

UGPC APPROVAL \_\_\_\_\_

UFS APPROVAL \_\_\_\_\_

CATALOG \_\_\_\_\_

## Graduate Programs—PROGRAM CHANGE REQUEST

DEPARTMENT: OCEAN AND MECHANICAL ENGINEERING (OME)

COLLEGE: ENGINEERING AND COMPUTER SCIENCE

PROGRAM NAME:

MS AND PHD PROGRAMS IN THE OME DEPARTMENT

**EFFECTIVE DATE**

(PROVIDE TERM/YEAR)

FALL 2016

PLEASE EXPLAIN THE REQUESTED CHANGE(S) AND OFFER RATIONALE BELOW AND/OR ATTACHED:

TO SATISFY SACS REQUIREMENTS, THE FOLLOWING CHANGES WERE MADE:

- MS PROGRAMS MUST CONTAIN AT LEAST 30 CREDITS OF 5000 AND 6000 LEVEL COURSES
- FOR THE COMBINED BS AND MS PROGRAMS, UP TO 9 CREDITS CAN BE DOUBLE COUNTED AS LONG AS THE FOLLOWING TWO CRITERIA ARE MET: A) MINIMUM 120 CREDITS FOR BS DEGREE, AND B) MINIMUM 30 CREDITS (5000-LEVEL OR HIGHER) FOR MS DEGREE. THEREFORE A MAXIMUM OF 9 CREDITS CAN BE DOUBLE COUNTED IF THE MINIMUM NUMBER OF CREDITS FOR THE COMBINED BS AND MS EXCEED 150 CREDITS.

THE PROGRAM CHANGES HAVE BEEN APPROVED BY THE DEPARTMENT GRADUATE COMMITTEE.

Faculty contact, email and complete phone number:

Tsung-Chow Su, Eng.Sc.D.  
561-297-3896

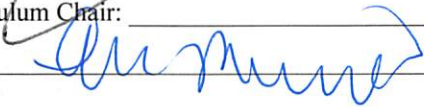
Consult and list departments that might be affected by the change and attach comments.

*None.*

Approved by:

Department Chair: 

College Curriculum Chair: \_\_\_\_\_

College Dean: 

UGPC Chair: \_\_\_\_\_

Graduate College Dean: \_\_\_\_\_

UFS President: \_\_\_\_\_

Provost: \_\_\_\_\_

Date:

2-25-16

2-26-16<sup>(2)</sup>

Email this form and syllabus to [UGPC@fau.edu](mailto:UGPC@fau.edu) one week before the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

## COMBINED PROGRAMS

### B.S.M.E. to M.S. Degree Program (Thesis Option)

Candidates seeking a combined program leading to both Bachelor of Science in Mechanical Engineering and Master of Science degrees with the thesis option must complete an approved program of at least 30 credits. Out of those 30, 9 credits [of graduate coursework \(5000 level or higher\)](#) will count toward both the bachelor's and master's degrees, as long as the following two criteria are met: (a) minimum 120 credits for the B.S. degree, and (b) minimum 30 credits (5000-level or higher) for the M.S. degree. Therefore a maximum of 9 credits can be double counted if the number of credits for both BS and MS exceeds 150.-

#### Prerequisite Coursework for Transfer Students

Students transferring to Florida Atlantic University must complete both lower-division requirements (including the requirements of the Intellectual Foundations Program) and requirements for the college and major. Lower-division requirements may be completed through the A.A. degree from any Florida public college, university or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the baccalaureate degree, students must also complete the prerequisite courses for their major as outlined in the [Transfer Student Manual](#).

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.

#### Degree Requirements

Candidates must complete the following:

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): [either MAP 4306, Engineering Mathematics 2, or EOC 5172, Mathematical Methods in Ocean Engineering 1](#);
3. Four technical electives (12 credits). [Two courses may be at the 4000 5000 level or higher](#);
4. Up to three courses may be taken while the student is an undergraduate;
5. Before the end of the student's third semester of full-time enrollment, a written thesis proposal must be submitted to the supervisory committee and defended in an oral examination;
6. A master's thesis (6 credits), which must be defended at an oral examination;
7. At least one-half of the credits must be at the 6000 level or above;
8. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

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### B.S.M.E. to M.S. Degree Program (Non-Thesis Option)

Candidates seeking a combined program leading to both Bachelor of Science in Mechanical Engineering and Master of Science degrees with the non-thesis option must complete an approved program of at least 33 credits. Out of those 33, 9 credits [of coursework \(3 credits at the 4000 level and 6 credits at the 5000 level or higher\)](#) will count toward both the bachelor's and master's degrees.

#### Prerequisite Coursework for Transfer Students

Students transferring to Florida Atlantic University must complete both lower-division requirements (including the requirements of the Intellectual Foundations Program) and requirements for the college and major. Lower-division

requirements may be completed through the A.A. degree from any Florida public college, university or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the baccalaureate degree, students must also complete the prerequisite courses for their major as outlined in the [Transfer Student Manual](#).

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.

#### Degree Requirements

Candidates must complete the following:

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): ~~either MAP 4306, Engineering Mathematics 2, or~~ EOC 5172, Mathematical Methods in Ocean Engineering 1;
3. Seven technical electives (21 credits). ~~Two~~ One courses may be at the 4000 level;
4. Up to three courses one at the 4000 level, and two at the 5000 level or higher, may be taken while the student is an undergraduate;
5. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from 11 courses in their program of study. The portfolio will be reviewed by the student's supervisory committee;
6. At least one-half of the credits must be at the 6000 level or above;
7. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

#### B.S.M.E. to M.S. Degree Program (Non-Thesis Option/Business Minor)

Candidates seeking a combined program leading to both Bachelor of Science in Mechanical Engineering and Master of Science degrees with the non-thesis option and with a minor in Business must complete an approved program of at least 36 credits. Out of those 36, 9 credits of coursework (3 credits at the 4000 level and 6 credits at the 5000 level or higher) will count toward both the bachelor's and master's degrees.

#### Prerequisite Coursework for Transfer Students

Students transferring to Florida Atlantic University must complete both lower-division requirements (including the requirements of the Intellectual Foundations Program) and requirements for the college and major. Lower-division requirements may be completed through the A.A. degree from any Florida public college, university or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the baccalaureate degree, students must also complete the prerequisite courses for their major as outlined in the [Transfer Student Manual](#).

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.

#### Degree Requirements

Candidates must complete the following:

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): ~~either MAP 4306, Engineering Mathematics 2, or~~ EOC 5172, Mathematical Methods in Ocean Engineering 1;

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3. Three technical electives (9 credits) [one at the 4000 level and two at the 5000 or 6000 level](#) from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section;
4. Up to three courses ([one at the 4000 level and two at the 5000 level or higher](#)) may be taken while the student is an undergraduate;
5. [Five business courses](#) (15 credits) as described at the beginning of this College of Engineering and Computer Science section;
6. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from 12 courses in their program of study. The portfolio will be reviewed by the student's supervisory committee;
7. At least one-half of the credits must be at the 6000 level or above;
8. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

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#### **MASTER'S PROGRAMS**

The Master of Science program has both thesis and non-thesis options. The thesis option requires a minimum of 24 credits of coursework and a thesis (6 additional credits). The non-thesis option requires a minimum of 33 credits of coursework. Requirements for the Ph.D. program are described later in this section.

Each student must complete a comprehensive and coordinated Plan of Study requiring depth in one or more of the following areas: mechanical systems, solid body mechanics, fluid mechanics, heat transfer, thermal/fluid systems, helicopter dynamics, materials, manufacturing, controls, robotics and CAD/CAM.

