Department of Ocean Engineering

http://engineering.tamu.edu/ocean

Department Head: Sharath Girimaji
Graduate Advisor: Jeffrey Falzarano

Ocean engineering is the application of basic engineering principles to the analysis, design, construction, and management of systems that operate in the ocean environment. The graduate ocean engineering program is broad-based and is designed to fit the needs of graduates from most engineering disciplines and naval architecture. Typical ocean engineering application areas include: beach protection and nourishment, coastal structures, coastal erosion, current and wave structure interaction, development of ocean energy resources, dynamics of offshore platforms and vessels, hydrodynamics, instrumentation for coastal and offshore measurements, marine dredging and dredged material placement, marine risers, moored and towed systems, numerical and physical modeling of ocean processes and systems, ocean mining, offshore petroleum recovery, offshore structures, pipeline flow assurance, ports and harbors, remotely operated and autonomous underwater vehicles, renewable ocean energy systems, search and salvage, suspended and dissolved constituent transport, subsea pipelines and cables, submersible vehicles and sustainable and resilient ocean systems.

The graduate degree programs include coursework leading to the Master of Science (MS), Master of Engineering (ME), and Doctor of Philosophy (PhD) degrees in Ocean Engineering and Doctor of Engineering (DEng) in engineering. Students entering the graduate degree program have widely varied engineering backgrounds. Each graduate student is expected to become well versed in the appropriate support disciplines, particularly mathematics, ocean wave mechanics, and hydrodynamics. The student is expected to achieve reasonable competence in the principal areas of offshore structures, coastal and port engineering, coastal and estuarine processes, dredging and/or mining processes, or marine hydrodynamics. The graduate program is designed to provide students with knowledge of engineering in the ocean environment and to establish a base for ocean engineering research. Graduate courses are given in ocean engineering wave theory, marine hydrodynamics, oceanography, mathematics, coastal engineering, estuary hydrodynamics, sediment transport, dynamics of offshore structures, dynamics of ocean vehicles, marine dredging, port and harbor design, laboratory modeling, nonlinear hydrodynamics, computational fluid dynamics, and advanced offshore and coastal numerical methods.

The Department of Ocean Engineering is a two-campus department with campuses located in College Station and Galveston. The laboratory facilities in College Station are among the most comprehensive in the nation for testing offshore, dredging and coastal systems. The facilities are located in the Reta and Bill Haynes ’46 Coastal Engineering Laboratory, Offshore Technology Research Center, and the Civil Engineering Laboratory Building. The facilities in Galveston include two wave channels and provide access to the Gulf of Mexico through use of small boats, field equipment and instrumentation, and research vessels are available for offshore and coastal engineering research and education.

There is no foreign language requirement for PhD in ocean engineering or DEng in engineering. Students pursuing PhD in ocean engineering or DEng in engineering are required to pass the Ocean Engineering qualifying exam.

Faculty

Falzarano, Jeffrey M, Professor
Ocean Engineering
PHD, University of Michigan, 1990

Figlus, Jens, Assistant Professor
Ocean Engineering
PHD, University of Delaware, 2010

Girimaji, Sharath S, Professor
Ocean Engineering
PHD, Cornell University, 1990

Gordon, Robert B, Senior Lecturer
Ocean Engineering
PHD, University of Rhode Island, 1982

Horrillo, Juan J, Associate Professor
Ocean Engineering
PHD, University of Alaska Fairbanks, 2006

Kang, Heonyong, Research Assistant Professor
Ocean Engineering
PHD, Texas A&M University, 2014

Kian, Rozita, Research Assistant Professor
Ocean Engineering
PHD, Middle East Technical University, 2015

Kim, Moo hyun, Professor
Ocean Engineering
PHD, Massachusetts Institute of Technology, 1988

Koola, Paul M, Professor of the Practice
Ocean Engineering
MBA, Texas A&M University, 2000

Na, Byoungjoon, Research Assistant Professor
Ocean Engineering
PHD, Texas A&M University, 2010

Perlin, Marc, Professor
Ocean Engineering
PHD, University of Florida, 1989

Randall, Robert E, Professor
Ocean Engineering
PHD, University of Rhode Island, 1972

Rodriguez, Ignacio J, Distinguished Professor
Ocean Engineering
PHD, Colorado State University, 1967

Shaw, Surupa, Lecturer
Ocean Engineering
PHD, University of New Hampshire, 2015
Subramanian, Rahul, Lecturer
Ocean Engineering
PHD, University of Michigan, 2012

Sweetman, John A, Professor
Ocean Engineering
PHD, Stanford University, 2001

Wood, Amanda L, Instructional Assistant Professor
Ocean Engineering
PHD, University of Houston, 2010

Masters

- Master of Engineering in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/ocean/ocean-meng)
- Master of Science in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/ocean/ocean-ms)

Doctoral

- Doctor of Philosophy in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/ocean/ocean-phd)

Courses

OCEN 630 Dynamics of Ocean Vehicles
Credits 3.3 Lecture Hours.
Dynamics and stability of motion of immersed and floating structures and ocean vehicles; maneuverability and control; behavior of ocean vehicles and stationary platforms in waves. Design considerations leading to motion reduction; applications to surface vessels, submersibles and drilling rigs.
Prerequisite: CVEN 311, MEEN 459 or equivalent, or approval of instructor.

