural, mechanical, thermo-fluid and electrical considerations of systems and their components. Use of CAD/software as well as economic, environmental, social, ethical, legal aspects, safety and other factors.

Prerequisites: ENGR 311, 312 and 344.

**ENGR 419 Mechanical Engineering Design II**

3 class hours, 2 laboratory hours, 4 credits.

Continuation of ENGR 418 (Mechanical Engineering Design I).

Prerequisite: ENGR 418.

**ENGR 421 Plant Facilities Design and Management I**

4 class hours, 4 credits.

A basic introduction into the management, operation, design, construction and maintenance of large facilities and building complexes. Typical facilities studied are large medical center and office complexes. Applications will demonstrate how the principles of transport processes, electrical theory and strength of materials apply to the understanding of the basic construction concepts and operations of large facilities. Special emphasis is given to current co-generation techniques with utility rate structure analysis. This course, together with ENGR 422 are designed to give the engineering graduate a working knowledge required to enter the facilities field.

Prerequisites: ENGR 242, 243, and 380.



**ENGR 422 Plant Facilities Design and Management II**

4 class hours, 4 credits.

Continuation of ENGR 421 (Plant Facilities Design and Management I).

Prerequisite: ENGR 421.

**ENGR 423 HVAC System Design**

3 class hours, 3 credits.

Principles of heating, ventilating and air conditioning are applied and utilized in the design of HVAC (environmental control) systems. Concepts include thermodynamics, psychrometrics, system calculations, heating and cooling load estimating, duct, pipe and fan sizing, air conditioning system concepts and configuration, hydronic heating, cooling, heating and air process equipment.

Prerequisite: ENGR 341 and 351.

**ENGR 424 HVAC Systems Operation and Management**

3 class hours, 1 laboratory hour, 3 credits.

Introduction to commercial HVAC facility systems utilizing vapor compression, absorption and related machinery. Course material includes preparation for urban refrigeration licensing exams, design of building hvac system machinery, cooling tower and energy management utilizing standard commercial refrigerants. Urban Code used in design of air balancing systems.

Prerequisite: ENGR 243 or 344.

**ENGR 428 Computerized Control Systems**

2 class hours, 2 laboratory hours, 3 credits.

This course has the dual goal of introducing students to computerized control systems and C programming. Students will use C to program single-board computers to monitor physical phenomena. In turn, the operations of the computer will be used to verify the correctness of the C programs. Students will be exposed to all fundamental aspects of C programming including: language syntax; sequence, selection, and repetition structures; procedures and functions; program design techniques, debugging, and maintenance.

Prerequisite: ENGR 343 or 383.

**ENGR 430 Data Networks**

2 class hours, 2 lab hours, 3 credits.

This course is a survey of hardware, software, and protocols commonly used in constructing computer networks, with an emphasis on data transfer over TCP/IP networks. The objectives of this course are to (1) enable to student to design and implement small scale computer networks, (2) enable the student to troubleshoot and add units to existing networks, and (3) enable the student to write requirements and specifications for large scale networks. Lab periods will require students to use computers running a variety of operating systems.

Prerequisites: CS 101.

**ENGR 432 Information Assurance**

2 class hours, 2 laboratory hours, 3 credits.

This course further develops networking protocols from ENGR 430 Data Networks with an emphasis on information assurance and security. The objectives of this course are (1) gain a basic understanding of the various types of network exploits that must be prevented, (2) gain an understanding of the software and network tools available for evaluating information assurance, and (3) gain experience in hardening networks and systems against intrusion, denial of service, and other security lapses. Lab periods will require students to use computers running a variety of operating systems.

Prerequisites: ENGR 430.

**ENGR 440 Marine Engineering Design II**

2 class hours, 2 laboratory hours, 3 credits.

Continuation of ENGR 354 (Marine Engineering Design I). Term project involving the design of a mechanical device or system.

Prerequisites: ENGR 244, 347 and 354.

**ENGR 443 Engineering Economics**

3 class hours, 3 credits.

Covers the principles and techniques for making decisions about the acquisition and retirement of capital goods needed by an engineering professional. Topics include economic analysis for decision making, interest and annuity relationships, the effects of uncertainty, cost estimation, Addresses problems found on the Fundamentals of Engineering examination. Computer usage required.

Prerequisites: ENGR 102, CS 101.

**ENGR 444 Engineering Project Management**

3 class hours, 3 credits.

The objectives of this course are to (1) develop knowledge of the uncertain environment of project management, which is especially challenging because of the uniqueness and magnitude of technological projects, and the use of tools such as multiple regression and basic decision theory to deal with these uncertainties, (2) gain knowledge of network analysis tools (i.e., PERT/CPM) for project resource allocation and time management, while remaining aware of the pitfalls and limitations of these tools, and (3) develop a sense of the interpersonal and organizational components of project management, especially the group dynamics of teams engaged in a complex technological effort.

Prerequisites: ENGR 443.

**ENGR 446 Marine Engine Theory and Application**

3 class hours, 3 credits.

The application of thermodynamics, fluid dynamics, and heat transfer to the design of marine engineering systems, including steam power plants, diesel power plants, waste heat recovery, refrigeration and other auxiliary systems. Students cannot receive credit for this course and for ENGR 354 Marine Engineering Design.

Prerequisite: ENGR 243 or 344.

**ENGR 450 Marine Engineering Design III**

2 class hours, 2 laboratory hours, 3 credits.

Continuation of ENGR 354 (Marine Engineering Design I). Term project involving the design of components of a shipboard system.

Prerequisites: ENGR 341, 351 and 354.

**ENGR 452 Controls**

2 class hours, 2 laboratory hours, 3 credits.

Introduction to various control criteria and methods of control. Control system analysis including methods of Nyquist, root locus, Bode diagrams, etc. Design applications including servo-mechanisms, and process control.

Prerequisite: MATH 212.

**ENGR 453 Modern Concepts**

3 class hours, 3 credits.

Current approaches to developing power generation projects, including traditional large-scale steam plants (nuclear and fossil fueled), combined cycle technologies, and cogeneration facilities; various types of design documents, including engineering drawings and specifications, that form the basis of a final design. Students learn the comprehensive engineering design process, from preliminary engineering study through final design and construction. Design project, report, and presentation.

Prerequisite: ENGR 354 or 446.

**ENGR 454 Vibrations**

3 class hours, 3 credits.

Theory of mechanical vibrations. Natural frequencies, harmonic analysis and multiple degrees of freedom systems.

Prerequisite: ENGR 244 and 343.

**ENGR 461 Ship Design II**

2 class hours, 4 laboratory hours, 4 credits.

Continuation of ENGR 368 (Ship Design I). Preliminary characteristics of a ship of the type examined in Ship Design I are determined to meet owner's requirements. General arrangements, hydrostatics, structural design, speed-power estimate, weights and centers, stability and trim. Extensive use of CAD and computer facilities is required.

Prerequisites: ENGR 366 and 368.

**ENGR 462 Ship Resistance and Propulsion**

2 class hours, 2 laboratory hours, 3 credits.

Study of resistance and powering of ships. Principle of model testing and similitude for ship hulls and propellers. Standard series calculations. Use of the college's model towing tank for performance of ship resistance and powering tests.

Prerequisite: ENGR 341.

**ENGR 471 Ship Design III**

2 class hours, 4 laboratory hours, 4 credits.

Continuation of ENGR 461 (Ship Design II). Course description included under ENGR 461.

Prerequisites: ENGR 461 and 462.

**ENGR 472 Sail Boat Principles and Design**

2 class hours, 2 laboratory hours, 3 credits.

Preliminary design techniques for small sail powered craft. Principal dimensions, form, stability, structural design, and speed calculations. Preliminary characteristics to meet owner's requirements. Practical use of CAD and computer facilities.

Prerequisites: Sequence 1: ENGR 363, 366 and 462;  
or Sequence 2: ENGR 347 and 371.

**ENGR 473 Ship Dynamics**

3 class hours, 3 credits.

Theory of ship motions in response to ocean waves, and methods of reducing motions. Statistical nature of ship response to waves. Uses ship designed in ENGR 461 and 471.

Prerequisites: ENGR 244, 343 and 363.

**ENGR 476 Power Boat Principles and Design**

2 class hours, 2 laboratory hours, 3 credits.

Preliminary design techniques, motor powered small craft. Principal dimensions, hull form and stability, structural design, speed and/or power requirements. Preliminary characteristics to meet owner's requirements. Practical use of CAD and computer facilities.

Prerequisites: Sequence 1: ENGR 363, 366 and 462;  
or Sequence 2: ENGR 347 and 371.

**ENGR 481 Communications Theory**

3 class hours, 3 credits.

Principles of communications systems: system and signal theory; analog modulation schemes; *A/D* and *D/A* conversion; introduction to digital communications.

Prerequisite: ENGR 387.

**ENGR 485 Electrical Power Systems**

3 class hours, 3 credits.

Analysis and design aspects of large power systems: system representation; symmetrical components load flow analysis; system protection computer solution methods emphasized.

Prerequisite: ENGR 380.

**ENGR 488 Electrical Design I**

2 class hours, 4 (2x2) laboratory hours, 4 credits.

Fundamentals of industrial control, instrumentation and automation: applications of control systems theory; sensors, analyzers, transducers, transmitters and final control elements; analog and digital control devices; distributed control systems and programmable controllers; ergonomics, human factors and safety aspects; design focus on systems applications and engineering practices.

Prerequisite: ENGR 387 or 390.

**ENGR 489 Electrical Design II**

2 class hours, 4 (2x2) laboratory hours, 4 credits.

Continuation of ENGR 488 (Electrical Design I). Additional topics as per student interest including: multivariable, adaptive, supervisory and optimal control; power electronics and solid state motor control.

Prerequisite: ENGR 488.

**ENGR 495 Marine Electrical Systems**

3 class hours, 3 credits.

Governing rules, regulations and design requirements for shipboard electrical systems; sizing ship power equipment; load analysis and system layout; cable sizing; short circuit analysis, system protection and coordination; recent technical developments in marine electrical machinery.

Prerequisite: ENGR 380.

***PROFESSIONAL STUDIES (ENGR 500 – 599)***

Cadets are expected to earn a weighted cumulative average (WCA) of 70.0 or better for the three summer sea terms ENGR 510, ENGR 520, ENGR 530. One who does not earn the expected WCA of 70.0 may be required to repeat ENGR 530 or may be disenrolled.

**ENGR 503 Manufacturing Processes I**

1 class hour, 3 laboratory hours, 1 credit.