#### **Admission Requirements**

Usual admission requirements are as follows. Students with non-engineering bachelor's degrees, click [here](#) for additional requirements.

1. A baccalaureate degree in Engineering, Natural Science or Mathematics, but preferably in Mechanical Engineering and from a regionally accredited institution. A student who does not have a background in mechanical engineering should expect to take additional undergraduate mechanical engineering coursework.
2. Demonstrated proficiency in both written and spoken English. A student from a non-English-speaking country is required to take the Test of English as a Foreign Language (TOEFL) exam and achieve a score of at least 550 (CBT-213, iBT-79).
3. At least a 3.0 (of a 4.0 maximum) GPA in the last 60 credits attempted prior to graduation.
4. A score of 145 or higher on the verbal and 150 or higher on the quantitative portions of the Graduate Record Examination (GRE) or a combined score of 1000 or higher on the verbal and quantitative portions of the GRE taken prior to fall 2011. GRE scores more than five years old will not be accepted.
5. Petitions for admittance to the program will not be accepted when a student wishes to include more than five courses taken as a non-degree-seeking student.

#### **Admission to Candidacy**

A student is eligible to apply for candidacy when:

1. The student has completed a minimum of 9 credits as a graduate student.
2. The student has maintained a minimum GPA of 3.0 in all courses attempted as a graduate student.
3. The student has filed an approved Plan of Study for the degree program.

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Students should file for candidacy as soon as they are eligible. Usually, no more than 20 credits of completed work before admission to candidacy will be accepted toward a degree program. A student should be admitted to candidacy prior to beginning work on thesis.

#### **Degree Requirements**

Students must satisfy all of the University graduate requirements.

[Link to Master of Science with Major in Mechanical Engineering](#)

[Non-thesis Option and Non-thesis Option with a Business Minor](#)

[Link to Master of Science with Major in Mechanical Engineering and Engineering Management Minor](#)

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#### **Master of Science with Major in Mechanical Engineering (Thesis Option)**

*Candidates for the Master of Science degree with the thesis option must complete an approved program of at least 30 credits including:*

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): [either MAP 4306, Engineering Mathematics 2, or EOC 5172, Mathematical Methods in Ocean Engineering 1](#);
3. Four technical electives (12 credits); [two courses may be at the 4000-5000 level or higher](#);
4. Before the end of the student's third semester of full-time enrollment, a written thesis proposal must be submitted to the supervisory committee and defended in an oral examination;
5. A Master's thesis (6 credits), which must be defended at an oral examination;
6. At least one-half of the credits must be at the 6000 level or above;
7. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

#### **Master of Science with Major in Mechanical Engineering Non-Thesis Option and Non-Thesis Option with a Business Minor**

*Candidates for the Master of Science degree with the non-thesis option must complete an approved program of at least 33 credits including:*

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): [either MAP 4306, Engineering Mathematics 2, or EOC 5172, Mathematical Methods in Ocean Engineering 1](#);
3. Seven technical electives (21 credits); [two one course=](#) may be at the 4000 level or higher with the additional courses at the 5000- or 6000-level;
4. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from 11 courses in their program of study. The portfolio will be reviewed by the student's supervisory committee;
5. At least one-half of the credits must be at the 6000 level or above;

6. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

**Candidates for the Master of Science degree with the non-thesis option and a Business minor must complete an approved program of at least 36 credits including:**

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): [either MAP-4306, Engineering Mathematics 2, or EOC 5172, Mathematical Methods in Ocean Engineering 1](#);
3. Three technical elective courses (9 credits) at the 5000 or 6000 level from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section; [One may be at the 4000 level.](#)
4. **Five business courses** (15 credits) as described at the beginning of this College of Engineering and Computer Science section under the Business Minor heading;
5. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from 12 courses in their program of study. The portfolio will be reviewed by the student's supervisory committee;
6. At least one-half of the credits must be at the 6000 level or above;
7. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section.

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#### **Master of Science with Major in Mechanical Engineering and Engineering Management Minor**

This Master of Science degree program with a minor in Engineering Management is a 36-credit program consisting of advanced courses in mechanical engineering as well as courses in the College of Business. Candidates for this program should have an undergraduate degree in mechanical engineering with a minimum GPA of 3.0 and a score of 145 or higher on the verbal and 150 or higher on the quantitative portions of the Graduate Record Examination (GRE), or a combined score of 1000 or higher on the verbal and quantitative portions of the GRE taken prior to fall 2011. GRE scores more than five years old will not be accepted. Non-English-speaking candidates must have a minimum score of 550 on the TOFEL. Two reference letters and at least two years of professional experience are also required.

**Candidates for the Master of Science degree with Major in Mechanical Engineering and Engineering Management minor must complete an approved program of at least 36 credits including:**

1. Three core courses (9 credits): EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
2. A math course (3 credits): [either MAP-4306, Engineering Mathematics 2, or EOC 5172, Mathematical Methods in Ocean Engineering 1](#);
3. Three elective courses (9 credits) from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section. One may be at the 4000 level;
4. Three required management courses (9 credits) listed in the table below;
5. Two management elective courses (6 credits) from the table below;
6. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from 12 courses in their program of study. The portfolio will be reviewed by the student's supervisory committee;

7. At least one-half of the credits must be at the 6000 level or above;

8. At least one-half of the credits must be from the list of Mechanical Engineering courses shown in the Engineering and Computer Science Course Descriptions section. [Only one course at the 4000 level can be taken from the list of courses below.](#)

Required Management Courses (9 credits)		
Organizational Behavior	MAN 6245	3
Operations Management	MAN 6501	3
Project Management	MAN 6526	3

Management Elective Courses (6 credits)		
<i>Select two courses from the list:</i>		
Business Law for Honors Students	BUL 4424	3
Labor Relations	MAN 4401	3
Introduction to Small Business – Entrepreneurship	MAN 4802	3
Entrepreneurship, Creativity and Innovation	MAN 6299	3
Project Management	MAN 6526	3
Cross-Cultural Management and Human Resources	MAN 6609	3
International Business Operations	MAN 6614	3
Entrepreneurial Consulting Project	MAN 6806	1-4
Seminar in Entrepreneurship/Venture Management	MAN 6875	3
Global Environment of Management	MAN 6937	3

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#### DOCTORAL PROGRAM

##### Doctor of Philosophy with Major in Mechanical Engineering

The degree of Doctor of Philosophy with major in Mechanical Engineering is conferred by the University primarily in recognition of a demonstrated ability for independent and original research in the discipline. This ability must be supported by a comprehensive and coordinated plan of advanced study designed to provide a strong background in the fundamentals of mechanical engineering and related areas.

##### Admission Requirements

Minimum requirements for admission to doctoral studies in mechanical engineering are as follows:

1. A baccalaureate in engineering or a related field from a recognized institution;
2. An average of "B" or better in the last 60 credits of work attempted;
3. A score of 145 or higher on the verbal and 150 or higher on the quantitative portions of the Graduate Record Examination (GRE) or a combined score of 1000 or higher on the verbal and quantitative portions of the GRE taken prior to fall 2011. GRE scores more than five years old will not be accepted;
4. Demonstrated proficiency in both written and spoken English. A student from a non-English-speaking country is required to take the test of English as a Foreign Language (TOEFL) and achieve a score of at least 550 (CBT-213,

IBT-79);

5. Three letters of reference attesting to the student's potential for graduate studies in mechanical engineering;
6. Approval for admission by the Department of Ocean and Mechanical Engineering. Usually, an applicant admitted will have a strong record of achievement that exceeds the minimum requirements. It is anticipated almost every applicant will already have a master's degree, but it is not an absolute requirement. Approval for admission by the department will be based on an evaluation of the student's record in terms of likelihood of success in the Ph.D. program.

