

# Ocean Engineering

<b>Ocean Engineering Core</b>		
Circuits 1	EEL 3111	3
Introduction to Electronics and Programming	EOC 4612C	3
Fundamentals of Engineering	EGN 1002	3
Statics	EGN 3311	3
Dynamics	EGN 3321	3
Strength of Materials	EGN 3331	3
Engineering Thermodynamics	EGN 3343	3
Engineering Materials 1	EGN 3365	3
Vibration Synthesis and Analysis	EGN 4323	3
Dynamic Systems	EGN 4432	3
Fabrication of OE Systems	EOC 2801	1
Ocean Engineering Fluid Mechanics	EOC 3123	4
Ocean Engineering Lab	EOC 3130L	3
Materials 1 – Marine Topics	EOC 3213	1
Acoustics for Ocean Engineers	EOC 3306	3
Structural Analysis	EOC 3410C	3
Ocean Thermal Systems	EOC 4193	3
Ocean Wave Mechanics	EOC 4422	3
Ocean and Environmental Data Analysis	EOC 4631C	3
Ocean Engineering Systems Control and Design	EOC 4804	3
Ocean Engineering Systems Control and Design Project	EOC 4804L	4
<b>Choose one of the following two junior elective courses:</b>		
Innovation in Sensing and Actuation Technology	EGN 4377C	3
Finite Element Analysis for Eng. Design	EGM 4350	3
<b>Choose two of the following four courses:</b>		
Ocean Structures	EOC 4412	3
Ship Hydrodynamics	EOC 4124	3
Underwater Acoustics	EOC 4307C	3
Marine Materials and Corrosion	EOC 4201C	3

<b>Non-Engineering Core</b> (grade of "C" or higher required)		
Intro to Programming in C	COP 2220	3
Engineering Graphics	EGN 1111C	3
Computer Applications in Eng. 1	EGN 2213	3
Computer Applications in ME 2	EML 4534	3
E. Math 1	MAP 3305	3
Oceanography	OCE 3008	3

<b>First Year, Fall (14 credits)</b>		
College Writing 1	ENC 1101*	3
General Chemistry 1	CHM 2045	3
General Chemistry 1 Lab	CHM 2045L	1
Calculus with Analytic Geometry 1	MAC 2311	4
Fundamentals of Engineering	EGN 1002	3

<b>First Year, Spring (14 credits)</b>		
College Writing 2	ENC 1102*	3
Oceanography	OCE 3008	3
General Physics for Engineers 1	PHY 2048	3
General Physics 1 Lab	PHY 2048L	1
Calculus with Analytic Geometry 2	MAC 2312	4

<b>First Year, Summer (10 credits)</b>		
Calculus with Analytic Geometry 3	MAC 2313	4
Intro to Programming in C	COP 2220	3
Foundations of Humanities		3

<b>Second Year, Fall (13 credits)</b>		
Engineering Math 1	MAP 3305	3
Physics for Engineers 2	PHY 2044	3
General Physics 2 Lab	PHY 2049L	1
Statics	EGN 3311	3
Engineering Graphics**	EGN 1111C	3

<b>Second Year, Spring (12 credits)</b>		
Computer Apps. In Eng. 1	EGN 2213	3
Dynamics	EGN 3321	3
Eng. Thermodynamics	EGN 3343	3
Ocean Engineering Lab	EOC 3130L	3

<b>Second Year, Summer (9 credits)</b>		
Circuits 1	EEL 3111	3
Strength of Materials	EGN 3331	3
Foundations of Humanities		3

<b>Third Year, Fall (15 credits)</b>		
Introduction to Electronics and Programming	EOC 4612C	3
Computer Applications in ME 2	EML 4534	3
Eng. Materials 1	EGN 3365	3
Dynamic Systems	EGN 4432	3
Foundations of Global (WAC)		3

<b>Third Year, Spring (14 credits)</b>		
Acoustics for Ocean Engineers	EOC 3306	3