Fundamentals of metal cutting, measuring systems, hand tools and machine tools with major emphasis on basic engine lathe operation. Also includes the use of milling machines, grinders, and drill presses. Safe operation and use of safety equipment is emphasized. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

**ENGR 504 Manufacturing Processes II**

1 class hour, 3 laboratory hours, 1 credit.

Manufacturing Processes II offers oxy-acetylene cutting and welding, brazing, arc welding, pipe fitting, and sheet metal fabrication. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

**ENGR 510 Summer Sea Term I**

6 credits.

Understanding of the ship's organization. Interrelationship of the components of an operating engine room. Safety of person and ship. Watchstanding, maintenance and repair, and lectures. Responsibility is delegated on the basis of experience and demonstrated ability. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: PS 111, 112, and ENGR 540.

**ENGR 516 Engineering License Seminar**

0 credits.

Lectures, discussion, and study of subjects required by U.S. Coast Guard for federal licensure as an officer in U.S. Merchant Marine. Course is graded Pass/Fail.

Prerequisites: All ashore 500 series courses required of Third Assistant Engineer Cadets.

Corequisite: ENGR 530.

**ENGR 520 Summer Sea Term II**

5 credits.

Areas of responsibility and depth of knowledge are increased in the overall operations of the vessel under the supervision of the Chief Engineer and the Senior Engineering Training Officer. Safety of person and ship is emphasized. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: ENGR 510 and 542.

**ENGR 521 Cadet Observer (in Lieu of Summer Sea Term II)**

6 credits.

Exceptionally qualified candidates may, upon application to the Engineering Department, be selected to sail on a commercial ship in lieu of ENGR520. Cadets will be assigned to vessels for approximately 60 days, as required to satisfy the USCG license requirements for sea service, if berths are available. Cadets will be selected based upon academic performance and conduct. An extensive sea project is required. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: ENGR 510 and 542.

**ENGR 523 Cadet Observer in Limited Horsepower Operations**

6 credits.

This course subjects the student seeking engineering certification for limited horsepower vessels to an intense practical, professional learning experience aboard a working tug or supply vessel. The intent is that the student will encounter and address situations where his or her technical knowledge is relevant and applicable, but at the same time encountering situations where that knowledge that will be placed in a recognizable, applied context. Cadet Observer status should comprise a work experience of no less than sixty sea days. An extensive sea project is required to satisfy applicable USCG and STCW requirements and prepare candidate for DDE license exam.

Prerequisite: ENGR 551.

### **ENGR 525 Industrial Internship I**

6 credits.

An internship with a sponsoring industrial firm, requiring the intern to be assigned to duties requiring the practical application of engineering knowledge. These could include such tasks as inspection of existing equipment or systems, inspection of newly completed work, preparation of specifications for renovation or repair work, or development of maintenance plans and programs. The intern will keep a daily work log, and will retain work samples subject to the approval of his/her supervisor, as agreed with the intern's faculty advisor. The intern will receive a formal performance review upon completion of the internship, and must complete a substantial internship report to receive credit.

Prerequisite: Permission of the department chairman and completion of sophomore year in a relevant engineering discipline.

### **ENGR 530 Summer Sea Term III**

6 credits.

Operational responsibilities by the student engineer of all phases of ship work under the supervision of the Chief Engineer and the Senior ENGR Training Officer. Safety of person and ship is emphasized. Each student must take and pass intensive oral and written examinations. In compliance with international STCW requirements, there will be no D or D+ grades in this course. Students cannot receive credit for this course and for ENGR 551 DDE I or for ENGR 552 DDE II.

Prerequisites: ENGR 504, 520, 543, and 544.

Corequisite: ENGR 516.

### **ENGR 535 Industrial Internship II**

6 credits.

An internship with a sponsoring industrial firm, requiring the intern to be assigned to duties requiring the practical application of engineering analysis and design techniques, which could include such tasks as review and application of relevant codes to proposed renovation and repair work, completion of calculations pertaining to performance or sizing of equipment, completion of design specifications, estimates, and drawings, or preparation of reports and presentation materials. The intern will keep a daily work log, and will retain work samples subject to the approval of his/her supervisor, as agreed with the intern's faculty advisor. The intern will receive a formal performance review upon completion of the internship, and must complete a substantial internship report to receive credit.

Prerequisites: ENGR 525, permission of the department chairman, and completion of the junior year in a relevant engineering discipline.

### **ENGR 540 Introduction to Ship Systems**

2 class hours, 2 laboratory hours, 3 credits.

An introduction to ship auxiliary and main propulsion machinery and systems, as well as engine room operation and management. Students are also required to undergo shipboard familiarization and engine room familiarization in preparation for Summer Sea Term I.

Corequisites: PS 111 and 112.

**ENGR 541 Ship Systems I**

2 class hours, 2 credits.

Study of design principles, characteristics, and classification of marine refrigeration and air conditioning systems. Construction and operating specifications of all system components. Correct procedures for operation and maintenance of system. In addition, U.S. Coast Guard design requirements pertaining to specific piping systems and equipment are covered. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: ENGR 540.

**ENGR 542 Ship Systems II**

2 class hours, 2 credits.

A continuation of the study of design principles and operating characteristics of marine auxiliary systems. Maintenance procedures, laws and regulations applicable to marine engineering systems are covered. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: ENGR 541.

**ENGR 543 Ship Systems III**

3 class hours, 3 credits.

Study of design principles, characteristics and classification suffocation of marine diesel engines. Construction specifications as indicated in the U.S. Coast Guard and ABS ENGR Regulations. Correct procedures for operation and maintenance of auxiliary and main engine diesels, fuels, and combustion. Diesel operation using diesel simulator, miscellaneous systems. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: ENGR 542.

**ENGR 544 Ship Systems IV**

3 class hours, 3 credits.

Principles, types, construction and description of ship main propulsion engines and their support components. Brief description of steam reciprocating engines; a comprehensive treatment of steam turbines, gas turbines, and electric drive systems together with the auxiliary components which comprise a complete propulsion plant. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: ENGR 542.



**ENGR 551 DDE I (Designated Duty Engineer)**

2 class hours, 6 lab hours, 4 credits.

The first of a two semester sequence in the comprehensive study of numerous designs and features of medium and high speed marine diesel engines including aspects of operation, maintenance and repair. Topics include: basic engine types and applications, engine construction and the details of engine parts, fuels, fuel analysis and handling, fuel and air systems. Laboratory hours consist of operation, maintenance, repair and management of the campus diesel fleet under the supervision of the Tug Engineer and Director of Small Vessel Operations, will be individually arranged (minimum 6 hrs/week) and a journal kept. Students cannot receive credit for this course and for ENGR 530 Summer Sea Term III.

Prerequisite: PS 111, 112, and ENGR 540.

**ENGR 552 DDE II (Designated Duty Engineer)**

2 class hours, 6 lab hours, 4 credits.

The second of a two semester sequence in the comprehensive study of numerous designs and features of medium and high speed marine diesel engines including aspects of operation, maintenance and repair. Topics include: exhaust and cooling systems, filters, starting and control systems, governors, reconditioning diesel engines, tune-up and trouble shooting. Laboratory hours consist of operation, maintenance, repair and management of the campus diesel fleet under the supervision of the Tug Engineer and Director of Small Vessel Operations, will be individually arranged (minimum 6 hrs/week) and a journal kept. Students cannot receive credit for this course and for ENGR 530 Summer Sea Term III.

Prerequisite: ENGR 551.

**ENGR 601-602 Independent Study in Engineering I-II**

1, 2, 3, or 4 credits per term.

Theoretical or experimental independent investigation of special topics in engineering. Student work will be under the direct supervision of a mentor assigned by the Engineering Department.

Prerequisite: Permission of the department.

**ENGR 610 Special Topics in Engineering**

1, 2, 3, or 4 credits.

Theoretical and/or experimental investigation of special problems in engineering.

Prerequisite: Permission of the department.

**ENGR 631 Undergraduate Research I**

3 credits.

This course offers honors undergraduate engineering students the opportunity to help expand the body of human knowledge by researching a topic on the edge of current engineering understanding. This research experience is a valuable gateway to the personal development of knowledge creation skills which distinguish the best in their fields. Students may take an additional semester of undergraduate research (ENGR 632) but may not apply more than a total of 6 credit hours of undergraduate research to their program of study. This course is intended for honors students who are capable of advanced studies. Registration for Honors Undergraduate Research I requires the express consent of the faculty member who is serving as the research advisor for the student's research.

**ENGR 632 Undergraduate Research II**

3 credits.

This course offers honors undergraduate engineering students the opportunity to help expand the body of human knowledge by researching a topic on the edge of current engineering understanding. This research experience is a valuable gateway to the personal development of knowledge creation skills which distinguish the best in their fields. Students may not apply more than a total of 6 credit hours of undergraduate research to their program of study. This course is intended for honors students who are capable of advanced studies. Registration for Honors Undergraduate Research II requires the express consent of the faculty member who is serving as the research advisor for the student's research.

Prerequisite: ENGR 631.

**ENVIRONMENTAL SCIENCE****ES 304 Remote Sensing**

2 class hours, 2 credits.

Principles of remote sensing; meteorological and oceanographic applications.

Prerequisites: OCEA 303, METE 201, PHYS 214.

**ES 410 Marine Microbiology**

3 class hours, 3 credits.

A survey of microbes and their role in chemical cycles, pollution, disease, and oil spill remediation.

Prerequisite: BIO 201, CHEM 121.

**ES 420 Environmental Pollution**

3 class hours, 3 credits.

Definition of pollution, assessment methodology, elements of air pollution, the acid rain and CO<sub>2</sub> problem. Domestic and industrial effluents. Sewage treatment plants. Pollution of the sea and ships. Dredge spoil and sludge. Toxic substance disposal. Oil pollution. Ocean waste management and monitoring strategies. Environmental impact assessment. Prerequisite: CHEM 100 or 121.

**ES 430 Environmental Impact Assessment**

3 class hours, 3 credits.

The value and role of environmental impact statements. Materials, structural designs, site locations and habitat impact.

Prerequisites: ES 420, CHEM 220.

**ES 450 Field Work in Marine Environmental Science**

2 laboratory hours, 1 credit.

Gathering and analysis of oceanographic and atmospheric data. Students, accompanied by several MES faculty, will spend 3 days and 2 nights (one weekend) aboard one of the college's vessels collecting samples and gathering data. Time will be arranged beforehand for preparatory work and afterward for the analysis of samples and data, and the presentation of write-ups.

Prerequisites: BIO 315, CHEM 220, METE 350, OCEA 303.

**ES 505/515 Environmental Science Internship I/II**

3 credits each.