Admission to doctoral studies does not constitute admission to candidacy for the degree.

#### **Admission to Doctoral Status**

Admission to doctoral status is granted after students have:

1. Successfully completed General Examination 1;
2. Been accepted by a department faculty member willing to serve as their dissertation advisor;
3. Had their plan of coursework approved by their advisor, by the department graduate coordinator and by the Graduate College.

#### **Admission to Candidacy**

Admission to candidacy requires formulation of a supervisory committee approved by the department graduate coordinator as well as successful completion of General Examination 1.

#### **Degree Requirements**

A central requirement for the Ph.D. degree in Mechanical Engineering is submission and defense of a dissertation based upon original research in an area of focus acceptable to the student's supervisory committee. The completed dissertation must be approved by the committee, the department chair and the Graduate College. Additional requirements are:

1. A minimum of 51 credits of coursework beyond the baccalaureate degree, or 21 credits beyond the master of science degree;
2. No more than 3 credits of directed independent study may be used to satisfy the minimum 21 credits of coursework;
3. A minimum of 12 credits must be in Mechanical Engineering courses, including three core courses: EGM 6533, Advanced Strength of Materials; EML 6223, Mechanical Vibrations or EML 6930, Special Topics (Control); and EML 6930, Special Topics (Fluid Dynamics);
4. Doctoral thesis research of not less than 33 credits;
5. Successful completion of General Examination 1;
6. Successful completion of General Examination 2;
7. Submitted and defended a dissertation based on original research in the student's area of specialization. The supervisory committee, the department chair and the Graduate College must have approved the dissertation;
8. Satisfaction of all University regulations and requirements for the Ph.D. degree;
9. **General Examination 1:** After the completion of three Mechanical Engineering core courses and two elective courses, the student will be required to take a General Examination 1, or Ph.D. Qualifying Exam. The primary purpose of General Examination 1 is to evaluate the student's ability, not only to demonstrate a thorough knowledge of Mechanical Engineering course material, but to evaluate original thinking. The written examination will be in four parts: One covering the core courses, one covering elective subjects, one covering Mathematics and one is a review and analysis of a research paper. The exam on the three core courses will be three hours in duration and will require three problems to be answered. The electives exam will be a two-hour exam and will require one problem from two



elective courses to be answered. The exam on Engineering Mathematics will be a two-hour exam and the student must answer two problems. The research paper exam will be a two-day take home exam requiring the student to answer questions on a specific research paper. A new set of examinations will be prepared and questions and problems from previous examinations are not available to students. It is expected that the examination on the elective courses will focus on the student's area of specialization;

An overall grade of 70 percent on the written examination is passing. Students who score below 70 percent are given the option of re-taking exams on topic areas in which they scored less than 70 percent before the beginning of the next semester. The student must score 70 percent in each subject that is retaken. Alternatively the student may retake the entire exam when it is next offered. There would only be one opportunity to retake all or part of the exam. General Examination 1 is scheduled early in the fall semester and in the spring semester each year;

10. For students who have obtained the M.S. in Mechanical Engineering at FAU, General Examination 1 must be taken no later than the beginning of the third semester of Ph.D. study or at the first opportunity it is offered thereafter. Those admitted to the Ph.D. program directly after the B.S. degree may take the examination after completing 24 credits of graduate coursework. For students not so previously enrolled, the exam must be taken by the beginning of the fourth semester or as soon as it is offered thereafter;

11. **General Examination 2:** At an appropriate point in the student's graduate studies, normally within 12 months of passing General Exam 1, the student must complete General Examination 2. This is the dissertation proposal defense, in which students defend the choice of a dissertation topic and answer a series of questions on fundamental issues related to their research topic. Students must have passed General Examination 1, selected the dissertation topic, formed a supervisory committee and completed a literature survey prior to the dissertation proposal defense;

In General Examination 2, students should be prepared to demonstrate the ability to perform research on a topic approved by the supervisory committee by presenting a comprehensive literature survey combined with a critical analysis of the state of the art in the particular field. While this examination will be centered around the particular research area, it will not necessarily be limited to that subject. If unsuccessful in the examination, the student may, at the discretion of the department, either remain in the doctoral program and retake the examination at a later date or withdraw from the program. No more than two attempts will be permitted.

#### **Transfer Credits**

A maximum of 6 credits beyond the master's degree can be transferred into the student's program of study.

#### **Time Limits**

No credit that is more than 10 years old at the time a graduate degree is awarded may be counted toward that degree at Florida Atlantic University. In addition, the final examination must be completed within five calendar years of the admission to candidacy, otherwise the Qualifying Examination must be repeated.

#### **Residency Requirement**

Students are required to spend two semesters of full-time study beyond the master's degree in residence at Florida Atlantic University.

## COMBINED PROGRAM

### B.S.O.E. to M.S. Degree Program

The Department of Ocean and Mechanical Engineering offers a combined Bachelor of Science in Ocean Engineering to Master of Science degree program. [For students taking the thesis option, Up to 9 credits of graduate coursework 4000- or \(5000-level or higher\) elective \(not core\) courses](#) in the B.S.O.E. program may be counted for both the B.S.O.E. and M.S. degrees. [Students taking the non-thesis option may count 3 credits \(4000 level\) and 6 credits \(5000 level or higher\) towards both degrees.](#) With an approximate duration of five years, this combined program provides an attractive way for students to continue their graduate work.

#### Prerequisite Coursework for Transfer Students

Students transferring to Florida Atlantic University must complete both lower-division requirements (including the requirements of the Intellectual Foundations Program) and requirements for the college and major. Lower-division requirements may be completed through the A.A. degree from any Florida public college, university or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the baccalaureate degree, students must also complete the prerequisite courses for their major as outlined in the [Transfer Student Manual](#).

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.

#### Admission Requirements

To be eligible for the joint B.S.O.E./M.S. program, students should:

1. Have an overall GPA of above 3.0 and a GPA of above 3.25 in the last 60 credits of coursework completed at the time of admission. The GPA must be maintained until graduation from the B.S. degree;
2. Formally apply to the joint program, completing the admissions process at least one semester prior to the beginning of the M.S. portion of their program;
3. Choose either the thesis or non-thesis option for the M.S. part of the program.

Once admitted to the program, students begin taking graduate courses in their senior year that would apply to both the bachelor's and master's degree programs. A maximum of 9 credits of elective courses can be applied to both programs. Students in the joint program must maintain enrollment to remain in good standing. Students must also meet all the degree requirements of the graduate program, including core courses and prerequisites. Those students who complete the M.S. degree program within one year after the completion of their B.S.O.E. degree program will be presented with a certificate of recognition.

## MASTER'S PROGRAM

The graduate program is structured around a core of courses central to ocean engineering and encompassing the subjects of acoustics, corrosion, physical oceanography, hydrodynamics, advanced mechanics of materials, marine systems and advanced mathematics. This core provides, at an advanced level, the fundamentals required for engineering work in the ocean environment. Additional courses in the fields of acoustics, hydrodynamics, marine materials, offshore structures, coastal engineering and marine vehicles are offered to enable students to pursue areas of interest. A summer program is offered by the department for graduate students attending on a year-round basis.

