OCEAN ENGINEERING (OE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

OE 817 - Marine Robotics and Applications
Credits: 3
This course covers (lecture/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. Graduate students will be assigned extra project work.
Equivalent(s): ME 817
Grade Mode: Letter Grading

OE 853 - 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; momentum theorem; turbulence and boundary layers are developed with ocean applications. Prereq: MATH 527; CEE 650 or ME 608.
Grade Mode: Letter Grading

OE 854 - 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. Prereq: General Physics I; Differential Equations, and Multi-Dimensional Calculus.
Equivalent(s): EOS 854
Grade Mode: Letter Grading

OE 857 - Coastal Engineering and Processes
Credits: 3
Introduction to 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. Prereq: fluid dynamics or permission. (Also offered as CIE 857 and ME 857.)
Equivalent(s): CIE 857, ME 857
Grade Mode: Letter Grading

OE 858 - Design of Ocean Structures
Credits: 3
The foundational information necessary for the design of ocean structures. Topics include 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. Prereq: Mechanics of Materials; Fluid Mechanics; Dynamics; Differential Equations, Waves & Tides, or permission.
Grade Mode: Letter Grading

OE 864 - 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. Students enrolled at the 800 level provide data for analysis. Prereq: MATH 426.
Equivalent(s): ESCI 864
Grade Mode: Letter Grading

OE 865 - 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. Prereq: General physics and differential equations.
Grade Mode: Letter Grading

OE 871 - Geodesy and Positioning for Ocean Mapping
Credits: 4
The science and technology of acquiring, managing, and displaying geographically referenced information; the size and shape of the earth, datums and projections; determination of precise positioning of points on the earth and the sea, including classical terrestrial-based methods and satellite-based methods; shoreline mapping, nautical charting and electronic charts. Prereq: one year of calculus and one year of college physics. (Also listed as ESCI 871.)
Equivalent(s): ESCI 871
Grade Mode: Letter Grading

OE 874 - 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. Progressions 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 times and angles. Analysis of impact offsets, mis-alignments and latency in all integrated sensors.
Equivalent(s): ESCI 874
Grade Mode: Letter Grading
OE 875 - Advanced Topics in Ocean Mapping  
Credits: 4  
The second of two courses covering the principles and practices of  
hydrography and ocean mapping. In this course the following topics are  
covered: Verification and Field QA/QC, Water Levels (Tides); Mapping  
Standards; Survey Planning, Execution and Reporting; Terrain Analysis;  
Optical Remote Sensing; Data Presentation; Seafloor Characterization;  
Electronic Navigational Charts; Hydrography for Nautical Charting,  
Product Liability and contracts; and the United Nations Convention for  
the Law of the Sea (UNCLOS). Prereq: OE874/ESCI 874, two terms each  
of college calculus and physics. Pre- or Co-req: MATH 831 or equivalent  
material.  
Equivalent(s): ESCI 875  
Grade Mode: Letter Grading

OE 892 - Master's Project  
Credits: 3  
The student works with a faculty member during one or two semesters  
on a well-defined research and/or original design project. A written report  
and seminar are presented. IA (continuous grading). Cr/F.  
Grade Mode: Graduate Credit/Fail grading

OE 895 - Special Topics  
Credits: 1-4  
New or specialized courses and/or independent study. May be repeated  
for credit.  
Grade Mode: Letter Grading

OE 899 - Master's Thesis  
Credits: 1-6  
May be repeated up to a maximum of 6 credits. Cr/F.  
Repeat Rule: May be repeated for a maximum of 6 credits.  
Grade Mode: Graduate Credit/Fail grading

OE 965 - Advanced Underwater Acoustics  
Credits: 3  
Focused topics varying from year to year depending on student interests  
and need. Topics may include one or more of the following: sonar  
systems engineering; underwater acoustic transducers; volume and  
surface scattering; underwater acoustic propagation; fisheries acoustics.  
Spring semester; offered every other year. Prereq: Underwater acoustics  
or permission.  
Repeat Rule: May be repeated for a maximum of 9 credits.  
Grade Mode: Letter Grading

OE 972 - Hydrographic Field Course  
Credits: 4  
A lecture, lab, and field course on the methods and procedures for  
the acquisition and processing of hydrographic and ocean mapping  
data. Practical experience in planning and conducting hydrographic  
surveys. Includes significant time underway (day trips and possible multi-  
day cruises) aboard survey vessel(s). Prereq: Fundamentals of Ocean  
Mapping, Geodesy and Positioning for Ocean Mapping; or permission.  
(Also listed as ESCI 972.)  
Equivalent(s): ESCI 972  
Grade Mode: Letter Grading

OE 990 - Ocean Seminars I  
Credits: 1  
Various topics, including marine systems design, marine vehicle  
operation, data collecting and processing, and marine law. Cr/F.  
Grade Mode: Graduate Credit/Fail grading

OE 991 - Ocean Seminars II  
Credits: 1  
Various topics, including marine systems design, marine vehicle  
operation, data collecting and processing, and marine law. Cr/F.  
Grade Mode: Graduate Credit/Fail grading

OE 995 - Graduate Special Topics  
Credits: 1-4  
Investigation of graduate-level problems or topics in ocean engineering.  
Repeat Rule: May be repeated for a maximum of 16 credits.  
Grade Mode: Letter Grading

OE 998 - Independent Study  
Credits: 1-4  
Independent theoretical and/or experimental investigation of an ocean  
engineering problem under the guidance of a faculty member.  
Grade Mode: Letter Grading

OE 999 - Doctoral Research  
Credits: 0  
Cr/F.  
Grade Mode: Graduate Credit/Fail grading