Supervised field experience which allows the students to apply and extend their scientific academic abilities in a professional working environment. The hands-on experience may be in environmental science, marine biology, meteorology, or oceanography. Projects can be conducted under the supervision of a researcher not associated with Maritime College; however, a Science faculty member must serve as an internal sponsor and overseer of the project. Two internships may span two academic semesters or may be taken concurrently as a single internship in the summer. The intern will be required to submit a proposal prior to commencement of each internship and a written report along with an evaluation letter from the internship supervisor upon completion.

Prerequisite: Permission of department chair and completion of sophomore year.

**ES 610 Special Topics in MES**

3 class hours, 3 credits.

Contemporary topics or problems in Marine Biology, Environmental Science, Meteorology or Oceanography.

## **ACCOUNTING**

### **GBAC 311 Financial Accounting**

3 class hours, 3 credits.

An introduction to accounting from the point of view of the investor and manager, GBAC 311 covers procedures for recording, summarizing and reporting business transactions, as well as asset valuation, costing and revenue analysis. Emphasis is on an analytical and interpretive approach to generally accept accounting principles that apply to the treatment of assets, liabilities, and capital transactions. The course includes an in-depth examination of corporate financial statements.

### **GBAC 315 Managerial Accounting**

3 class hours, 3 credits.

Topics of study include forms of business organization, corporation accounting, marketable securities, inventories, cash flows, income tax, and cost accounting for retail, service and manufacturing enterprises.

Prerequisite: GBAC 311.

## **ECONOMICS and FINANCE**

### **GBEC 121 Essentials of Macroeconomics**

3 class hours, 3 credits.

An analysis of the forces that affect national economies including aggregate levels of production, employment and prices. Particular emphasis on the impact of government spending, taxation and monetary policy. Topics include GDP accounting, business cycles, inflation and unemployment, fiscal policy, national debt, monetary theory, and the framework of international economics.

Prerequisite: GBUS 100.

### **GBEC 122 Essentials of Microeconomics**

3 class hours, 3 credits.

An analysis of the economic forces that influence the behavior of firms. Topics include basic demand and supply, price and demand elasticities, costs of production, and the behavior of enterprises under competitive and monopolistic conditions. Resource and labor markets as well as environmental constraints also are studied.

Prerequisite: GBUS 100.

### **GBEC 323 Banking and Financial Markets**

3 class hours, 3 credits.

An examination of U.S. monetary and banking systems. Topics covered include the functioning of financial intermediaries, the role of the Federal Reserve System, the Securities and Exchange Commission and other regulators, and the structure and performance of domestic and global financial markets.

Prerequisites: GBEC 121 and 122.

**GBEC 424 International Economics and Finance**

3 class hours, 3 credits.

A study of the patterns of international trade from historical, theoretical and empirical perspectives. Analysis of the economics and policy issues involved in tariffs, bilateral and multilateral trade agreements, and economic unions. International finance from the enterprise and national perspectives. Analysis of trade with developing, middle income and industrial countries and the role played by multinational firms.

Prerequisites: GBEC 121 and 122.

**GBEC 426 Labor Economics and Industrial Relations**

3 class hours, 3 credits.

A study of the structure and economics of labor markets including determinants of wages and levels of employment, the practice of collective bargaining, labor legislation and maritime labor issues.

Prerequisites: GBEC 121 and 122.

**GBEC 427 Financial Management**

3 class hours, 3 credits.

An introduction to the financial management of corporations, including statements, ratio analysis, current assets and liability management, capital budgeting, stock and debt financing.

Prerequisite: GBUS 100.

**GBEC 428 Economic Geography**

3 class hours, 3 credits.

This course explores global patterns of resource use and international trade. Topics include population dynamics, resource and enterprise location, global transportation and communications, land use, the economics of international trade and investment, and the relationship between geography and culture.

Prerequisites: GBUS 100, GBEC 121 and 122.

**GBEC 429 Seminar in Transportation Economics**

3 class hours, 3 credits.

Economic and managerial analysis of characteristic problems in the transportation industry. Examination of issues such as regulation and deregulation, freight rate setting, service quality, pollution, security and safety, congestion, port management structures, location and land value, social considerations, technology and innovation.

Prerequisites: All required management and economics courses.

## **LAW**

### **GBLW 431 Business Law**

3 class hours, 3 credits.

Topics include contracts, business torts, agency, white collar crime, the Uniform Commercial Code, product liability, consumer rights, negotiable instruments, real and personal property, bankruptcy and business ethics.

### **GBLW 433 Admiralty Law**

3 class hours, 3 credits.

Topics include jurisdiction of admiralty courts, rights of seamen, bills of lading, charter parties, cargo claims, maritime liens, insurance, general average, salvage, collisions, limitation of liability, sovereign immunity, pollution and United States Coast Guard proceedings against merchant mariners' licenses.

### **GBLW 435 Environmental Law and Policy**

3 class hours, 3 credits.

An introduction to the role of administrative agencies and legal institutions in controlling all forms of pollution. Topics include government's environmental responsibilities, energy policy, regulation of air and water pollution, toxic substances, and restrictions on the development of public and private lands. The course considers economic, scientific and technological aspects of administrative and legislative approaches to environmental problems. The evolving role of international law affecting the environment also is discussed.

### **GBLW 437 International Law**

3 class hours, 3 credits.

Topics covered include the sources of international law, sovereignty, the jurisdiction of the nation state and the community of nations, and the status of diplomatic representatives. The law of the sea is examined extensively, including territorial seas, contiguous zones, exclusive economic zones, innocent passage, hot pursuit, freedom of navigation, fishing rights, scientific research and mineral exploitation.

## **MANAGEMENT**

### **GBMG 341 Organizational Management**

3 class hours, 3 credits.

An examination of the fundamentals of organization and administration including planning, organizing, directing, coordinating, evaluating and controlling. Topics include the structure and processes for managing the organization as a system in a dynamic environment, corporate social responsibility and international dimensions.

Prerequisite: GBUS 100.

**GBMG 343 Organizational Behavior and Development**

3 class hours, 3 credits.

This course examines individual and small group dynamics within the corporate structure. It applies behavioral science theory and research to issues such as management style, leadership, motivation, decision-making and problem solving. Goal-setting, power and conflict in organizations, and organizational change and development also are considered.

Prerequisite: GBMG 341.

**GBMG 345 Fundamentals of Marketing**

3 class hours 3 credits.

This course considers the functions performed by marketing intermediaries and the distribution of goods and services from producers to customers.. Topics include the nature and scope of marketing problems, the behavior of consumers and industrial buyers, product design and development, channels of distribution, promotional and pricing strategies, social responsibility and ethics, governmental regulation and international dimensions of marketing.

Prerequisite: GBUS 100.

**GBMG 347 Entrepreneurship in International Transportation and Trade**

3 class hours, 3 credits.

This course is designed to provide the student with an overview of entrepreneurship in international transportation and trade, including the critical features of starting and maintaining a new business venture or marketing a new product. The course takes the student entrepreneur from the product concept to making it a reality. Topics to be covered include: entrepreneurial ideas, innovation, and behavior, the role of entrepreneurs in business, financing and financial planning, legal aspects of new venture formation, organization of the venture, managerial functions pertaining to strategies, planning and human resource management, marketing the firm's products to potential customers and the ethical and social responsibilities of entrepreneurs. Class discussions and team activities will focus on the development of a suitable new entrepreneurial business and marketing plan.

Prerequisite: GBMG 345.

**GBMG 348 Business Ethics**

3 class hours, 3 credits.

The course examines ethical issues, moral principles, values, duties, obligations, and etiquette in the context of business theory and practice. A philosophical framework (e.g. Aristotle) for ethical and moral thinking is set. Ethics as a set of values going beyond the law is studied. Ethical relationships which businesses, and business people, encounter with stakeholders and others are examined and defined. The course text and other readings draw on a wide body of literature, including the humanities, management theory and the social sciences. Actual cases (e.g. Bhopal, *Exxon Valdez*, Enron, Arthur Andersen, WorldCom) are studied for ethical implications. Special issues of ethical conduct within the workplace (e.g. sexual harassment; equal opportunity; whistleblowers; nepotism) are studied and discussed.

Prerequisite: GBUS 100.

**GBMG 348 Business Ethics**

3 class hours, 3 credits.

The course examines ethical issues, moral principles, values, duties, obligations, and etiquette in the context of business theory and practice. A philosophical framework (e.g. Aristotle) for ethical and moral thinking is set. Ethics as a set of values going beyond the law is studied. Ethical relationships which businesses, and business people, encounter with stakeholders and others are examined and defined. The course text and other readings draw on a wide body of literature, including the humanities, management theory and the social sciences. Actual cases (e.g. Bhopal, *Exxon Valdez*, Enron, Arthur Andersen, WorldCom) are studied for ethical implications. Special issues of ethical conduct within the workplace (e.g. sexual harassment; equal opportunity; whistleblowers; nepotism) are studied and discussed.

Prerequisite: GBUS 100.

**GBMG 440 Seminar in Strategy and Policy**

3 class hours, 3 credits.

An integrative learning experience that relates business knowledge to managerial decision-making. Readings and case analyses test skills in applying management, marketing, financial and other business techniques in competitive situations. Emphasis is on successful performance in a complex and dynamic global business environment.

Prerequisites: All required management and economics courses.

**GBMG 442 International Marketing Management**

3 class hours, 3 credits.

An in-depth analysis of the issues involved in developing international marketing programs from the determination of objectives and evaluation of opportunities to the implementation of global strategies. Cases and exercises emphasize how marketing principles are applied and different marketing mixes are developed by multinational providers of goods and services.

Prerequisite: GBMG 345.



**GBMG 443 Cross-Cultural Management**

3 class hours, 3 credits.

This course considers the challenges of doing business across different national cultures. Topics include identifying cultural differences and their impacts on relationships with customers, suppliers, subordinates, superiors and co-workers. The effect of language, religion, value systems and social structure are considered, as are the implications of differences in attitudes toward performance, uncertainty, assertiveness, individualism, gender, leadership and expectations about the future.

Prerequisite: GBMG 341.

**GBMG 444 Business, Government and Society**

3 class hours, 3 credits.

A study of changes in the social, political and legal environment of business and their impact on management. The course reviews the regulatory obligations of corporations and analyzes current issues and proposals concerning technology, social change and business ideology. Emphasis is given to managing the corporation's actions in these and other areas through case analyses.

**GBMG 445 Public Administration in Transportation**

3 class hours, 3 credits.

Topics include principles of administrative organization, methods of leadership and control, intergovernmental relations and public sector human resources management as well as budgeting, policy making and decision making in government organizations that manage or regulate transportation systems. Attention also is given to interactions with elected and appointed officials, legislative bodies, industry organizations and other interests groups.