OCEN 671 Ocean Wave Mechanics
Credits 3.3 Lecture Hours.
Wave theory and applications to engineering problems; linear and non-linear theories of regular gravity waves; wave properties and transformation in shoaling water; spectral analysis of irregular waves; forecasting, hindcasting and theoretical spectra.
Prerequisite: CVEN 311 or equivalent.

OCEN 672 Coastal Engineering
Credits 3.3 Lecture Hours.
Effects of waves on coastal structures; design of seawalls breakwaters, jetties, harbors, ship channels and pipelines; intentional and accidental discharge of pollutants; diffusion and spreading; oil spill containment and collection.
Prerequisite: OCEN 671.

OCEN 673 Nonlinear Hydrodynamic Problems in Ocean Engineering
Credits 3.3 Lecture Hours.
Nonlinear hydrodynamic problems involved with the complex offshore structures in high sea environment; nonlinear waves application of Volterra model to weakly nonlinear systems; generation of nonlinear model waves; nonlinear hydrodynamic interaction between waves and structure; dynamic analysis of nonlinear response of integrated offshore structures.
Prerequisites: OCEN 671 and OCEN 678.

OCEN 674 Ports and Harbors
Credits 3.3 Lecture Hours.
Basic port planning including site selection, environmental factors and economic conditions; design of wharves, quays, jetties, breakwaters, terminals, navigational channels and fenders; harbor sedimentation and maintenance dredging; design of fishing, small craft and recreation boat harbors.
Prerequisite: Approval of instructor.

OCEN 675 Nonlinear Wave Dynamics
Credits 3.3 Lecture Hours.
Nonlinear wave-wave interactions in steep ocean waves significantly affect wave properties and long-term wave evolution. Strong and weak wave interactions and their respective effects on waves are studied, using various perturbation methods. Applications are shown through using Hybrid Wave Models to analyze wave measurements and predict wave loads on structures.
Prerequisite: OCEN 671.

OCEN 676 Dynamics of Offshore Structures
Credits 3.3 Lecture Hours.
Review of concepts of linear structural dynamic analysis for time and frequency domain simulations, functional design of off-shore platforms, pipelines, floating structures and moorings; environmental loading problems; hydrodynamic phenomena including wind and current interaction, vortex shedding and wave forces; structure-fluid interaction models.
Prerequisites: OCEN 671 or approval of the instructor.

OCEN 677 Environmental Fluid Mechanics
Credits 3.3 Lecture Hours.
Introduction to fluid and mass transport in naturally occurring flows; topics include molecular and turbulent diffusion; dispersion; river, estuary, and ocean mixing; dissolution boundary layers; tidal mixing; offshore wastewater outfalls; introduction to environmental quality numerical modeling.
Prerequisite: CVEN 311 or equivalent.

OCEN 678 Fluid Dynamics for Ocean and Environmental Engineering
Credits 3.3 Lecture Hours.
General conservation laws; Navier-Stokes equations; steady and unsteady Bernoulli’s equation; potential flow theory and basics of panel methods; laminar and turbulent boundary layer; dispersion and diffusion processes in laminar and turbulent flow; flow past a body of any shape.
Prerequisite: CVEN 311 or equivalent.

OCEN 681 Seminar
Credit 1.2 Lab Hours.
Reports and discussion of current research and selected published technical articles.

OCEN 682 Coastal Sediment Processes
Credits 3.3 Lecture Hours.
Sediment properties and size distribution, fluvial sediment transport equations, movement of material by the sea, review of pertinent wave theories, littoral drift, inlet stability, coastal protection structures, similarity in sediment transport, movable bed models, sediment tracing, Aeolian sand transport, case studies.
Prerequisite: OCEN 671 or approval of instructor.
OCEN 683 Estuary Hydrodynamics  
Credits 3. 3 Lecture Hours.
Development of applicable equations for tidal dynamics applied to real estuaries; technology for determination of mean velocities, circulation patterns, water depths, turbulent dispersion patterns, etc. for solution of environmental problems in estuaries; physical and mathematical models. 
Prerequisites: OCEN 678 or approval of instructor.

OCEN 685 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.
Special topics not within scope of thesis research and not covered by other formal courses.

OCEN 688 Marine Dredging  
Credits 3. 3 Lecture Hours.
Dredge pump selection; pump and system characteristics; cavitation; types of dredges; continental shelf and deep-ocean dredging; head loss in horizontal and vertical pipes for two and three-phase flow; design of disposal methods for dredged material; environmental effects of dredging. 
Prerequisite: Approval of instructor.

OCEN 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of ocean engineering. May be repeated for credit.

OCEN 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.