#### Financial Aid

Most full-time graduate students in the department receive financial support, usually in the form of graduate assistantships. Graduate assistants normally work on research projects conducted in the department, and their project work usually serves as a basis for their thesis/dissertation. Teaching Assistantships also may be available.

From time to time, graduate assistants are assigned to help a faculty member conduct a course, but direct teaching assignments are not permitted and regular lecture assignments should not be anticipated. Departures from this rule may be considered only for exceptional students with demonstrated teaching abilities.

Several graduate assistantships are available each year and are awarded on the basis of the technical area of interest, the applicant's experience, overall academic record and letters of recommendation. The current stipends for assistantships are \$17,000 for master's students and \$22,000 for Ph.D. students, after admittance to candidacy, for 12 months of service on a half-time basis, plus tuition costs.

### **Application for Admission**

Students are encouraged to begin their graduate studies in the fall semester. Applications for admission should be initiated about one year in advance of the desired starting date and should be filed as early as possible, preferably in the early fall. Normally notification of admission is given several weeks after receipt of the completed application. Depending upon the student's background, certain preparatory courses may be required to make up for deficiencies before full admission to the program is granted. These courses may be taken at FAU.

Application material for admission to the degree programs in Ocean Engineering can be obtained by:

1. Accessing [www.fau.edu/graduate/](http://www.fau.edu/graduate/)

2. Sending a request to:  
Florida Atlantic University  
Graduate College, SU 80, Room 101  
777 Glades Road, P.O. Box 3091  
Boca Raton, Florida 33431-0991

3. Sending a request to:  
Graduate Program Administrative Assistant  
Department of Ocean and Mechanical Engineering, Bldg. 36, Rm. 182  
777 Glades Road, P.O. Box 3091  
Boca Raton, Florida 33431-0991

Up-to-date information is available [here](#).



### **Master of Science with Major in Ocean Engineering**

Three major paths to the Master of Science with major in Ocean Engineering are available to graduate students. Students with non-engineering bachelor's degrees, click [here](#) for additional requirements.

#### **Thesis Option**

The thesis option requires a minimum of 30 credits, including a minimum of 6 thesis credits. At least 15 of the credits must be taken from the Ocean Engineering core course list (see core course requirements section). In addition, 9 credits will be selected in consultation with the student's advisor. At least 15 of the 30 credits must be at the 6000 level. ~~Up to 9 credits may be at the 4000 level with the approval of the graduate committee.~~ Students electing the thesis option will be required to complete the thesis program, which includes successful defense and completion of the thesis.

#### **Non-Thesis Option**

This option requires a minimum of 33 credits. At least 15 of the credits must be taken from the Ocean Engineering core course list (see core course requirements section). In addition, 18 credits will be selected in consultation with the student's advisor. No thesis credits may be counted toward this degree. Additionally, ~~24-30~~ of the 33 credits must be at or above the 5000 level. ~~The remainder may~~ The remaining three credits of elective course may be at the 4000 level ~~with approval of the advisor.~~

#### **Master of Science with a Business Minor Option**

A non-thesis option, this program leads to a master's degree along with a minor in Business Administration. It requires a total of 36 credits. At least 15 of the credits must be taken from the Ocean Engineering core course list (see core course requirements section). In addition, 6 credits relating to the student's area of focus in ocean engineering must be selected and 15 credits must be selected from the College of Business approved course list

outlined under the [Business Minor](#) heading at the beginning of this College section.

The [Admissions](#) and [Degree Requirements](#) sections of this catalog contain statements of regulations that apply to all graduate students. Of particular interest is the information under the headings Graduate Admission Regulations and Graduate Degree Requirements. Statements referring to foreign language requirements do not apply to Ocean Engineering students; neither the Master of Science nor the Ph.D. degree requires foreign language proficiency.

### **Admission Requirements**

Specific admission requirements for Ocean Engineering are more stringent than the general FAU graduate admissions requirements.

A candidate for the master's program in Ocean Engineering must satisfy the following entry requirements:

1. A baccalaureate or equivalent degree in Engineering, Science or Mathematics;
2. A 3.0 (on a 4.0 scale) GPA or better in the last 60 credits of undergraduate work;
3. Scores of at least 145 (verbal) and 150 (quantitative) on the Graduate Record Examination (GRE).
4. Must demonstrate proficiency in both written and spoken English. Students from non-English-speaking countries are required to take the Test of English as a Foreign Language (TOEFL) and achieve a score of at least 550 (paper-based) or 213 (computer-based) or 79 (iBT);
5. All students will have a thesis or advisory committee during their studies. For thesis students, their advisor is the chair of the advisory committee. A thesis or advisory committee must be formed before a plan of study can be filed;
6. Students who enter the program without an assistantship will be assigned a mentor by the chair of the graduate committee. Students without an advisor are required to visit at least three faculty members during their first semester requesting to form an advisory committee. A report on the outcome of the faculty visits must be filed with the campus graduate coordinator.
7. Adherence to the policies and regulations and the graduate admission requirements of the University as outlined in this University catalog;
8. Conditional admission may be permitted if the above requirements are not met.



### **Degree Requirements**

The degree of Master of Science with major in Ocean Engineering will be awarded to candidates who have:

1. Complied with University graduate policies and regulations;
2. Satisfied the University's graduate degree requirements;
3. Satisfactorily completed the appropriate courses of study.

*And for the thesis option:*

4. Submitted and defended a thesis based on the student's original work in an area of focus.

*And for the non-thesis or minor in business options:*

4. At the time of application for degree, students must submit a portfolio to their advisor consisting of four graduate projects from courses in their program of study. The portfolio will be reviewed by the student's supervisory committee.

### **Program Options and Core Course Requirements**

Four program options are available to graduate students in Ocean Engineering with either the thesis or non-thesis option. These are shown in a subsequent section.

All graduate students, regardless of option or specialty, must complete the following core courses or must take a

satisfactory substitute course of similar content from another university or offer an appropriate substitute consistent with the student's specialty for approval by the supervisory committee by departmental petition.

Mathematical Methods in Ocean Engineering 1*	EOC 5172
Engineering Data Analysis	EOC 6635
Physical Aspects of Oceanography	OCP 6050
<b><i>In addition, two of the following five courses must be taken:</i></b>	
Advanced Strength of Materials**	EGM 6533
Special Topics	EOC 6934
Advanced Hydrodynamics 1	EOC 6185
Corrosion 1	EOC 6216C
Engineering Principles of Acoustics	EOC 6317C

\* Students with an advanced mathematics competency may obtain exemption upon entrance to the program for Mathematical Methods in Ocean Engineering 1 (EOC 5172) and/or Mathematical Methods in Ocean Engineering 2 (EOC 6174). These students must demonstrate to their advisor, using course descriptions, that the equivalent of five to six courses beyond calculus, including areas such as differential equations, advanced calculus, matrix theory, complex analysis and probability and statistics have been taken. Approval by the graduate programs committee is also required.

\*\* May be substituted with EOC 6934, Special Topics (Theory of Elasticity)

#### **Transfer Credits**

A maximum of 9 credits of graduate-level work earned at FAU as an undergraduate or while in non-degree status at FAU and a maximum of 6 credits earned at another recognized institution prior to admission to the Ocean Engineering graduate program may be transferred to a student's degree program subject to the following restrictions:

1. The student must present a transcript identifying the course, in which the student has earned a grade of "B" or better, along with a catalog/course description.
2. The course must not have been counted toward any other graduate or undergraduate degree awarded or to be awarded to the student. An exception exists in the B.S.O.E. to M.S. program ~~where where~~ [\(1\) for thesis students up to 9 credits \(5000 level or higher\) may be counted for both degrees, and \(2\) for students in the non-thesis option, 3 credits at the 4000 level and 6 credits at the 5000 level or higher may be counted towards both degrees.](#)
3. The student's advisor and the Ocean and Mechanical Engineering graduate program coordinator, who may seek the advice of other faculty if needed, will decide whether to accept or reject the course credit.