**GBMG/MATH 446 Operations Research**

3 class hours, 3 credits.

Quantitative methods for business-oriented decision and optimization problems. Topics chosen from among: linear programming and related sensitivity analysis; transportation problem; network and project-scheduling algorithms; queues; simulation; Markov processes; decision analysis. Use of software packages.

Prerequisite: One year of college mathematics; CS 101.

**TRANSPORTATION SYSTEMS****GBTT 251 Transportation Systems**

3 class hours, 3 credits.

An overview of various modes of water-borne, ground and air transportation including their operation, design and economic characteristics; the role of transportation in industry and society; demand and supply modeling; equilibrium network flows; costing; short and long term planning; and government policy and regulation.

**GBTT 252 The Business of Shipping**

3 class hours, 3 credits.

This course surveys the various aspects of the business of water-borne transport of goods and passengers. Topics include private versus common carriage; organization and management of liner and tramp shipping companies; freight rates; the roles of ship managers, ship brokers; bunker brokers, stevedores, port agencies, terminals and warehouses. These subjects are examined from operational, financial, regulatory and risk-management perspectives.

**GBTT 351 International Logistics**

3 class hours, 3 credits.

This course applies a total systems approach to the management of activities involved in the physical movement of raw materials, in-process inventory and finished goods from point of origin to point of use or consumption. Topics include supply chain management, inbound and outbound logistics systems, customer service, inventory and warehousing, transportation management, information systems, global logistics and logistics strategy.

**GBTT 359 Urban Transportation**

3 class hours, 3 credits.

Public sector development, management and operations of people-moving systems. Transportation modes studied include subways, commuter rail, ferries and hydrofoils, cable traction and buses. Major cities' systems are examined, and employment opportunities in the field are discussed.

**GBTT 451 Marine Insurance**

3 class hours, 3 credits.

An introduction to the fundamentals of cargo, hull, and protection and indemnity insurance. Topics include insurance markets, brokers, agents, underwriters, forms of policies, valuation, total losses, particular average, general average, insured perils, war risks, subrogation, reinsurance and insurance of pollution liabilities.

**GBTT 453 Import/Export and Traffic Management**

3 class hours, 3 credits.

A survey of the fundamentals of foreign trade from a transactional perspective. Topics include negotiating the international sales contract, U.S. customs practice, entry of goods, tariffs, foreign trade zones, bonded warehousing, duty drawbacks, export controls, reducing the risk of nonpayment, the letter of credit, letters of undertaking and guarantees, arranging for the transportation of the goods, freight forwarding, non-vessel operating common carriers, negotiating and entering into contracts of affreightment, service contracts, charter parties, bills of lading, insuring the goods, and engaging stevedoring and terminal services.

**GBTT 455 Advanced Transportation Management**

3 class hours, 3 credits.

An advanced course in carrier organization and management. Topics include transportation operations, marketing, finance, purchasing, information systems and maintenance as well as human resources management and labor relations. The class examines national transportation policy, regulation and the changing environment of transportation. Activities include original research on problems in transportation management with emphasis on marine transportation.

**GBTT 457 Port and Terminal Operations**

3 class hours, 3 credits.

An introduction to the diversified operations within ports, both U.S and international. Topics include the role of port authorities and other governmental agencies, interorganizational relationships, port development, security and law enforcement, traffic control, harbor maintenance, and the operation of container, bulk and petroleum terminals.

**GBTT 460 Principles of Global Supply Chain Security**

3 class hours, 3 credits.

The course depicts security as a control mechanism in several major channels in the supply chain; e.g. in human resources confidentiality of employee records; in logistics cargo and passenger security; in communications encrypted email and hacker-free databases; in finance sanctity of credit cards and identity; and in marketing protection of intellectual property. Students will engage in a team research project as a practicum for learning how to develop and conduct vulnerability assessments and security planning. A major underlying course theme is that security can only be successfully developed and implemented in context of the cultural, economic, and political contexts of the supply chain processes for which it serves as a control mechanism.

Prerequisite: Junior (2<sup>nd</sup> class) standing or permission from the department.

**GBTT 462 Science and Technology Issues of Security**

3 class hours, 3 credits.

This course explores the social and political contexts, the implications and consequences of the scientific and technological issues in the security arena. For example, containers now coming out of a port terminal are scanned for radiation; what can the scanners detect and if radiation is detected, what does that mean? How would a city be evacuated in the event a nuclear device was detected? Another example of technology with far-reaching implications is that of biometrics; suppose everybody had their retina patterns in a national database? When is personal information too intrusive for government access?

Prerequisite: Junior (2<sup>nd</sup> class) standing or permission from the department.

### **GBTT 465 Lectures in Contemporary Security Issues**

3 class hours, 3 credits.

The capstone course of a minor in intermodal and maritime security jointly offered by the Department of Global Business and Transportation (GBAT), and the Department of Marine Transportation (MT). In addition to lectures by the professor supervising the course, from time to time prominent experts in maritime and intermodal security, from both public and private sectors, will address the students on topical issues of the day in their field of security. Students will be required to do a term paper that integrates the information from the different speakers as well as both primary and secondary research performed by the student.

Prerequisite: Junior (2<sup>nd</sup> class) standing or permission from the department.

## **GENERAL BUSINESS**

### **GBUS 100 Introduction to Business and Economics**

3 class hours, 3 credits.

This foundation course introduces students to basic concepts of economics and to the structure, functions, and objectives of the business enterprise.

### **GBUS 300 International Business**

3 class hours, 3 credits.

An introduction to international business examining the environment in which multinational firms operate and the distinctive ways in which global enterprises perform business functions. Topics include the impact of cultural and political-legal differences, trade theory, regional and global economic integration, foreign exchange, country selection, exporting and importing, supply chain management, marketing globally and international human resource management.

Prerequisite: GBMG 341.

### **GBUS 525 ITT Internship/Work Experience**

6 credits.

Candidates for the Bachelor of Science in International Transportation and Trade are required to perform an internship in an organization in international transportation, trade or another aspect of global business or to complete a summer work experience aboard a SUNY Maritime training vessel. The activities are intended to familiarize ITT candidates with professional work environments and expose them to career opportunities.

### **GBUS 610 Special Topics in Business and Transportation**

3 credits.

Significant topics in business and transportation are examined that reflect the interest of both the students and the instructor. Activities typically involve review of the current and historical literature on the topic and the design, implementation and presentation of a substantial analytic or developmental project.

Prerequisites: GBMG 341 and permission of the instructor.

## **GEOLOGY**

### **GEOL 301 General Geology**

3 class hours, 3 credits.

Physical geology, rocks and minerals, plate tectonics, geologic time, evolution of the Earth, processes at Earth's surface, hydrologic cycle, Earth resources.

Prerequisite: CHEM 100 or 121.

## **HISTORY**

### **HIST 101-102 American Civilization I-II**

3 class hours, 3 credits each semester.

Survey of American civilization from its beginning in Europe to the present, including consideration of military affairs and national security policy.

Prerequisite: ENGL 101.

### **HIST 401-402 Topics in European Civilization I-II**

3 class hours, 3 credits each semester.

Survey of European civilization from the Middle Ages to the end of World War II.

Prerequisite: HIST 101 or 102.

### **HIST 403-404 Topics in Recent History I-II**

3 class hours, 3 credits each semester.

Consideration of selected topics in American or World History, 1945 to the present.

Prerequisite: HIST 101 or 102.

### **HIST 415 Topics in American Social History**

3 class hours, 3 credits.

A consideration of several major social institutions and social phenomena in their American settings. Topics may include: the family, schools, sports, cities, immigration, and/or slavery.

Prerequisite: HIST 101 or 102.

### **HIST 416 U. S. Maritime History to the Civil War**

3 class hours, 3 credits.

An investigation into the ways that maritime commerce provided the foundation for the growth of the United States from pre-Columbian times through the Civil War. The focus of the course will be on the growth of America as a sea power, and the influence of the U. S. Navy and its role in promoting American merchant shipping.

Prerequisite: HUMN 201 or 202.

**HIST 417 U. S. Maritime History since 1865**

3 class hours, 3 credits.

An investigation into the major developments in American maritime history from the Civil War to the present. The course will focus on pivotal naval battles, as well as the growth of maritime commerce, as the twin catalysts of national expansion and cultural exchange.

Prerequisite: HUMN 201 or 202.

**HIST 418 History of American Foreign Policy**

3 class hours, 3 credits.

A survey of the major developments in American foreign policy.

Prerequisite: HIST 101 or 102.

**HIST 420 / NVSC 102 Sea Power and Maritime Affairs**

Same as NVSC 102.

Prerequisite: HIST 101 or 102.

**HIST 421 Vietnam and America**

3 class hours, 3 credits.

Vietnam in the Twentieth Century. Focus on America's direct involvement and a consideration of its legacy for the U.S. and for Southeast Asia.

Prerequisite: HIST 101 or 102.

**HIST 422 Turning Points in American History**

3 class hours, 3 credits.

The causes and consequences of the American Revolution, Civil War, and World War II. Attention is given to critical battles and the political, social, and economic influence of each war upon the development of American society.

Prerequisite: HIST 101 or 102.

**HIST 425 History of Technology**

3 class hours, 3 credits.

A survey of selected major developments in Western technology, and their effects on society. Analysis of the process of technological innovation, and the application of modern technology in resource-limited societies. Special emphasis on those developments which bear on modern life and work.

Prerequisite: HIST 101 or 102.

**HIST 440 History of American Enterprise I**

3 class hours, 3 credits.

This course will explore the lives and critical business decisions of the pioneering entrepreneurs who used the accumulation of capital, acquired through astute investments, to create this nation's largest companies and corporations. Students will examine the role of these business pioneers in the growth of commerce as the engine of cultural exchange and, therefore, American expansion. This course covers the period from the first colonists to 1865.

Prerequisite: HIST 101 or 102.

**HIST 441 History of American Enterprise II**

3 class hours, 3 credits

This course will explore the lives and critical business decisions of the pioneering entrepreneurs who used the accumulation of capital, acquired through astute investments, to create this nation's largest companies and corporations. Students will examine the role of these business pioneers in the growth of commerce as the engine of cultural exchange and, therefore, American expansion. This course covers the period from the end of the Civil War to the present.

Prerequisite: HIST 101 or 102.

**HIST 465 History of Science**

3 class hours, 3 credits.

This is a course in the role science played in the development of our modern technologically-based society, and the corresponding role that industrial society has played in the development of contemporary scientific inquiry. The first half of this course will examine major personalities and breakthroughs in the subject matter and processes of science, from the ancient world through the nineteenth century. The second half of the course will focus on selected controversial topics in contemporary science.