Ocean Engineering Fluid Mechanics	EOC 3123	4
Ocean Thermal Systems	EOC 4193	3
Structural Analysis	EOC 3410C	3
Fabrications of OE	EOC 2801	1

<b>Third Year, Summer (9 credits)</b>		
Vibrations	EGN 4323	3
Finite Element Analysis for Eng. Design/or***	EGM 4350 or	3
Innovation in Sensing and Actuation Technology***	EGN 4377C	3
Foundation of Society and Human Behavior		3

<b>Fourth Year, Fall at SeaTech Campus (13 credits)</b>		
Materials 1 - Marine Topics	EOC 3213	1
Ocean Wave Mechanics	EOC 4422	3
Ocean & Env. Data Analysis	EOC 4631C	3
Ocean Systems Control & Design	EOC 4804	3
Foundation of Global Citizenship		3

<b>Fourth Year, Spring at SeaTech Campus (13 credits)</b>		
Ocean Engineering Systems Control and Design Project	EOC 4804L	4
Ship Hydrodynamics****	EOC 4124	3
Marine Materials and Corrosion****	EOC 4201C	3
Underwater Acoustics****	EOC 4307C	3
Ocean Structures****	EOC 4412	3
Foundation of Society & Human Behavior		3
<b>Total</b>		<b>136</b>

\* WAC (Gordon Rule) course.

\*\* Engineering Graphics should typically be taken at FAU

\*\*\* Chose one course from these two junior elective courses

\*\*\*\* Choose two courses from these four senior elective courses

# Ocean Engineering

[UNDERGRADUATE COURSES](#)/[LINK TO GRADUATE COURSES](#)

*(See Computer Science and Computer Engineering courses, this section)*

<b>Introduction to Logic Design (CDA 3201C) 4 credits</b>	<b>DELETE</b>
<b>C for Engineers (EEL 2161) 3 credits</b>	<b>DELETE</b>
<b>Introduction to Programming in C (COP 2220) 3 credits</b>	<b>ADD</b>
<b>Circuits 1 (EEL 3111) 3 credits</b>	

*(See Mechanical Engineering courses, this section)*

<b>Electro-Mechanical Devices (EGM 4045) 3 credits</b>	<b>DELETE</b>
<b>Computer Applications 1 (EGN 2213) 3 credits</b>	<b>ADD</b>
<b>Finite Element Analysis for Engineering Design (EGM 4350) 3 credits</b>	<b>ADD</b>

**Engineering Graphics (EGN 1111C) 3 credits**  
**Engineering Graphics (EGN 1111C) 3 credits**  
**Statics (EGN 3311) 3 credits**  
**Dynamics (EGN 3321) 3 credits**  
**Strength of Materials (EGN 3331) 3 credits**  
**Engineering Thermodynamics (EGN 3343) 3 credits**  
**Engineering Materials 1 (EGN 3365) 3 credits**  
**Dynamic Systems (EGN 4432) 3 credits**

<b>Marine Materials and Corrosion (EOC 4201C) 3 credits</b>	<b>MODIFY</b>
<b>Ship Hydrodynamics (EOC 4124) 3 credits</b>	<b>MODIFY</b>
<b>Underwater Acoustics (EOC 4307C) 3 credits</b>	<b>MODIFY</b>
<b>Ocean Structures (EOC 4412) 3 credits</b>	<b>MODIFY</b>

*(See Interdisciplinary courses, this section)*

**University Honors Seminar in Ocean Sciences (EOC 1930) 3 credits**

*Writing Across Curriculum (Gordon Rule)*

*Prerequisite: Permission of instructor*

A seminar in the University Honors Program on topics in ocean sciences.

**Fabrication of Ocean Engineering Systems (EOC 2801) 1 credit**

*Prerequisite: EGN 1111C*

A laboratory course directed to acquainting ocean engineering students with the basic machinery and machining processes used to fabricate parts of engineering systems for use in an ocean environment.