#### **Recency of Credits**

No credit earned ten or more years before the degree is awarded may be counted toward a graduate degree.

#### **Course Load**

All students choosing the thesis option and receiving financial assistance must be full-time students. This requires that they are registered for a minimum of 9 credits in the fall semester, 9 credits in the spring semester and 6 credits in the summer semester. All international students must be registered as full-time students. A maximum of 12 credits may be taken in a semester. In the graduation semester, the student may be allowed to take 1 credit.

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#### **Supervisory Committee**

All graduate students will be assigned an academic advisor who will assist the student in planning a course schedule for the program and will also approve all course selections, schedules and schedule changes.

By the end of the first semester or at the completion of 9 credits, the student, in consultation with the academic advisor, should make the following selections:

1. A particular program option. If selecting a thesis program, then:
  - a. Chair of the supervisory committee.
  - b. At least two other members for the supervisory committee.

The chair of the supervisory committee, who is normally the student's advisor, and at least two of the other members must be chosen from the Ocean and Mechanical Engineering faculty. Members from outside the department may be chosen for the supervisory committee with the permission of the department chair. The student should obtain the consent of other members to serve on the supervisory committee. Having obtained this permission, the names of the committee members should be submitted to the department chair. The committee acts as a unit to guide the student's degree program.

### **Plan of Study**

Students choosing the thesis option as part of the M.S. program should, as soon as practical after the selection of a supervisory committee, submit a formal Plan of Study to the committee. The plan must be listed on the form titled "Plan of Study for the Master's Degree (Form 6)" and will include all course and thesis work that the student expects to complete for the M.S. degree. The form must be submitted no later than the end of the second semester. Upon approval of the plan, the student will be admitted to candidacy for the M.S. Degree. The student is required to defend his/her thesis proposal before the end of the third semester.

For students electing the non-thesis option, the "Plan of Study for the Master's Degree (Form 6)" must still be completed and approved by the advisor, who will submit the plan to the Graduate College. For both the thesis and non-thesis options, it is required that the admission to candidacy form be completed and submitted at least one semester prior to the semester in which the student expects to graduate.

### **Fast Track Program**

The Department of Ocean and Mechanical Engineering offers an accelerated program option for the Master of Science with major in Ocean Engineering (with thesis) for qualified students who will be supported under research assistantships. The accelerated program allows a student to complete an M.S. degree in 12 months.

The objective of this option is to provide an opportunity for the student to earn a master's degree in one year, which translates into significant reductions in both time and expense, thus allowing the student to enter the workforce sooner, minimizing the financial impact of pursuing an M.S. degree. In order to achieve this goal, the program of study and thesis work must be well defined prior to the student starting the program of study. In addition to the normal requirements, students with an engineering core GPA of 3.5 or better, in conjunction with their prospective graduate studies academic advisor, are invited to submit a letter of intent to the graduate committee for consideration to be admitted into this program. The letter of intent should include an outline of the project and milestones to be reached by the end of each semester. Students admitted into the accelerated option are allowed to take a maximum of 12 credits per semester.

### **Thesis Work and Progress Reviews**

For those students who elect the thesis option, the first step, to be completed by the end of the third semester of full-time enrollment, is the submission of a written thesis proposal to the supervisory committee. This proposal must be approved by the supervisory committee before the student begins extensive work in the selected research area. In the proposal defense, the student presents and defends, as required, the planned research. Each semester after the proposal defense the committee will review the student's progress.

If at any time the progress in the student's research is found to be unsatisfactory, the supervisory committee will report to the department chair, inform the student in writing as to the nature of the difficulties and record the committee's opinion in the student's file. The student will then be given ample opportunity to improve performance and defend the student's position at a further review meeting held at the end of the semester. If no improvement has been demonstrated, the student's future program, including the continuation of stipend and tuition waiver, will be re-evaluated.

A minimum of two weeks prior to the anticipated thesis defense, the written thesis must be delivered to the department in the format described in the [Graduate Thesis and Dissertation Guidelines](#). The guidelines may also be obtained from the Graduate College or from the Ocean Engineering program. An announcement stating the thesis

topic and time and location of the defense will be provided to all department faculty and to the supervisory committee members one week prior to the scheduled defense. The announcement will also be posted in the department and/or mailed to all Ocean and Mechanical Engineering faculty, staff and students.

**Unsatisfactory Performance**

A graduate student whose academic performance is deemed unsatisfactory will be denied further registration in the department programs. Unsatisfactory academic performance is defined as failure to maintain a minimum 3.0 GPA in all FAU graduate program courses at the end of the second semester in the program (this would normally be 15 to 18 credits) or after any subsequent semester. Please note that this is more strict than the University requirement. A student who exhibits unsatisfactory performance in the Ocean Engineering graduate program is not precluded from applying to another program in the University. No graduate credit may be earned for courses completed with a "C-," "D+," "D," "D-," "F" or "U" (refer to the [Academic Policies and Regulations](#) section of this catalog), even if grades in other courses bring the average up to a satisfactory level. A student who withdraws from a course after the Drop/Add period may be required to repay any tuition benefits received.

**Master of Science Course Options**

The following are suggested course sequences for the four Master of Science (M.S.) thesis options. When suggested course(s) are not offered, equivalent course(s) as determined by the student's advisor may be taken. Although some of these program options recommend more than eight courses, students are required to take only eight courses (24 credits) to meet the minimum requirements.

**Top**

**M.S. with Major in Ocean Engineering  
Marine Materials and Offshore Structures Option**

<b>First Year, Fall</b>	
Advanced Strength of Materials	EGM 6533
Corrosion 1	EOC 6216C
Engineering Data Analysis	EOC 6635

<b>First Year, Spring</b>	
Introduction to Finite Element Methods	EGM 5351
or Advanced Fracture and Failure Processes 1	EOC 6157
Mathematical Methods in Ocean Engineering 1	EOC 5172
Elective	

<b>First Year, Summer</b>	
Fracture Mechanics	EML 6239
or Master's Thesis	OCE 6971
Physical Aspects of Oceanography	OCP 6050

<b>Second Year, Fall</b>	
Mechanics of Composite Materials	EGM 6562
or Special Topics (Theory of Elasticity)	EOC 6934
Master's Thesis	OCE 6971
Elective	

<b>Additional Courses</b>	
Mechanical Properties of Polymers	EML 6235

(spring semester)	
Special Topics, Flow Control (fall semester)	EOC 5934
Finite Elements Methods (spring semester)	EOC 6155
Advanced Hydrodynamics 1 (fall semester)	EOC 6185
Corrosion 2	EOC 6218C
Offshore Structures (spring semester)	EOC 6431
Special Topics, Nanostructured Materials	EOC 6934

**Top**

**M.S. with Major in Ocean Engineering  
Ship Design and Underwater Vehicles Option**

<b>First Year, Fall</b>	
Advanced Hydrodynamics 1	EOC 6185
Engineering Data Analysis	EOC 6635
Special Topics (Ship Structural Design)	EOC 6934

<b>First Year, Spring</b>	
Mathematical Methods of Ocean Engineering 1	EOC 5172
Hydrodynamic Aspects of Ship Design	EOC 6515
Intelligent Underwater Vehicles 1	EOC 6663