Prerequisite: HUMN 201 or 202.

**HUMANITIES****HUMN 201-202 Humanities I-II**

3 class hours, 3 credits each semester.

Reading and discussion of major works of western world literature from ancient times to the present.

Prerequisite: ENGL 102.

**HUMN 300 Humanities III**

3 class hours, 3 credits.

A study of the ideas treated in Humanities I & II as they are developed in modern works of fiction and non-fiction. Required for designated advanced placement students. Otherwise an elective course.

Prerequisite: HUMN 201 or 202.

**HUMN 400 History of Art**

3 class hours, 3 credits.

A study of painting, sculpture, and architecture from prehistoric times to the present. Fundamental concepts of art analysis will also be introduced.

Prerequisite: HUMN 201 or 202.

**HUMN 401 Studio Drawing and Painting**

2 class hours, 2 studio hours, 3 credits.

Two class hours a week introduce basic techniques of drawing and painting, two classes weekly of lecture and discussion on the visual elements and major styles in art history. No previous art experience is necessary.

Prerequisite: HUMN 201 or 202.

**HUMN 402 Images of Men, Women, and Machines**

3 class hours, 3 credits.

Looking at art, film, fiction, drama, advertising, and photography over the past hundred years, this course focuses on the social and cultural impact of modern machines, and the ways these machines including automobiles, airplanes, home appliances, and consumer electronics have transformed the lives of both men and women.

Prerequisite: HUMN 201 or 202.

**HUMN 403 A History of Western Music**

3 class hours, 3 credits or 2 class hours, 2 rehearsal/performance hours, 3 credits.

A historical survey of Western music from the medieval to the present, emphasis on stylistic characteristics and representative composers and works. Students who will complete two years of satisfactory service in the College band before graduation need attend only two class hours each week. Others will attend a third class hour or work on an appropriate project.

Prerequisite: HUMN 201 or 202.

**HUMN 404 Art and Technology**

3 class hours, 3 credits.

An introduction to the interrelationships between art, technology, science and engineering.

Prerequisite: HUMN 201 or 202.

**HUMN 407 Literature of Leadership**

3 class hours, 3 credits.

This course analyzes the various positions taken throughout history regarding the responsibilities of the leader. Topics to be covered include: the rise to power, theory versus practice in the use of authority, "right authority" versus its abuse, and how societies deal with leaders who have gone astray.

Prerequisite: HUMN 201 or 202.



**HUMN 412 Models for Decision Making**

3 class hours, 3 credits.

The principles of effective decision making. Topics range from such basic notions as "rationality" to such technical areas as Delphi forecasting.

Prerequisite: HUMN 201 or 202.

**HUMN 458 Moral Choices in Literature**

3 class hours, 3 credits.

We are taught to "do the right thing," but how do we recognize the right thing in order to choose properly? This course is organized in two parts: defining the right and the good; then, having the courage to act rightly in the face of social apathy or disapproval.

Prerequisite: HUMN 201 or 202.

**HUMN 460 The Bible as/in Literature**

3 class hours, 3 credits.

Discussion of literary dimensions of passages from the Bible and the relationships of a variety of other stories, poems, and plays to the Bible.

Prerequisite: HUMN 201 or 202.

**HUMN 461 Religion**

3 class hours, 3 credits.

An introduction to the philosophy of religion. Principal topics of discussion include immortality; the problem of evil; and the principle of inerrant scripture.

Prerequisite: HUMN 201 or 202.

**HUMN 465 Humanities Research Methods**

3 class hours, 3 credits.

An elective for students seeking to enhance their skills in research, analysis, and writing. This course is aimed at introducing the student to the skills involved in historical, literary, or aesthetic research. Emphasis is on the ability to locate, evaluate, and synthesize data, as well as the technical aspects of academic investigation, research methods and tools, and expository writing.

Prerequisite: HUMN 201 or 202.

**HUMN 490 Seminar in Maritime Studies**

3 class hours, 3 credits.

Analysis of the technological, legal, environmental, and ethical aspects of policy decisions in the maritime sphere. Readings range from polemical arguments by interest groups to international treaties. Students prepare case studies and argue positions as both advocates and arbiters.

### **HUMN 505/515 Internship I/II**

3 credits each term.

Student placement in maritime-related publishing, marketing, legal, and museum sites. Students will devote six hours per week (typically one full day) to their internship, keep a journal of activities, and file an end-of-term report with their faculty mentor.

Prerequisite: HUMN 201 or 202.

### **HUMN 610-611 Special Topics in Humanities**

3 class hours, 3 credits.

Special topics and issues for qualified students interested in acquiring a broader knowledge of our linguistic, literary, or artistic heritage.

Prerequisite: HUMN 201 or 202.

## **LEADERSHIP**

### **LEAD 101 Leadership and the Maritime Experience**

1 class hour, 1 credit.

A required course for all freshmen (first-time college or < 32 transfer credits). This course is aimed at introducing the student to college life with emphasis on the unique history and goals of Maritime College, helping the student manage the difficult transitional first-year of college via the formulation of a plan for academic success, and fostering the student's potential for leadership via the development of self-awareness and interaction with other students from diverse backgrounds.

### **LEAD 102 Exploring Leadership**

1 class hour, 1 credit.

This integrative course offers students an opportunity to connect the study of leadership theory with opportunities to practice leadership. Students will explore the concept and practice of "citizen leadership" as a framework for civic and professional leadership roles throughout life. LEAD 102 introduces "leadership" and "citizenship" as social constructs, i.e. ideas and values that vary across cultural and historical contexts.

Prerequisite: LEAD 101.

(LEAD 102 may be taken in place of NVSC 103 Basic Naval Science.)

## **MATHEMATICS**

The Science Department administers a placement test in mathematics to all undergraduate students admitted to the college. An evaluation of each student's mathematics preparation will be based on the performance on this test and admissions credentials. First-semester students, including transfer students, will be registered in the appropriate mathematics course in accordance with the results of this evaluation and their choice of curriculum.

**MATH 80 Elementary Algebra**

3 class hours, 3 credits.

Arithmetic review; scientific notation; algebraic operations; factoring; solving linear and quadratic relations; absolute value; Pythagorean theorem; coordinate geometry; graphing lines and parabolas; relevant word problems. Course offered on a pass/fail basis. (Note: This course does not count towards satisfying the requirement “one year of college mathematics”).)

**MATH 90 Introduction to College Mathematics**

4 class hours, 4 credits.

Algebra review; basic function concepts; lines, systems of linear equations, and linear functions; quadratic functions; polynomial and rational functions; exponential functions and logarithms; trigonometry and trigonometric functions; applications to problems in business and the sciences.

Prerequisite: MATH 80 or permission of department.

**MATH 101 Calculus I**

4 hours, 4 credits.

Precalculus review; limits and continuity; average and instantaneous rate of change; the derivative; differentiation of the elementary functions; applications to graph sketching, optimization, rectilinear motion.

Prerequisite: A grade of B- or better in MATH 90 or permission of the department.

**MATH 102 Calculus II**

4 hours, 4 credits.

Antiderivatives; the definite integral; Fundamental Theorem of Calculus; techniques of integration; improper integrals; applications of integration; probability distributions; introduction to mathematical software package.

Prerequisite: A grade of C- or better in MATH 101.

**MATH 111 Applied Calculus I**

4 class hours, 4 credits.

Graphs and functions; introduction to limits; differentiation and integration of polynomials, other algebraic functions, exponential and logarithmic functions. Two ongoing features of this course are: thorough presentation of germane algebra and analytic geometry before proceeding with a given calculus topic; applications to business and the life sciences (with emphasis on the idea of a model).

Prerequisite: MATH 90 or permission of the department.

**MATH 112 Applied Calculus II**

3 class hours, 3 credits.

Trigonometric functions; functions of several variables and partial derivatives; multi-variate optimization; mathematics of finance; systems of linear equations and matrices; introduction to vectors.

Prerequisite: MATH 111.

**MATH 211 Calculus III**

4 hours, 4 credits.

Partial derivatives; parametric equations; vector calculus; multiple integrals; polar and spherical coordinates; infinite series; Taylor polynomials and Taylor series; use of mathematical software package.

Prerequisite: MATH 102.

**MATH 212 Differential Equations**

4 hours, 4 credits.

First order equations; numerical methods; elements of linear algebra; matrices and determinants; linear differential equations of higher order; power series solutions; Laplace transforms; systems of linear equations; dynamical systems; use of mathematical software package.

Prerequisite: MATH 211.

**MATH 251 Statistics**

3 class hours, 3 credits.

Frequency distributions; measures of central tendency and variability; elementary probability; normal distribution; confidence intervals; hypothesis testing; simple and multiple regression analysis; use of statistical software.

Prerequisite: MATH 90, CS 101.

**MATH 301 Advanced Calculus**

3 class hours, 3 credits.

Functions of several variables; vectors; differentials; Implicit Function Theorem; Inverse Function Theorem; extrema; line and surface integrals; Fourier series; partial differential equations.

Prerequisite: MATH 212.

**MATH 302 Complex Variables**

3 class hours, 3 credits.

Complex numbers, analytic functions; contour integration; Taylor and Laurent series; poles and residues; conformal mapping; applications.

Prerequisite: MATH 212.

**MATH 446 Operations Research**

3 class hours, 3 credits.

Quantitative methods for business-oriented decision and optimization problems. Topics chosen from among: linear programming and related sensitivity analysis; transportation problem; network and project-scheduling algorithms; queues; simulation; Markov processes; decision analysis. Use of software packages.

Prerequisite: One year of college mathematics; CS 101.

**MATH 610 Special Topics in Mathematics**

1, 2, or 3 credits.

## **METEOROLOGY**

### **METE 201 Meteorology for Mariners**

2 class hours, 2 laboratory hours, 3 credits.

Structure and composition of the atmosphere; atmospheric radiation; forces and winds; general circulation; moisture; atmospheric stability; polar front and wave cyclone theory; marine weather observations; elements of weather forecasting and ship routing. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

### **METE 350 Synoptic Meteorology**

3 class hours, 3 laboratory hours, 4 credits.

Surface and upper-air circulation systems, vorticity and divergence, thickness and hydrostatics, air masses and fronts, moisture and stability, theory of weather forecasting. Plotting and analysis of surface and upper-air charts, use of thermodynamic diagrams, dynamic and non-dynamic forecast techniques, scales of motion, weather analysis and forecasting using NMC charts operationally available.

Prerequisite: METE 201.

### **METE 402 Tropical Cyclones**

2 class hours, 2 laboratory hours, 3 credits

Tropical circulation; stream function and analysis; trade wind features; the ITCZ; tropical disturbances; easterly waves; tropical vortices; the monsoon; the hurricane problem; man and the hurricane; damage; recent research.