**Ocean Engineering Fluid Mechanics (EOC 3123) 4 credits**

*Prerequisites: EGN 3321 or equivalent, EGN 3343 or equivalent, EOC 3130L and EML 4534 all with minimum grades of "C"*

The first course of a two-semester study of incompressible-fluid flow and its application to ocean engineering with emphasis on fluid properties, hydrostatic forces, buoyancy and stability of floating bodies including metacentric height concepts, fluid dynamics, dimensional analysis, modeling, real flows in closed conduits and open channels, boundary-layers, lift and drag, turbo-machines, computational and experimental methods, resistance and propulsion of marine vehicles, and design problems. A grade of "C" or better is required for the major.

**Ocean Engineering Laboratory (EOC 3130L) 3 credits**

*Prerequisites: CHM 2045, CHM 2045L, PHY 2044 or PHY 2949, PHY 2049L and EGN 2213 all with minimum grades of "C"*

*Corequisite: MAP 3305*

Introduction to engineering laboratory methods and techniques with experiences in measurements, experiment planning, data recording, and laboratory report preparation. Five major lab experiences, including one or more at sea, are included.

**Materials 1 - Marine Topics (EOC 3213) 1 credit**

*Prerequisite: EGN 3365 or equivalent with minimum grade of "C"*

Introduction to atmospheric and submerged marine corrosion. Corrosion prevention methods. An introduction to cathodic protection. Introduction to fracture and fracture control in marine environments. Materials and devices for energy storage, primary/secondary batteries, fuel cells. Composite materials for marine applications.

**Acoustics for Ocean Engineers (EOC 3306) 3 credits**

*Prerequisites: EEL 3111, EOC 3130L and EML 4534, all with minimum grades of "C"*

Fundamentals of acoustics. Sound propagation in fluids; speech, hearing, noise, architectural acoustics, loudspeakers, microphones, transducers, underwater sound transmission.

**Structural Analysis (EOC 3410C) 3 credits**

*Prerequisite: EGN 3331 or equivalent with minimum grade of "C"*

Classical methods of analysis of beams, trusses, frames, cables, and arches for ocean and other structural applications. Approximate methods, moment area, virtual work, consistent deformations.

Add

**Introduction to Electronics and Programming (EOC 4612C) 3 credits**

*Prerequisites: EEL 3111, EOC 3130L, COP 2220, all with minimum grades of "C"*

Introduction to basic micro-controllers, sensors and motors. Simple switching and filtering circuits using transistors and op-amp, data communication and micro-controller programming will be covered.

Add

**Innovation in Sensing and Actuation Technology (EGN 4377C) 3 credits**

*Prerequisites: Electro-Mechanical Devices (EGM4045) or Introduction to Electronics & Programming (EOC4612L), OE Lab (EOC 3130L) or ME Lab (EML 4730L), all with minimum grades of "C"*

TBD

**Ship Hydrodynamics (EOC 4124) 3 credits**

*Prerequisites: EOC 3123 and EOC 4422 with minimum grades of "C"*

The second course of a two-semester study of incompressible-fluid flow and its application to ocean engineering with emphasis on: fluid properties, hydrostatic forces, buoyancy and stability of floating bodies including metacentric height concepts, fluid dynamics, dimensional analysis, modeling, real flows in closed conduits and open channels, boundary-layers, lift and drag, turbo-machines, computational and experimental methods, resistance and propulsion of marine vehicles, and design problems.

**Ocean Thermal Systems (EOC 4193) 3 credits**

*Prerequisites: EGN 3343 and EML 4534, all with minimum grades of "C"*

*Corequisite: EOC 3123*

Basic concepts of heat and mass transfer concepts with application to the ocean and ocean systems. Applications will include power cycles and heat exchangers in ocean systems. The interactive environmental processes involving solar radiation, convective ocean circulation, evaporation and mixtures will be considered.

**Marine Materials and Corrosion (EOC 4201C) 3 credits**

*Prerequisite: EGN 3365 or equivalent with minimum grade of "C"*

Materials selection for marine applications. Atmospheric and submerged marine corrosion. Corrosion prevention and fracture and failure analysis. Materials and devices for energy storage, primary/secondary batteries, fuel cells and electrochemical capacitors. Composite materials, strengthening mechanisms.