<b>First Year, Summer</b>	
Physical Aspects of Oceanography	OCP 6050
Special Topics	EOC 6934

<b>Second Year, Fall</b>	
Corrosion 1	EOC 6216C
Special Topics	EOC 6934
Thesis (6 credits)	OCE 6971

<b>Additional Courses</b>	
Introduction to Finite Element Method (spring semester)	EGM 5351
Advanced Computational Fluid Dynamics (spring semester)	EML 6726
Experimental Marine Hydrodynamics	EOC 6506C
Special Topics (May include Elements of High Speed Marine Vehicles Design)	EOC 6934

**Top**

**M.S. with Major in Ocean Engineering  
Hydrodynamics and Physical Oceanography Option**



<b>First Year, Fall</b>	
Advanced Hydrodynamics 1	EOC 6185
Engineering Principles of Acoustics	EOC 6317C
Engineering Data Analysis	EOC 6635

<b>First Year, Spring</b>	
Advanced Computational Fluid Dynamics	EML 6726
Mathematical Methods in Ocean Engineering 1	EOC 5172
Hydrodynamic Aspects of Ship Design	EOC 6515

<b>First Year, Summer</b>	
Special Topics	EOC 6934
Physical Aspects of Oceanography	OCP 6050

<b>Second Year, Fall</b>	
Mathematical Methods in Ocean Engineering 2	EOC 6174
Master's Thesis	OCE 6971

<b>Additional Courses</b>	
Turbulent Flow	EOC 6190
Advanced Ocean Wave Mechanics	EOC 6320
Experimental Marine Hydrodynamics	EOC 6506C
Special Topics (Ship Structural Design)	EOC 6934

**Top**

**M.S. with Major in Ocean Engineering  
Acoustics Option**

<b>First Year, Fall</b>	
Advanced Hydrodynamics 1	EOC 6185
Engineering Principles of Acoustics	EOC 6317C
Engineering Data Analysis	EOC 6635

<b>First Year, Spring</b>	
Mathematical Methods in Ocean Engineering 1	EOC 5172
Ocean and Seabed Acoustics	EOC 6312
Advanced Signal Processing	EOC 6630

<b>First Year, Summer</b>	
Special Topics	EOC 6934
or Master's Thesis	OCE 6971
Physical Aspects of Oceanography	OCP 6050

<b>Second Year, Fall</b>	
Mathematical Methods in Ocean Engineering 2	EOC 6174

Master's Thesis	OCE 6971
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<b>Additional Courses</b>	
Introduction to Finite Element Methods (spring semester)	EGM 5351
Mechanical Vibrations	EML 6223

**Top**

**M.S. with Major in Ocean Engineering  
Business Minor Option**

The following is a suggested course sequence for the Master of Science with major in Ocean Engineering, minor in Business. This is a non-thesis option only requiring a total of 36 credits.

<b>First Year, Fall</b>	
Financial Accounting Concepts	ACG 6027
Engineering Data Analysis	EOC 6635
Ocean Engineering Core	

<b>First Year, Spring</b>	
Mathematical Methods in Ocean Engineering 1	EOC 5172
Financial Management	FIN 6406
Global Environment of Management	MAN 6937
or Marketing Functions and Processes	MAR 6055

<b>First Year, Summer</b>	
Management of Information Systems and Technology	ISM 6026
Physical Aspects of Oceanography	OCP 6050

<b>Second Year, Fall</b>	
Ocean Engineering Core	
Ocean Engineering Core	

<b>Second Year, Spring</b>	
Ocean Engineering Elective	
Ocean Engineering Elective	

**Top**

**DOCTORAL PROGRAM**

## Doctor of Philosophy with Major in Ocean Engineering

The degree of Doctor of Philosophy with major in Ocean Engineering is conferred on a candidate by the University upon completion of comprehensive training and in recognition of the candidate's ability to independently and efficiently pursue research in ocean engineering.

The requirements for the degree include performing original research, preparing a dissertation describing this research and systematic advanced studies in engineering and the underlying sciences. This section discusses the details of the degree regulations.

### Admission Requirements

Applicants must have a master's degree in Engineering, Science or Mathematics from an accredited college or university. A student with outstanding scholastic achievement who holds only a baccalaureate degree may be admitted directly to the Ph.D. program. See later section for requirements.

1. Applicants must have a 3.0 GPA (on a 4.0 scale) or better in the last 60 credits of work attempted and must have an official transcript forwarded directly to the FAU Graduate College from each college-level institution attended;
2. Applicants must have scores of at least 145 (verbal) and 150 (quantitative) on the Graduate Record Examination (GRE);
3. Applicants must demonstrate proficiency in both written and spoken English. A student from a non-English-speaking country is required to take the Test of English as a Foreign Language (TOEFL) and achieve a score of at least 550 (paper-based) or 213 (computer-based) or 79 (iBT);
4. Applicants must submit to the Graduate College at least two letters of recommendation attesting to the student's ability to pursue with distinction a curriculum of advanced study and research in a chosen area;
5. Applicants should abide by the policies and regulations and the graduate admission requirements of the University as outlined in this University Catalog;
6. Conditional admission may be permitted if the above conditions are not met.

### Degree Requirements (Changes below effective spring 2016.)

The degree of Doctor of Philosophy in Ocean Engineering will be conferred on candidates who have fulfilled the following requirements:

1. Completed 54 credits of course and dissertation work after the M.S. degree (84 credits for those admitted to the Ph.D. directly after the B.S. degree). Of the 54 credits, 21 credits must be coursework;
2. Of the 21-credit minimum of coursework, at least 12 credits must be from the Ocean, **Mechanical\***, **Civil\*** or **Geomatics\*** Engineering programs. No more than 3 credits of directed independent study may be used to satisfy the 21-credit minimum;
3. A minimum of 33 dissertation credits. No more than 39 dissertation credits may be counted toward the total credit requirement for the Ph.D. degree;
4. A major program of research and advanced studies in ocean engineering;
5. **Unless otherwise stated**, a minimum of 9 credits in advanced mathematics or equivalent beyond the B.S. degree;
6. Successful completion of General Examination 1, a written comprehensive examination of coursework;
7. Successful completion of General Examination 2, a dissertation proposal defense;
8. Submitted and defended a dissertation based on original research in the student's area of specialization. The supervisory committee, the department chair and the Graduate College must have approved the dissertation;
9. Complied with the University's Graduate Policies and Regulations and satisfied the University's Graduate Degree Requirements.

\* Only available for the Sustainable Infrastructure Engineering option.

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**Core Course Requirements (Changes below effective spring 2016.)**

All graduate students, regardless of option or specialty, must complete the following core courses or must offer a satisfactory substitute course of similar content from another university or an appropriate substitute consistent with the student's specialty preference for approval by the supervisory committee.

<b>Common Core Courses (choose three)</b>	
Mathematical Methods in Ocean Engineering 1	EOC 5172
Engineering Data Analysis	EOC 6635
Physical Aspects of Oceanography	OCP 6050
Offshore Structures*	EOC 6431
<b><i>In addition, two of the following courses must be taken:</i></b>	
Advanced Hydrodynamics 1	EOC 6185
Corrosion 1	EOC 6216C
Engineering Principles of Acoustics	EOC 6317C
Special Topics	EOC 6934
Advanced Strength of Materials* or	EGM 6533 or
Advanced Mechanics of Materials*	CES 6107
Introduction to Finite Element Methods* or	EGM 5351 or
Finite Element Methods in Civil Engineering*	CES 6119
Infrastructure Maintenance and Management*	CGN 6616
Special Topics*	CGN 6930

\* Only available for the Sustainable Infrastructure Engineering option.