Prerequisite: METE 201.

### **METE 408 Dynamic Meteorology**

3 class hours, 3 credits.

Thermodynamics of gases and applications to meteorology; atmospheric hydrostatics and thickness; thermodynamics of water vapor and moist air; elements of cloud physics. Hydrodynamics of fluids and applications to meteorology; The Equation of Motion; continuity; divergence and vertical motion; The Vorticity Equation; elements of quasi-geostrophic theory

Prerequisites: MATH 102 or 112, PHYS 211, METE 350.

### **METE 410 Marine Climatology**

2 class hours, 2 credits.

Radiation; general circulation; climate controls; climate classification; climatology of selected marine locations; climatology of tropical storms, ocean currents, fog, and sea ice.

Prerequisite: METE 201.

**METE 422 Weather Forecasting**

2 class hours, 2 laboratory hours, 3 credits.

Quasi-geostrophic forecast theory, elements of numerical weather prediction; short range forecasting and nowcasting; operational forecasting using NMC charts, radar, and satellite pictures.

Prerequisite: METE 350.

**METE 610 Special Topics in Meteorology**

1, 2, or 3 credits per term.

Research in meteorology and technical writing.

Prerequisites: METE 350.

**MARINE TRANSPORTATION****MT 212 Ship Management**

3 class hours, 3 credits.

The student will learn fundamental concepts and principles required to manage an international shipping company from the shoreside perspective. Subjects will include the various types of charter agreements, voyage trading data, cargo booking and trading, Bills of Lading, Insurance and the customer/owner relationship.

**MT 250 Ship Construction and Stability for Unlimited License**

2 class hours, 2 credits.

Description of structural components, types of construction, materials and methods of shipbuilding. Principles of ship form, flotation, transverse and longitudinal stability. Application of stability, trim, and stress tables, and stress calculating equipment and software. Merchant marine methodology in stability and trim calculations for intact and damaged vessels. This course satisfies STCW requirements in the areas of ships construction and stability.

**MT 321 Introduction to Cargo Operations and Ship Stability**

3 class hours, 3 credits.

The course is in two sections. The first section is a review of basic ship's construction; structural components, types of construction, materials and methods of shipbuilding. This section will also study the principles of transverse and longitudinal stability, general stability and trim calculations for both intact and damaged vessels as appropriate to the licensed deck officer. The second section of the course focuses on a study of vessel cargo and the role of the ship in integrated transportation systems. Specific topics include a survey of cargo gear, principles and problems of stowage and carriage of general, bulk, refrigerated, dangerous cargo, grain, special cargoes and containers, and the role of the ship's officer related to various types of vessels and cargo operations. A complete project is required dealing with the actual loading and stowage of a vessel, utilizing industry software and actual ship specifications. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: PHYS 211.

**MT 322 Marine Cargo Operations**

2 class hours, 2 laboratory hours, 3 credits.

A study of the tanker industry, and the operational aspects of the tanker; including basic safety and pollution prevention precautions and procedures, layouts of different types of oil tankers, types of cargo, their hazards and their handling equipment, general operations sequence and oil tanker construction and terminology. Pertinent U.S. Coast Guard and OPA '90 regulations will be covered, as well as how they relate to specific duties and responsibilities. Operational exposure to loading/discharging and auxiliary tanker systems will be gained through exercises structured around the school's tanker in a weekly two-hour laboratory. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: MT 321.

**MT 350 Hazardous Material and Oil Spill Response**

3 class hours, 3 credits.

This course will introduce the student to current methods and strategies used to combat oil and hazardous materials spills. The course will review legislation pertaining to facility and vessel response plans, carriage of hazardous materials, and worker safety. The course will familiarize the student with various types of spill response equipment and strategies through both classroom lectures and practical demonstrations.

**MT 404 Environmental Management**

3 class hours, 3 credits.

This class will provide an overview of current international environmental regulations as they pertain to the shipping industry. The discussion will include the place of environmental compliance in the company and the compliance process. Sections of the following Laws pertaining specifically to Vessel Operations will be used: MARPOL, Resource Conservation and Recovery Act, Clean Water Act, Clean Air Act, Montreal Protocol, State Statutes. Public health statutes applicable to shipping and vessel sanitation will also be covered. (USPHS – CDC Reporting Criteria). Case studies will be used throughout the course.

Prerequisite: NAUT 307.

**MT 408 International Safety Management**

3 class hours, 3 credits.

This course will introduce students to the ship management requirements found in the IMO's International Safety Management Code and how those requirements and principles are applied in the international shipping industry. Students will become familiar with the various aspects of the code and how the Code is implemented through such programs as safety management programs. Extensive use of case studies will be made.

**MT 426 Maritime Communications**

2 class hours, 2 laboratory hours, 3 credits.

A Simulator-based training course designed to satisfy the International Maritime Organization (IMO) requirements for training in Global Maritime Distress and Safety Systems. The course provides the student with a good working knowledge of modern marine communications. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

**MT 430 Principles of Emergency Management Systems**

3 class hours, 3 credits.

This course uses established guidelines set by FEMA and widely used in business to introduce students to the emergency management system in theory and practice. Discussion will include general topics in emergency management systems with an emphasis on how corporations are including these principles into business continuity planning. The course will include such topics as risk analysis, communications, planning and mitigation.

**MT 435 Maritime Security**

3 class hours, 3 credits.

Perform Federal Level 1 Anti-Terrorism Training. Instruct in Chemical, Biological and Radiological Defense (CBR-D). Obtain certification as a Company and Vessel Security Officer. Instruction and discussion on current Security issues and technology. The purpose of this course is to provide the student with a fundamental knowledge in Maritime Security and prepare them to be a Company or Vessel Security Officer.



**MT 450 Liquefied Gas Tanker Operations**

3 class hours, 3 credits.

The purpose of this course is to meet the training requirements for Liquefied Gas Vessel Person in Charge. The 42 hour course provides individuals with a thorough working knowledge of liquid gas tank ship operations and enables them to conduct safe, pollution free cargo operations. The emphasis of the course is placed on safety and operational aspects of cargo operations in accordance with accepted industry practice and legal requirements. This course covers the mandatory minimum training requirements of a Liquefied Gas Tanker Training Program as listed in Section A-V/1 paragraph 22-34 in the STCW 95 Code and 46 CFR Part 13 Table 13.121(F).

Prerequisites: PS 112, MT 250 and 322.

***SUMMER SEA TERM (DECK)*****MT 510 Ship Operation and Management I (Summer Sea Term I)**

6 credits.

Communications: Visual communications used in the merchant marine; Morse Code, blinker light and International Code Flags; merchant ship communications systems; use of lifeboat radio apparatus.

Navigation: Use of shipboard aids available to the navigator; elementary chart work plotting position, courses and distances; practical supervised piloting; introduction to instruments used in celestial navigation.

Operations: Ship activation; boat handling; davit operation; man-overboard drills; hull construction; numbering of carpments, deck doors, firehouse stations and extinguishers; ventilation; drainage; fire and flushing mains; loading marking; deck fittings; preservation, sanitation and maintenance; safety practices; ship deactivation, Basic Rules of Nautical Road. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: PS 111 and 112.

**MT 510B Cruise Practicum (for ITT majors only)**

3 credits.

A three-week segment of the Summer Sea Term introducing students to all aspects of ship operations. At sea, students will observe the underway operations of a commercial vessel; ashore, they will visit international companies to familiarize themselves with all facets of the maritime industry.

Prerequisites: PS 111 and 112; STCW Safety course.

**MT 520 Ship Operation and Management II, Intermediate (Summer Sea Term II)**  
6 credits.

Communications: Ship's visual communication apparatus; signal practice to obtain a speed of eight words per minute with the blinker light: International code, H.O. 102. Introduction to radio telephone.

Navigation: Sextant-review of adjustments and altitude measurements; celestial observations; computing and plotting of lines of position; azimuths and compass error; practical adjustments of the magnetic compass; chart work in conjunction with all phases of piloting and sailing; correction of charts and publications from Notices to mariners. Introduction to electronic aids to navigation. Day's work. Operations: Care of lifeboats and equipment; fire detection and extinguishing systems; use of portable fire extinguishers, emergency lifesaving appliances, cargo booms and winches, grand tackle, line throwing apparatus; tours of foreign port facilities, ships and shipyards. Intermediate Rules of Nautical Road. Meteorology: Plotting and making the weather map; synoptic observations and weather forecasting at sea. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: MT 510, METE 201, NAVG 212. Seamanship Practical.

**MT 521 Cadet Observer (In Lieu of Summer Sea Term II)**  
6 Credits.

Cadets with exceptional academic status may, upon application to the Department of Marine Transportation, be selected to sail on a commercial ship in lieu of Summer Sea Term II. Cadets will be assigned to vessels exceeding tonnage specified by the U.S. Coast Guard for Unlimited Tonnage, Deep Sea or for a minimum of 90 days, vice the 60 days required for the College's Summer Sea Term. Candidates are selected by the Department of Marine Transportation, based upon academic and regimental performance. An extensive sea project is required. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: MT 510, NAVG 212. Seamanship Practical.

**MT 523 Cadet Observer in Limited Tonnage Operations**  
6 credits.

MT 523 is designed as a capstone class for MTSVO-D majors. Successful completion of the course includes: minimum of 90 days at sea (60 on an Articulated Tug Barge (ATB)) with a participating company; arranged by Maritime College Placement Office, sea-project, PIC requirements, and STCW assessments.

Prerequisites: All other courses required for the MTSVO-D degree.

**MT 530 Ship Operation and Management III, Advanced (Summer Sea Term III)**  
5 credits.

Communications: Review of visual signaling and practical work to obtain a speed of six words per minute in blinker; radio auto-alarm; VHF/UHF radiotelephone operations; GMDSS Operators Certificate.

Navigation: Practical work in celestial navigation, electronic navigation, relative motion and piloting; analysis of dead-reckoning, running fixes and estimated positions supervising the correction of charts and publications; practical use of the tide and tidal current tables; duties and responsibilities of the navigator.

Operations: Steering gear drill, individual ship handling, use of distress signals, preparation of ship for U.S. Coast Guard annual inspection; foreign ports and port facilities; assumption of deck officer's duties and responsibilities. Advanced Rules of the Road. Each cadet on his/her first Class Sea Term must take and pass the written qualifying examination.

In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: NAUT 307 and 308, NAVG 312. Lifeboatman's Certification.

**MT 601-602 Independent Study in Marine Transportation I-II**

1, 2, 3, or 4 credits per term.

