OE 677 - Seamanship and Marine Weather for Ocean Engineers and Scientists
Credits: 2
A survey of basic principles of seamanship and marine weather intended for ocean engineers and ocean scientists. Reviews ship and vessel nomenclature, shipboard safety, techniques for equipment handling and instrument deployment, common shipboard evolutions associated with scientific cruises, navigation principles, and marine weather phenomena and products. Includes field trips and practical applications.
Grade Mode: Credit/Fail Grading

OE 717 - Marine Robotics and Applications
Credits: 3
The purpose of this course is to cover (in lecture and lab format) the broad spectrum of marine vehicles and applications, as well as what is involved in designing and building robotic vehicles for specific missions. Course topics include: marine applications, sensors for marine environments, vehicle subsystems, ocean and open water environment, dynamic modeling and control, and design/fabrication/testing. Various invited speakers (both scientists and engineers) provide learning modules on various marine robotic related topics.
Co-requisite: ME 670
Equivalent(s): ME 717
Grade Mode: Letter Grading

OE 720 - Design of Recirculating Aquaculture Systems
Credits: 3
The purpose of this course is to provide a practical engineering approach to the design of land-based, recirculating aquaculture systems. The course includes an introductory background on the state of our global seafood industries and the need for sustainable production approaches in fresh, brackish, and saltwater environments with various types of systems presently in use. With a focus on recirculating aquaculture systems, this course will include topics such as environmental chemistry and water quality, stoichiometric analyses, nitrification, the potential of hydrogen, temperature, dissolved oxygen, carbon dioxide, the carbonate cycle and alkalinity. A systems design approach will then be covered to include developing plans for assessing biomass growth, system oxygen consumption and total nitrogen and carbon dioxide production. System design will consider processes associated with tank hydrodynamics, waste settling, solids removal, biofiltration, UV treatment, temperature control, aeration, degassing, pumps, and piping systems. Mass balance approaches through control volumes will be examined. Ahands-on, student led system design project will be required and examined using engineering economic principles such as the time value of money, inflation, taxes, and internal rates of return. Use of computer tools will be necessary.
Prerequisite(s): (MATH 426 with a minimum grade of D- or MATH 424B with a minimum grade of D-) and (PHYS 407 with a minimum grade of D- or PHYS 407S with a minimum grade of D- or PHYS 407H with a minimum grade of D- or PHYS 401 with a minimum grade of D- and PHYS 402 with a minimum grade of D-) and (CHEM 405 with a minimum grade of D- or CHEM 403 with a minimum grade of D- and CHEM 404 with a minimum grade of D-)
Grade Mode: Letter Grading
OE 753 - Ocean Hydrodynamics  
Credits: 3  
Fundamental concepts of fluid mechanics as applied to the ocean, continuity, Euler and Navier-Stokes equations, Bernoulli equation, stream function, potential function, moment theorem, turbulence and boundary layers are developed with ocean applications.  
Prerequisite(s): MATH 527 with a minimum grade of D- and (CEE 650 with a minimum grade of D- or ME 608 with a minimum grade of D-).  
Grade Mode: Letter Grading  

OE 754 - Ocean Waves and Tides  
Credits: 4  
Small amplitude, linear wave theory, standing and propagating waves, wave energy, refraction, diffraction, transformation in shallow water, statistics of random seas, spectral energy density, generating wave time series using the random phase methods forces on structures, Froude scaling of wave tank experiments, nonlinear effects. Description of tides as long waves, equilibrium tide, mathematical modeling including friction, nonlinear effects, and Coriolis forces, tidal analysis, the Great Bay Estuarine System as a case study.  
Prerequisite(s): (PHYS 407 with a minimum grade of D- or PHYS 407S with a minimum grade of D-) and MATH 527 with a minimum grade of D- and MATH 528 with a minimum grade of D-.  
Grade Mode: Letter Grading  

OE 757 - Coastal Engineering and Processes  
Credits: 3  
Introduces small amplitude and finite amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling.  
Prerequisite(s): CEE 650 with a minimum grade of D- or ME 608 with a minimum grade of D-.  
Grade Mode: Letter Grading  

OE 758 - Design of Ocean Structures  
Credits: 3  
The foundational information necessary for the design of ocean structures. Topics include analysis and design of floating body, fixed body and moored line hydrostatics; wave forces on small and large bodies; dynamic response of floating bodies; and pile and gravity foundation geotechnics.  
Prerequisite(s): (ME 525 with a minimum grade of D- or CEE 502 with a minimum grade of D-) and (ME 608 with a minimum grade of D- or CEE 650 with a minimum grade of D-) and OE 754 with a minimum grade of D- and MATH 527 with a minimum grade of D-.  
Grade Mode: Letter Grading  