**Transfer Credits**

The doctoral program may accept for transfer 6 credits beyond the baccalaureate degree from other institutions to the student's degree program upon approval by the department and subject to the following restrictions:

1. The student must present a transcript identifying the course in which the student has earned a grade of "B" or better, along with a catalog/course description;
2. The course must not have been counted toward any other graduate or undergraduate degree awarded or to be awarded to the student;
3. The student's advisor and the Ocean Engineering graduate program committee, who may seek the advice of other faculty if needed, will decide whether to accept or reject the course credit;
4. Obtaining credit for a non-FAU course does not alter the total number of credits required for graduation;

Additional credits consistent with University policy may be considered for transfer subject to the restrictions above, if approved by the student's advisor.

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**Recency of Credits**

No credit earned ten or more years before the degree is awarded may be counted toward a graduate degree.

**Course Load**

Full-time graduate students are those who register for 9 or more credits during the fall and spring semesters and 6

credits during the summer. Students who wish to register for more than 15 credits for any semester must obtain approval in advance from the Graduate College. All students receiving financial assistance must satisfy these requirements, and all international students must be full-time students. In the graduating semester, the student may be allowed to take 1 credit.

### Residency Requirements

Candidates must satisfy the minimum residency requirement for the Ph.D. by completing beyond the master's degree either (1) 18 credits in one calendar year, or (2) 24 credits in no more than two calendar years on the SeaTech or Boca Raton campus of FAU. To satisfy University requirements, two semesters must be full-time, consisting of 9 credits in the spring or fall term and 6 credits in the summer term.

Candidates may be permitted to conduct all or part of their research in the field, in government or industrial laboratories or elsewhere off campus only if adequate staff, dissertation research supervision and facilities, as determined by the department, are available.

### Program Options (Changes below effective spring 2016.)

Students who wish to specialize in specific Ocean Engineering programs may pursue in-depth studies in the areas of marine materials, offshore structures and corrosion; hydrodynamics and physical oceanography; marine vehicles; acoustics and vibrations, and **sustainable infrastructure engineering**. Unless otherwise stated, the Ocean Engineering program graduate courses are 3 credits each, **and all** programs require a minimum of 9 credits in graduate-level mathematics or equivalent.

When suggested elective courses as listed in the following sections are not offered, equivalent courses as determined by the student's supervisory committee may be taken.

### Marine Materials, Offshore Structures and Corrosion Option

It is suggested that students in the Marine Materials and Corrosion Option take the following courses in addition to the core courses required for all Ocean Engineering Ph.D. students.

Advanced Fracture and Failure Processes 1	EOC 6157
Corrosion 1	EOC 6216C
Corrosion 2	EOC 6218C
Physical Metallurgy	EOC 6230
Special Topics (Theory of Elasticity)	EOC 6934
<i>Depending on a student's area of thesis research, elective courses may be chosen from, but are not necessarily limited to, the following:</i>	
<a href="#">Physical Chemistry 1</a>	CHM 3410
Advanced Topics in Physical and Theoretical Chemistry	CHM 6581
Introduction to Finite Element Methods	EGM 5351
Advanced Strength of Materials	EGM 6533
Mechanics of Composite Materials	EGM 6562
Mechanical Properties of Polymers	EML 6235
Fracture Mechanics	EML 6239
Signal Processing	EOC 6630
Special Topics (Nanostructured Materials)	EOC 6934

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### Hydrodynamics and Physical Oceanography Option

It is suggested that students in the Hydrodynamics and Physical Oceanography Option take the following courses in addition to the core courses required for all Ocean Engineering Ph.D. students.

Advanced Computational Fluid Dynamics	EML 6726
Advanced Hydrodynamics 1	EOC 6185
Turbulent Flow	EOC 6190
<i>Depending on a student's area of focus, the elective courses may be chosen from the following list together with other courses offered by the Ocean Engineering Department:</i>	
Mathematical Methods in Ocean Engineering 2	EOC 6174
Advanced Ocean Wave Mechanics	EOC 6320
Experimental Marine Hydrodynamics	EOC 6506C
Hydrodynamic Aspects of Ship Design	EOC 6515
Special Topics (Ship Structural Design; Flow Control)	EOC 6934

### **Marine Vehicles Option**

In addition to the core requirements, recommended courses include those below.

Intelligent Underwater Vehicles 1	EOC 6663
Marine Power Plant Design and Optimization	EOC 6808
Special Topics (Elements of High Speed Marine Vehicles)	EOC 6934
Other courses that may be taken will be determined by the student's area of study.	

### **Acoustics and Vibrations Option**

It is recommended that students in the Acoustics and Vibrations Option take the following courses in addition to the core courses required for all Ocean Engineering Ph.D. students.

Mechanical Vibrations	EML 6223
Advanced Hydrodynamics 1	EOC 6185
Ocean and Seabed Acoustics	EOC 6312
Signal Processing	EOC 6630
Special Topics	EOC 6934

Depending on the student's area of focus, elective courses may be chosen from the courses offered by the department as well as from supporting departments such as Civil Engineering, Computer Engineering, Electrical Engineering, Mathematics, Mechanical Engineering and Physics.

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### **Sustainable Infrastructure Engineering Option** (Effective spring 2016.)

It is recommended that students in the Sustainable Infrastructure Engineering Option take two more elective courses, as approved by the dissertation advisor, in addition to the core courses required for all Ocean Engineering Ph.D. students. This program requires a minimum of 3 credits in graduate-level mathematics or equivalent.

Depending on the student's area of focus, elective courses may be chosen from the courses offered by the Ocean Engineering as well as from supporting departments such as Civil Engineering, Computer Engineering, Electrical Engineering, Mathematical Sciences, Mechanical Engineering and Physics.

### **Supervisory Committee**

In consultation with the student and the advisor, a supervisory committee will be nominated by the department chair, approved by the dean of the College of Engineering and Computer Science and appointed by the Graduate College.

The supervisory committee shall consist of no fewer than four members selected from the Ocean and Mechanical Engineering faculty. Additional members can be from the Ocean and Mechanical Engineering Department, other departments, other universities or from industry.

The committee will include at least one person selected from the faculty from outside the discipline of the student's major. If the student elects or is required to select a minor, this member of the supervisory committee shall represent the discipline selected as the minor.

The supervisory committee should be appointed as soon as possible after the student has passed General Examination 1 and, in general, no later than the end of the second year of equivalent full-time study. Duties of the supervisory committee include:

1. To ensure that the student is aware of all regulations governing the degree. It should be noted, however, that this does not absolve the student of the responsibility of making inquiries regarding the regulations and procedures;
2. To discuss and approve the proposed course of study, dissertation research project and the student's plans for its execution;
3. To conduct and take part in the General Examination 2. No fewer than four faculty members shall be present for the General Examination 2, which must be given on campus;
4. To meet following General Examination 2 to review the research progress, the expected results and make suggestions for completion of the program;
5. To meet on campus when the dissertation is completed and conduct the final oral examination to assure that the dissertation is original research and a contribution to knowledge. No fewer than four faculty members shall be present with the candidate for this examination, but only members of the official supervisory committee are required to sign the dissertation. The supervisory committee must approve the dissertation;
6. To review the student's dissertation carefully. Before signing, each committee member must be sure that it is free of grammatical, editorial or technical errors.