Independent investigation of special topics in Marine Transportation. Student work will be under the direct supervision of a mentor assigned by the Marine Transportation Department. In the event that the course earns 1 credit, the department has the option of assigning a Pass/Fail grade.

Prerequisite: Permission of the department.

**MT 610-611 Special Topics in Marine Transportation I-II**

3 credits.

Significant/varied topics in marine transportation of specialized interest are covered. Topics will be chosen to reflect the interest of both students and instructor.

Prerequisites: All required MT courses.

**NAUTICAL SCIENCE**

**NAUT 307 Nautical Operations: Legal**

2 class hours, 2 credits.

USCG Rules and Regulations, vessel inspection regulations, certification & documentation of vessels, ship's business, industrial relations, commercial maritime law and policy. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: PS 111 and 112.

**NAUT 308 Nautical Operations: Safety**

1 class hours, 2 laboratory hours, 2 credits.

This course is designed to meet two specific licensing requirements: Advanced Firefighting and Survival Craft Crewman. Each of these subjects is an endorsement on the Third Mate and Third Assistant engineer's license. The first seven weeks of this class (21 hours) will be devoted to Advanced Fire Fighting. An additional eight hours of practical training is held at the fire field.

The second portion of this class, an additional 21 hours, will concentrate on survival craft operations and shipboard evacuation procedures. Students will learn to plan and implement evacuation plans, conduct drills and gain familiarity with survival craft operations and deployment. The practical assessment for this class will be held during the Pre-cruise period for all cadets. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: MT 510 or ENGR 510.

**NAUT 314 Rules of the Road**

2 class hours, 2 credits.

Laws and rules for prevention of collision at sea, pertinent U. S. court decisions, practical application of rules to actual situations. Exposure to visual aspects of rules of the road, through use of the College's bridge simulator. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: MT 510.

Corequisite: NAUT 315.

**NAUT 315 Collision Avoidance**

3 class hours, 3 credits.

Relative motion as a tool for collision assessment, radar transfer plotting techniques, direct plotting techniques, single and multiple contact situations, resolution of primary, secondary, and tertiary threats. Use will be made of the College's Radar/ARPA simulator. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Corequisite: NAUT 314.

**NAUT 408 License Seminar**

4 class hours, 2 credits.

Lecture, discussions and problems dealing with subjects required by the U.S. Coast Guard for federal license as an officer in the merchant marine. In order to complete this course satisfactorily, each candidate for license is required to demonstrate, by qualifying examinations in all areas, his ability to become a fully qualified merchant marine officer.

Prerequisites: Satisfactory completion of all required NAUT courses and three successful summer sea terms.

**NAUT 410 Tugs and Towing I**

1 class hour, 2 weekend internships, 3 credits.

Tugboat development and construction, boat operations and equipment, tug handling techniques, safety, and the operations, organization and services of various tugboat companies. Laboratory: includes deck safety, deck seamanship, and light tugboat handling. A report related to the towing industry is required.

Prerequisites: PS 111 and 112.

**NAUT 411 Tugs and Towing II**

1 class hour, 2 weekend internships, 3 credits.

A course to introduce and prepare interested students in towing and docking operations. Using the barge SUNY 2000, students will garner the required skills needed to understand basic towing and docking operations. Skills acquired during Tugs and Towing I are required to ensure safe operation during towing evolutions.

Laboratory: push gear, alongside towing, astern towing, ship docking, and barge docking.

Prerequisite: NAUT 410.

**NAUT 416 Bridge Watchstanding**

1 class hour, 2 simulator hours, 3 credits.

This course simulator-based course is designed to enhance the potential Third Mate's decision-making skills as it applies to traffic and voyage planning situations. Practical application of Rules of the Road and development of correct bridge procedures will be emphasized. Open sea and harbor conditions will be simulated for day as well as night using the simulator. Each watch team has 2 simulator hours and 1 class hour per week. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: NAUT 314 and 315.

Corequisite: NAVG 312.

**NAUT 420 Piloting & Ship Handling for the Mariner**

1 class hour, 3 laboratory hours, 3 credits.

Piloting and ship handling for the mariner will serve two vital areas for the mariner. In piloting, the cadet will garner the skills required to pilot, safely and professionally, for a particular waterway. In ship handling, previously learned ship handling characteristics will be reinforced and improved using old and new methods.

Prerequisites: PS 111 and 112.

## **NAVIGATION**

### **NAVG 112 Terrestrial Navigation**

4 class hours, 4 credits.

Advance piloting techniques and practices including: voyage planning, use of pertinent publications in the determination of the voyage plan, effects of tide and current and their calculations, set and drift problems, visibility of lights, and the Pilot Chart. Analysis and determination of the terrestrial fix. Sailings and their applications, including mid-latitude and great circle sailing problems. Estimated time of arrival and fuel consumption problems. Introduction to time and nautical astronomy. Laboratory hours will continue with practical chart work including basic piloting problems using bearings and ranges, use of, identification and aids to navigation, factors affecting vessel's course and speed. Extensive exposure to bridge simulation and college tug for practical application of piloting and boat handling. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Corequisites: PS 111 and 112.

### **NAVG 212 Celestial Navigation**

4 class hours, 4 credits.

Topics include: The theory of celestial navigation; the celestial sphere; the navigational spherical triangle; time and its application; Development of the celestial line of position. Celestial sight reduction: spherical trigonometry formulas and sight reduction tables: the use of the Nautical Almanac; determination of latitude; determination of time of celestial phenomena; compass error from azimuths and amplitudes of celestial bodies. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisite: NAVG 112.

### **NAVG 312 Electronic Navigation Systems**

4 class hours, 4 credits.

Theory and operation of radio navigation systems including Loran C, Decca, Omega, Transit Satnav, GPS and GMDSS. Theory and operation of marine radar systems, CAS and ARPA systems. Required for U.S. Coast Guard radar certification.

Laboratory: Piloting and navigation using radar and radio navigation simulators. Practical radar plotting and collision avoidance operations. Required for U.S. Coast Guard radar certification. Course includes preparation for the FCC Marine Radio Operator Permit, and GMDSS Operators Certificate. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

Prerequisites: NAUT 314 and 315, MT 520 or 521.

## **NAVG 402 Advanced Marine Navigation**

1 class hour, 2 laboratory hours, 2 credits.

The transition from navigation as an art to the science of problem solving, in preparation for the Federal License Exam for Third Mate in the US Merchant Marine. Additionally, an intensive review of all general subject matter related to shipboard navigation is accomplished.

Prerequisite: Satisfactory completion of all Marine Navigation courses and MT 520 or 521.

**Note 1.** The United States Coast Guard has approved the Maritime College course offerings in the principles, proper operation and utilization of marine radar equipment, and the College is authorized to issue radar certificates to the students who satisfactorily complete the course requirements.

**Note 2.** Cardio-Pulmonary Resuscitation (CPR) certification is required of all license candidates. Arrangements are made with the American Red Cross to obtain the certification. The fee is paid to the Red Cross.

## **NAVAL SCIENCE**

Naval Science courses may be required for NROTC and Merchant Marine Reserve Program Midshipmen, Seaman-to-Admiral 21 (STA-21) Officer Candidates and Marine Enlisted Commissioning and Education Program (MECEP) students.

### **NVSC 100-110**

### **NVSC 200-220**

### **NVSC 300-330**

### **NVSC 400-440 NVSC Laboratory**

2 class hours, 1/2 credit, per semester.

Required of all NROTC/MMR midshipmen, STA-21, and MECEP students. Midshipmen are provided the opportunity in laboratory to develop personally while participating in activities as a team leader or team member. Naval Science Laboratories are a blend of academic lectures on naval theory and naval administration and practical training in physical readiness, military discipline and an appreciation of the customs and traditions of the Naval Service.

**NVSC 101 Introduction to Naval Science**

3 class hours, 3 credits.

Introduction to the naval profession and to concepts of sea power, emphasizing the mission and organization of the Navy and Marine Corps. Included is an overview of officer and enlisted ranks and rates, training, education, and career patterns. Course also covers naval courtesy and customs, leadership, and nomenclature. Exposes the student to the professional competencies. Required of all MMR and NROTC scholarship and college program midshipmen in lieu of NVSC 103. Freshman students may take NVSC 101 in lieu of NVSC 103, allowing them to stay on track for both the NROTC MMR and NROTC College Program options.

**NVSC 102 / HIST 420 Sea Power and Maritime Affairs**

3 class hours, 3 credits.

A study of the U.S. Navy and the influence of sea power upon history. Incorporates both an historical and political science process to explore the major events, attitude, personalities, and circumstances that have imbued the U.S. Navy with its proud history and rich tradition. It deals with issues of national imperative in peacetime as well as war, varying maritime philosophies which were interpreted into naval strategies/doctrines, budgetary concerns that shaped force realities, and the pursuit of American diplomatic objectives, concluding with the current search for direction in the post Cold War era. Required of all NROTC scholarship and college program midshipmen, free elective for all others.

**NVSC 103 Basic Naval Science**

1 class hour, 1 credit.

Introduction to Navy policies and Maritime affairs as they relate to the Merchant Marine Officer. The course covers Naval and Maritime evolutions, functions, missions, and strategy. Course is required for all freshman students except for MMR/NROTC scholarship and college program midshipmen and foreign students; freshman students may take NVSC 101 in lieu of NVSC 103.

**NVSC 201 Leadership and Management**

3 class hours, 3 credits.

Advanced organizational behavior and management in the context of the naval organization. Major behavioral theories are explored in detail. Practical applications are explored by the use of experimental exercises, case studies, and laboratory discussions. Required of all NROTC scholarship and college program midshipmen; free elective for all other students.



**NVSC 204 Naval Science for the Merchant Marine Reserve Officer**

2 class hours, 2 credits.

Introduction to the functional coordination of the Merchant fleet with the Navy in peacetime, during international tension, or during formally declared war. Naval control of shipping, operations, communications, offensive and defensive procedures and weaponry for merchant ships are covered in detail. Required for all students applying for the MMR program.

Prerequisite: NVSC 101 or 103.

**NVSC 211 Navigation**

3 class hours, 3 credits.

Piloting and celestial navigation including theory, principles, procedures, the use of charts, visual and electronic aids, and the theory and operation of magnetic and gyro compasses. Celestial navigation is covered in depth. Practical skills are developed. Topics include tides, currents, effects of wind and weather, plotting, use of navigation systems, and a day's work in navigation. Required of all Navy option NROTC midshipmen who are not in a deck license program; free elective for other engine license students.

**NVSC 303 Naval Ship Systems II (Weapons)**

3 class hours, 3 credits.