**Underwater Acoustics (EOC 4307C) 3 credits**

*Prerequisite: EOC 3306 with minimum grade of "C" or permission of instructor*

Sonar equations, underwater sound propagation, sonar system performance and design.

**Ocean Structures (EOC 4412) 3 credits**

*Prerequisite: EOC 3410C with a minimum grade of "C"*

Matrix and finite-element methods, environmental loading, stability, and dynamics of floating body applied to ocean structures.

**Ocean Wave Mechanics (EOC 4422) 3 credits**

*Prerequisite: EOC 3123 with minimum grade of "C"*

*Corequisite: EGN 4323 with minimum grade of "C"*

Small amplitude wave theory, finite amplitude waves, wave generation, wave forecasting, wave measurements. Wave force on fixed structures, floating bodies and moored bodies.

**Ocean and Environmental Data Analysis (EOC 4631C) 3 credits**

*Prerequisites: EOC 3130L, EML 4534*

Fourier transform applications to the processing of ocean engineering related types of signals. Introduction to probability and statistics. Digital processing techniques. Laboratory work involving analysis of ocean engineering-

signals using modern data acquisition systems.

**Ocean Engineering Systems Control and Design (EOC 4804) 3 credits**

*Prerequisites:* All 3000-level core engineering courses required by the department, excluding-EOC 3213, and including EOC 4193 and EGN 4432, each with minimum grades of "C"

*Corequisite:* EOC 4631C

Ocean engineering design, creativity and professionalism. Ocean systems design, simulation and control. Dynamic modeling, system trade-offs and system evaluation. Feasibility, preliminary and final design for project to be completed in EOC 4804L.

**Ocean Engineering Systems Control and Design Project (EOC 4804L) 4 credits**

*Prerequisite:* EOC 4804

Completion and execution of the system design project developed in previous EOC 4804 including detail design, final design, fabrication, testing, evaluation, and reporting of results in written and oral form.

**Directed Independent Study (EOC 4905) 1-3 credits**

*Prerequisite:* Permission of instructor

**Special Topics (EOC 4930) 1-4 credits**

*Prerequisite:* Permission of instructor

New developments in Ocean Engineering and related areas.

**Cooperative Education - Ocean Engineering 1 & 2 (EOC 4949) 1-3 credits**

*Prerequisite:* Successful completion of one semester of upper-level ocean engineering curriculum

Cooperative work-study with ocean oriented organizations for ocean engineering students who have completed at least one full semester of upper-level Ocean Engineering. On-the-job training and instruction. May be repeated once for credit. These credits do not count toward the bachelor's degree. *Grading:* S/U

**Introduction to Oceanography (OCE 2001) 3 credits**

(Note: Ocean Engineering majors may not take this course for credit.) A survey course exploring the origin of ocean basins, continents, sea water and physical, chemical, geological and meteorological oceanography.

**Oceanography (OCE 3008) 3 credits**

*Prerequisite:* CHM 2045, CHM 2045L with minimum grade of "C"

Nature of sea water; trace and major constituents; the ocean carbon, phosphorous, and nitrogen cycles; basins, continental shelf, deep ocean floor; thermal vents, manganese nodules, marine sediments; marine life; plate tectonics; estuaries and mixing processes; pollution; corrosion and biofouling; winds, waves, tides, currents and ocean circulation processes; energy (heat, light, sound); depth, temperature, salinity, and other physical effects.

**Ocean Engineering**

**Undergraduate Courses/link to graduate courses**

<b>Approved by</b>	<b>Date</b>
Department Chair <i>Jihad Khan</i>	<i>Oct. 24 - 2016</i>
College Curriculum Chair <i>D. J. ...</i>	<i>10/24/2016</i>
College Dean <i>...</i>	<i>10/24/2016</i>
UUPC Chair <i>J. S. ...</i>	<i>11/14/16</i>
Undergraduate Studies Dean <i>...</i>	<i>11/15/16</i>
UFS President _____	
Provost _____	