#### **Plan of Study and Admission to Candidacy**

Admission to the doctoral program at FAU does not automatically constitute admission to candidacy for the degree. A Plan of Study for the Ph.D. degree (Form 5) must be submitted to the Graduate College before the end of the second semester of enrollment. The Graduate College will admit a student to candidacy for the Doctor of Philosophy degree after the following conditions have been met:

1. Admission to graduate school to work toward the doctoral degree;
2. Successful completion of the General Examination 1 (Ph.D. Qualifying Exam);
3. Selection of a dissertation faculty advisor and the formation of a supervisory committee;
4. Formulation and submission of a program of study that is approved by the department;
5. Recommendation of the supervisory committee and department chair.

**Note:** Students may not enroll for Ph.D. dissertation credits (EOC 7980) until they have been admitted to candidacy.

Following the successful completion of General Examination 1, the student must complete and submit the form "Admission to Candidacy for the Doctoral Degree (Form 8)." General Examination 1 and submission of admission to candidacy form should be completed at least two semesters before the beginning of the semester in which the degree is to be conferred. A student not admitted to candidacy before the beginning of the fourth academic year of graduate work at the University must petition through the College to the Graduate College for permission to register for additional work.



### **Coursework and Research**

The work for the Ph.D. degree must consist of research and advanced studies in ocean engineering. The student who previously obtained a master's degree will be required to complete a total of 54 credits of course and dissertation work for the Ph.D. At least 18 of the credits must be taken from the Ocean Engineering list of courses and all core course requirements must be satisfied. A minimum of 33 credits of doctoral dissertation research will be required. No more than 39 dissertation credits may be counted toward the 54-credit requirement. The remaining credits may be selected from the listing of OE courses, advanced mathematics courses, elective courses, directed independent study (DIS) or dissertation. A minimum of 9 credits of graduate-level mathematics must be satisfied. [Also, the supervisory committee may approve up to 6 credits at the 4000 level.](#)

### **B.S. to Ph.D. Program**

A student with outstanding scholastic achievement who holds only a baccalaureate degree (B.S.) may be admitted directly to the Ph.D. program in Ocean Engineering. The student with a B.S. will be required to complete a total of 84 credits of course and dissertation work for the Ph.D. At least 18 of the credits must be taken from the Ocean Engineering list of courses, and all core course requirements must be satisfied. A minimum of 33 credits of doctoral dissertation research will be required. No more than 39 dissertation credits may be counted toward the 84-credit requirement. The remaining credits may be selected from the listing of OE courses, advanced mathematics courses, elective courses, directed independent study (DIS) or dissertation. A minimum of 9 credits of graduate-level mathematics must be satisfied. [Also, the supervisory committee may approve up to 9 credits at the 4000 level.](#)

### **General Examination 1**

After the completion of three Ocean Engineering core courses and three elective courses, the student will be required to take a General Examination 1, or Ph.D. Qualifying Exam. The primary purpose of General Examination 1 is to evaluate the student's ability, not only to demonstrate a thorough knowledge of Ocean Engineering course material, but to evaluate original thinking. The written examination will be in three parts: One covering the core courses, one covering elective subjects and one is a review and analysis of a research paper. The exam on the three core courses will be four hours in duration and will require four problems to be answered. The electives exam will be a three-hour exam and will require one problem from each elective to be answered. The research paper exam will be a two-day take home exam requiring the student to answer questions on a specific research paper. A new set of examinations will be prepared and questions and problems from previous examinations are not available to students. It is expected that the examination on the elective courses will focus on the student's area of specialization.

An overall grade of 70 percent on the written examination is passing. Students who score below 70 percent are given the option of re-taking exams on topic areas in which they scored less than 70 percent before the beginning of the next semester. The student must score 70 percent in each subject that is retaken. Alternatively the student may retake the entire exam when it is next offered. There would only be one opportunity to retake all or part of the exam. General Examination 1 is scheduled early in the fall semester and early in the spring semester each year.

For students who have obtained the M.S. in Ocean Engineering at FAU, General Examination 1 must be taken no later than the beginning of the third semester of Ph.D. study or at the first opportunity it is offered thereafter. Those admitted to the Ph.D. program directly after the B.S. degree in Ocean Engineering at FAU may take the examination after completing 24 credits of graduate coursework. For students not so previously enrolled, the exam must be taken by the beginning of the fourth semester or as soon as it is offered thereafter.



### **General Examination 2**

At an appropriate point in the student's graduate studies, normally within 12 months of passing General Examination 1, the student must complete General Examination 2. This is the dissertation proposal defense, in which students defend the choice of a dissertation topic and answer questions on fundamental issues related to their research. The student must have passed General Examination 1, selected the dissertation topic, formed a supervisory committee and completed a literature survey prior to the dissertation proposal defense.

In General Examination 2, the student should be prepared to demonstrate the ability to perform research on a topic approved by the supervisory committee by presenting a comprehensive literature survey combined with a critical analysis of the state of the art in the particular field. While this examination will be centered around the particular research area, it will not necessarily be limited to that subject. If unsuccessful in the examination, the student may, at the discretion of the department, either remain in the doctoral program and retake the examination at a later date or withdraw from the program. No more than two attempts will be permitted.



### **Dissertation and Progress Reviews**

Following successful completion of the dissertation proposal defense (General Examination 2), the student is expected to engage in an intensive program of coursework and doctoral dissertation based on a major, original research project. During each subsequent semester, the student's supervisory committee will review the progress. If at any time the student's progress in the research is found to be unsatisfactory, the supervisory committee will report to the department chair, inform the student in writing as to the nature of the difficulties and record the committee's opinion in the student's file. The student will then be given ample opportunity to improve performance and defend the student's position at a further review meeting held at the end of the semester. If no improvement has been demonstrated, the student's future program, including the continuation of stipend and tuition waiver, may be reconsidered.

By the beginning of the semester in which the degree is to be conferred, a candidate for the Doctor of Philosophy degree must deliver a draft of the dissertation to the supervisory committee. Not less than two weeks after the submission of the first draft of the dissertation, the candidate is expected to give a seminar covering the results of the research; this seminar will be followed by a dissertation examination by the supervisory committee. The seminar should be given as early as possible, but not later than two months before the degree is to be conferred.

The Ph.D. dissertation final version must be approved by the supervisory committee and department chair and submitted to the dean of the College of Engineering and Computer Science at least one week prior to the due date for submission to the Graduate College. The candidate is responsible for allowing sufficient time for members of the supervisory committee to examine the dissertation. The dissertation must be delivered to the department in the format described in the [Graduate Thesis and Dissertation Guidelines](#). The guidelines may also be obtained at the Graduate College or from the Ocean Engineering program.

Upon receiving approval of the Graduate College and following completion of all other University requirements, the degree will be recommended. Application for the degree must be made one semester before the semester of graduation.

### **Unsatisfactory Performance**

A graduate student whose performance is deemed unsatisfactory will be denied further registration in the department programs.

Unsatisfactory performance is defined as failure to maintain a minimum 3.0 GPA in all FAU graduate program courses at the end of the second semester in the program (this should normally constitute 15 to 18 credits) or after any subsequent semester.

Please note that this is more strict than the University requirement. A student who exhibits unsatisfactory scholarship in the Ocean Engineering graduate program is not precluded from applying to another program in the University. No graduate credit may be earned for courses completed with a "C-" or lower even if grades in other courses bring the average to a satisfactory level. A student who withdraws from a course after the Drop/Add period may be required to repay any tuition benefits received.