Modern naval weapons from a systems approach, with examples from today's fleet. Attention is given to airborne, surface and sub-surface platforms. This course outlines the theory and employment of weapons systems. The facets of command, control, and communications are explored as a means of weapons system integration. Required of all Navy option NROTC midshipmen; free elective for all other students.

**NVSC 304 Naval Ship Systems I (Engineering)**

3 class hours, 3 credits.

A study of ship characteristics and types including ship design, hydrodynamic forces, stability, compartmentation, propulsion, electrical and auxiliary systems, interior communications, ship control, and damage control; theory and design of steam, gas turbine, and nuclear propulsion; shipboard safety and firefighting. Required of all Navy option NROTC midshipmen who are not in an engine license program.

**NVSC 311 Evolution of Warfare**

3 class hours, 3 credits.

History of warfare, focusing on the impact of major military theorists, strategies, tacticians, and technological development. Required of all Marine Option NROTC Midshipmen and MECEP students.

**NVSC 312 Amphibious Warfare**

3 class hours, 3 credits.

History of amphibious doctrine and the conduct of amphibious operations. Emphasis is on the Twentieth Century, especially World War II. Present day potential and limitations of amphibious operations, including the rapid deployment force concept, are explored. Required of all Marine option NROTC midshipmen and MECEP students.

**NVSC 402 Leadership and Ethics**

3 class hours, 3 credits.

The study of naval junior officer responsibilities in naval administration. This capstone course in the NROTC curriculum builds on and integrates the professional competencies developed in prior course work and professional training. Required of all NROTC and MMR midshipmen, STA-21, and MECEP students. Free elective for all other students.

**NVSC 403 Naval Operations and Seamanship**

3 class hours, 3 credits.

A study of the international and inland rules of the nautical road, relative-motion vector analysis theory, relative motion problems, formation tactics, and ship employment. Also included are an introduction to naval operations analysis, ship behavior and characteristics in maneuvering, applied aspects of ship handling, and afloat communications. Required of all Navy option NROTC midshipmen; free elective for all other students.

**OCEANOGRAPHY****OCEA 303 General Oceanography**

3 class hours, 2 laboratory hours, 4 credits.

Origin of the earth and oceans, earth structure, continental margins and basins, marine sediment, water and ocean structure, seawater chemistry, atmospheric circulation, oceanic circulation, waves, tides, coasts, life in the ocean, marine productivity, marine communities.

Prerequisites: CHEM 100 or 121.

**OCEA 308 Dynamic Oceanography**

3 class hours, 3 credits.

Hydrostatics; equations of motion; dynamics of a frictionless ocean; dynamics of an ocean with friction; turbulence diffusion, and the classical theory of waves; seiches and tides; wave forecasting.

Prerequisites: MATH 102 or 112, PHYS 214, OCEA 303.

**OCEA 402 Estuaries and Coastal Processes**

3 class hours, 3 credits.

Physical, chemical, biological and geological processes in estuaries. Classification according to geometry, salinity, circulation. Tidal flushing and pollutant dispersal.

Prerequisite: OCEA 303.

**OCEA 414 Marine Geology**

3 class hours, 3 credits.

Matter & Minerals. Rock types. Igneous, Sedimentary, Metamorphic. Geologic Time. Shorelines. Earthquakes, Seismology and Earth's Interior. Sea Floor Spreading, Continental Drift, and Plate Tectonics.

Prerequisite: GEOL 301, OCEA 303.

**OCEA 415 Marine Biogeochemistry**

3 class hours, 3 credits.

Chemical oceanography, chemical and biological processes affecting gases, nutrients and trace metals in seawater, seawater composition, oceanic distribution of chemical species, carbon and nutrient cycling, redox reactions on seawater, diagenesis, hydrothermal vents, marine organic chemistry

Prerequisites: CHEM 121, OCEA 303.

**OCEA 416 Marine Biogeochemistry Lab**

3 laboratory hours, 1 credit.

Introduction to analytical chemistry of seawater; analyses of salinity, dissolved oxygen, dissolved nutrients in seawater; applications of seawater analyses to gas solubility, primary productivity and air/sea exchange of gases in a variety of marine environments.

Prerequisites: CHEM 121, OCEA 303.

**OCEA 425 Marine Environmental Issues**

3 class hours, 3 credits.

Contemporary environmental issues in the ocean, marine pollution, oil spills, heavy metals, halogenated hydrocarbons, plastics, marine energy resources

Prerequisites: CHEM 100 or 121, OCEA 303.

**OCEA 610 Special Topics in Oceanography**

3 class hours, 3 credits.

Investigation of problems in oceanography of special interest to the merchant marine.

**PHYSICAL EDUCATION**

PE 100 (Swimming and Water Safety) and PE 411 (Medical Care Provider) are a requirement for students seeking the U.S. Coast Guard License. The PE 411 course is offered during the Summer Sea Term for students in the “unlimited” license programs, and in both the Fall and Spring semesters for students in the curricula.

**PE 100 Swimming and Water Safety**

2 hours, 1 credit.

Stroke development, conditioning, and water safety survival training. It is strongly recommended that students take PE 100 before SST I.

**PE 101 Lifetime Fitness and Conditioning**

2 hours, 1 credit.

The study of Exercise Physiology in an academic, as well as an activity mode. Exams from classroom work and activity labs and fitness testing would be required.

**PE 20x Lifetime Sports**

2 hours, 1 credit.

The 200-level courses involve specific sports training, and skills development unique to that particular individual or team sport. This could include such activities as Basketball, Soccer Volleyball Tennis, Rowing, Sailing. The course numbering will be sport-specific (PE 201 Basketball, etc.).

**PE 350 Intercollegiate Athletic Participation**

One full season, 1 credit.

Requires being an active member on any of the College's Varsity Sport teams. This could be used to satisfy the PE requirement in Lifetime Sports (PE 20x).

**PE 411 Medical Care Provider**

2 hours, 1 credit.

Study and practice in: the contents of a standard first aid kit, the anatomy and physiology of human body systems, toxicological shipboard hazards, identification of hazardous substances and hazards of exposure, patient assessment, standard isolation techniques, CPR and use of AED, treatment of burns and scalds, heat and cold emergencies, symptoms and treatment of hyperthermia/hypothermia/dehydration, radio medical services, medications, sterilization techniques, prevention of disease transmission, treatment for shock, broken bones, dislocations, splinting, and patient movement and transportation. The student will be certified by the American Red Cross by means of a written exam and practical skills performance. This course meets the STCW competencies as well. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

**PHYSICS****PHYS 102 Engineering Physics I**

4 class hours, 4 credits.

Basic standards and unit conversions, vector algebra, translational kinematics, particle dynamics, work and energy, rotational kinematics and dynamics, temperature, calorimetry, first law of thermodynamics.

Prerequisite: MATH 101.

**PHYS 201 Engineering Physics II**

4 class hours, 4 credits.

Electric field and potential, D.C. circuits, Magnetic fields, Faraday's Law, inductance and capacitance, AC circuits, wave motion, EM waves and spectrum.

Prerequisite: A grade of C- or better in PHYS 102.

**PHYS 202 Engineering Physics Lab**

2 lab hours every week, 1 credit.

Measurements and error analysis, mechanics, heat, electricity and magnetism experiments.

Corequisite: PHYS 201.

**PHYS 211 General Physics I**

3 class hours, 3 credits.

Unit conversions, vector algebra, translational kinematics, particle dynamics, work and energy, momentum, rotational kinematics and dynamics, heat.

Prerequisite: MATH 90 or departmental permission.

Corequisite: MATH 101 or 111, PHYS 213.

**PHYS 213 General Physics I Lab**

2 laboratory hours fortnightly, 0.5 credit.

Measurements and errors, experiments in mechanics and heat.

Corequisite: PHYS 211.

**PHYS 214 General Physics II**

4 class hours, 4 credits.

Thermodynamics, electric field, potential, DC circuits, magnetic fields, Faraday's Law, AC circuits, waves- sound and electromagnetic radiation, diffraction of waves- spectroscopy.

Prerequisite: PHYS 211 or 102.

**PHYS 216 General Physics II Lab**

2 laboratory hours fortnightly, 0.5 credit.

Measurements and errors, experiments in electricity and magnetism.

Corequisite: PHYS 214.

**PHYS 332 Modern Physics**

3 class hours, 3 credits.

Electromagnetic radiation, quantum theory of radiation and matter, lasers, x rays, solid state devices, special relativity, nuclear radioactivity, nuclear reactions, nuclear fission and fusion.

Prerequisite: PHYS 201 or 214.

**PHYS 363 Physics of Fluids**

3 class hours, 3 credits.

Physics of fluids; structure of matter; hydrostatics: buoyancy, surface tension; hydrodynamics: Bernoulli's principle, laminar and turbulent flow; heat and thermodynamics: expansion of liquids and heat capacity; transfer processes: conduction, convection, radiation, ideal gas laws, phase equilibria, thermodynamic processes and cycles, first and second laws, entropy.

Prerequisite: PHYS 214.

**PHYS 610-611 Special Topics in Physics**

1, 2, or 3 credits per term (2 semesters).

Theoretical or experimental investigation of special problems in either classical or modern physics.

**PROFESSIONAL STUDIES****PS 111 Professional Studies**

2 class hours, 2 credits.

An introduction to the shipping industry, ships, and ship systems. Basic Transportation module: the shipping industry, ship nomenclature, organization, and construction. Basic Engineering module: propulsion plant nomenclature, components arrangements, and characteristics.

**PS 112 Basic Safety Training**

1 class hour, 2 laboratory hours, 2 credits.

Satisfies aspects of STCW Basic Safety Training requirements for all shipboard personnel. Elements include: Fire prevention/firefighting; elementary first aid; personal survival; personal safety and social responsibilities. Introduction to survival craft and rescue boats. In compliance with international STCW requirements, there will be no D or D+ grades in this course.

**SPANISH****SPAN 101-102 Spanish I-II**

3 credits each, 3 class hours each.

These courses are for non-native speakers who have not studied Spanish previously. Students who wish to receive Humanities credit for Spanish, must complete the 6 credit sequence. If a student passes Spanish 101 and does not take Spanish 102, the course will be counted as a 3 credit free elective.

## **SOCIAL SCIENCE**

### **SS 400 Fundamentals of International Relations**

3 class hours, 3 credits.

An examination of major factors which determine the nature of international relations. Topics to be discussed include the origins of the nation-state system, the role of military power, the economic element of international relations, the nature of diplomacy, and the role of international law.

### **SS 610-611 Special Topics in History and the Social Sciences**

3 class hours, 3 credits.

Special topics for qualified students interested in acquiring a broader knowledge of the social sciences.