OE #764 - Spectral Analysis of Geophysical Time Series Data  
Credits: 4  
This course considers basic exploratory techniques and in-depth spectral analysis for estimation with geophysical time series data, including calculations of confidence intervals and significance testing. This course prepares students for interpreting time series data with science and engineering applications. Topics include sampling theory, filtering, statistics, probability, spectral analysis, and empirical orthogonal functions. Students gain experience in code-writing for the analysis of time series data.  
Prerequisite(s): MATH 426 with a minimum grade of D-.  
Equivalent(s): ESCI 764  
Grade Mode: Letter Grading  

OE 765 - Underwater Acoustics  
Credits: 3  
An introduction to acoustics in the ocean. Fundamental acoustic concepts including the simple harmonic oscillator, waves on strings, and the acoustic wave equation; the sonar equation; sound generation and reception by underwater acoustic transducers and arrays; basics of sound propagation; reflection and scattering from ocean boundaries. Spring semester offered every year; satisfies core course requirement in Ocean Engineering.  
Prerequisite(s): (PHYS 408 with a minimum grade of D- or PHYS 408S with a minimum grade of D-) and MATH 527 with a minimum grade of D-.  
Grade Mode: Letter Grading  

OE 770 - Geodesy for Ocean Mapping  
Credits: 3  
Ocean mapping requires precise positioning and navigation. For this we need to precisely know Earth's shape, gravity field, and orientation in space. Data used for this purpose include satellite-based positioning, gravity measurements, and ground surveys. Reference frames can then be created allowing the integration of geometric observations for the creation of mapping products.  
Prerequisite(s): (MATH 426 with a minimum grade of D- or MATH 426H with a minimum grade of D-) and (PHYS 407 with a minimum grade of D- or PHYS 407S with a minimum grade of D-) and PHYS 401 with a minimum grade of D-.  
Grade Mode: Letter Grading  

OE 771 - Positioning for Ocean Mapping  
Credits: 4  
Ocean mapping necessitates accurate positioning and navigation, which, in turn, rely on a comprehensive grasp of measurement methodologies. This course will comprehensively examine various positioning techniques, including spirit leveling, total stations, Global Navigation Satellite Systems (GNSS), inertial navigation systems (INS), and underwater acoustic positioning systems. Emphasis will be placed on the observational methodologies associated with each technology, along with the propagation of observation uncertainty.  
Prerequisite(s): (MATH 426 with a minimum grade of D- or MATH 426H with a minimum grade of D-) and (PHYS 407 with a minimum grade of D- or PHYS 407S with a minimum grade of D-) and PHYS 401 with a minimum grade of D-.  
Equivalent(s): ESCI 771  
Grade Mode: Letter Grading  

OE 774 - Integrated Seabed Mapping Systems  
Credits: 4  
Overview of typical applications that involve mapping the sediment-water interface in the ocean and adjacent waters. Emphasis on defining the task-specific resolution and accuracy requirements. Fundamentals of acoustics relevant to seabed mapping. Progression through typical configurations involving single beam, sidescan, phase differencing and multibeam systems. Integration of asynchronous 3D position, orientation and sound speed measurements with sonar-relative acoustic travel time and angles. Analysis of impact of offsets, mis-alignments and latency in all integrated sensors.  
Grade Mode: Letter Grading  

OE 795 - Special Topics  
Credits: 2-4  
New or specialized courses and/or independent study. May be repeated barring duplication of subject.  
Repeat Rule: May be repeated up to unlimited times.  
Grade Mode: Letter Grading
OE 796 - Independent Study
Credits: 1-4
Independent study for exceptional students. Individual reading, writing, or laboratory work carried out under the tutelage of a faculty member. May be used as a technical elective for the ocean engineering major if taken for 3-4 credits.
Repeat Rule: May be repeated for a maximum of 4 credits.
Grade Mode: Letter Grading

OE 797 - Honors Seminar
Credits: 1
Course enrichment and/or additional independent study in subject matter pertaining to 600- or 700-level OE courses.
Attributes: Honors course
Repeat Rule: May be repeated for a maximum of 3 credits. May be repeated up to 3 times.
Grade Mode: Letter Grading