

# UCF - Graduate Program Handbooks 2016-2017

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## Aerospace Engineering MSAE

Together, the [Graduate Student Handbook](#) and your graduate program handbook should serve as your main guide throughout your graduate career. The Graduate Student Handbook includes university information, policies, requirements and guidance for all graduate students. Your program handbook describes the details about graduate study and requirements in your specific program. While both of these handbooks are wonderful resources, know that you are always welcome to talk with faculty and staff in your program and in the Graduate College.

The central activities and missions of a university rest upon the fundamental assumption that all members of the university community conduct themselves in accordance with a strict adherence to academic and scholarly integrity. As a graduate student and member of the university community, you are expected to display the highest standards of academic and personal integrity.

Here are some resources to help you better understand your responsibilities:

- [Academic Honesty](#)
- [Academic Integrity Training](#) - Open to all graduate students at no cost

## Introduction

Welcome to UCF's Aerospace Engineering Masters Program! Promoting student success is a primary goal of the program. This serves the best interests of the students, the faculty, the program and the university. This graduate handbook is created to serve as a guide for all Mechanical Engineering Masters students (as well as faculty and staff) within the Materials Science and Engineering program. In this handbook we have consolidated and explained many of the details of the graduate student policies and procedures at UCF, as well as specific rules within the Mechanical, Materials, and Aerospace Engineering (MMAE) Department. The objective of the Masters handbook is to provide effective direction and guidance to graduate students that will lead to their success at UCF. Since the Graduate Catalog serves as the primary source for general policies, this handbook serves as a supplement, providing a more detailed and specific policy manual for students in the program.

The Masters program in Aerospace Engineering (MSAE) at UCF is distinguished by offering an outstanding selection of courses and by providing students with state-of-the-art research opportunities working with faculty mentors who are active in a wide range of sponsored research funded by local and national industry, as well as many federal agencies (NASA, NSF, DOD, DOE, DARPA, NRL, ARO, AHA, NIH...). The result is education through superior academics enriched by research experiences with a wide range of possible exposures ranging from traditional mechanical engineering research in energy and power generation systems, mechanical systems, design and controls to innovative work in nanotechnology, miniaturization, bioengineering and interdisciplinary research. MSAE students also have the opportunity to learn and train across multiple disciplines through the several innovative curriculum and interdisciplinary research facilities and research centers at UCF, including the Siemens Energy Center, the Florida Solar Energy Center (FSEC), the Advanced Materials Processing and Analysis Center (AMPAC), the Nanoscience and Technology Center (NSTC), and the Center for Research and Education in Optics and Lasers (CREOL).

Moreover, students are encouraged and expected to become engaged in the research project of our faculty members who are pursuing applied and fundamental research with local industry and government agencies such as Siemens Power Corporation, Lockheed Martin, and the Kennedy Space Center, as well as bioengineering research with Orlando Regional Health Services, the MD Anderson Cancer Center and many mid-size local companies whose work is at the cutting edge of the bioengineering industry. This approach provides distinctive advantage to UCF graduates in that they not only understand mechanical engineering-specific challenges but also have an overall understanding of engineered systems for many applications. The exposure that our students gain with their close contact with key personnel from local industry often provides good avenues for future employment.

The objective of this Handbook is to help students understand the process of completing a graduate education at UCF, provide information on resources that will help them develop academically and professionally, and to clearly define the responsibilities of the student to complete the degree program. The Handbook will also serve as a reference tool to guide graduate students through their graduate program and help students stay on track for degree completion. It will also help faculty and staff to better guide those students.

## Advising and Mentoring

Advising and mentoring are two of the greatest elements that bring success to a Masters student's career. The faculty advisor is a very important person in the life of a graduate student. The faculty advisor will, mostly likely, end up being the student's thesis committee chair. The Graduate Coordinator, however, will provide initial guidance new students on overall academic requirements and the program and university policies and procedures, while the faculty advisor serves as the primary mentor providing direction on research, advice on plan of study, and guidance on other areas of academic and personal life.

### Roles and Responsibilities:

- Faculty Advisor
  - The advisor helps the student select which courses to take.
  - The advisor (in consultation with the student) develops the student's plan of study
  - The advisor directs the student's research
  - The advisor reviews and approves the student's thesis or dissertation
  - The advisor often provides financial support for the student (based upon a research contract)
- Student
  - The student takes coursework as required, maintaining a minimum 3.0 GPA
  - The student maintains a full course load and works diligently to complete all requirements in a timely manner
  - The student (in consultation with the faculty advisor) develops a plan of study prior to completing the first 9 hours of coursework
  - It is the student's responsibility to keep informed of all rules, regulations, and procedures required for graduate studies. Graduate program regulations will not be waived or exceptions granted because students plead ignorance of the regulations or claim failure of the adviser to keep them informed.

The process in which a student should obtain a faculty advisor is by contacting the various Aerospace Engineering faculty and seeing where there is a common research interest. It is entirely the responsibility of the student to find an advisor. The student should do so within the first few weeks of their studies here at UCF. When there is no formal advisor, the Graduate Coordinator can serve as the default academic advisor.

The student-advisor relationship is a very important one for both parties and it is in their best interests to maintain this relationship and communicate openly. In those rare cases when either party desires a change, it is recommended that the need for a change be discussed with the program Graduate Coordinator.

## Plan of Study

The plan of study serves as an agreement between the student and the program, listing all courses necessary for completing degree requirements. Students, with their advisor, decide on a course of study for meeting the degree requirements and complete the plan of study form. The plan of study will then serve as a guide for the student to follow and also serve as a reference tool for

the MSAE program to track the academic progress of the student. The plan of study form is located on the MMAE website. This form should be prepared and signed by the adviser and student, then given to the graduate program assistant for review, MSAE Program Coordinator's approval, College approval and filing in the student's permanent file. It must comply with the student's relevant catalog.

Plans of study for students seeking a Masters degree should be on file by completion of the initial 9 hours of graduate coursework. The student and his/her advisory committee may make changes in the plan of study at any time with approval of the graduate program director. However, once established, the plan of study cannot be altered solely due to poor academic performance of the student.

All Masters students must maintain a minimum of 3.0 GPA for their graduate studies at UCF and on their plan of study coursework. If a student, with the agreement of their faculty advisor, wishes to make changes on their plan of study, they must follow the same process as submitting an initial plan of study. All signatures must be obtained again and the updated plan of study on file with the College.

## **Incomplete Grades**

A grade of "I" (incomplete) may be assigned by the instructor when a student is unable to complete a course due to extenuating circumstances, and when all requirements can clearly be completed in a short period of time following the close of regular classes. In all circumstances where an "I" grade is received, the student and faculty member must complete an agreement form that specifies how and when the incomplete grade will be made up. This agreement form is submitted with the instructor's grade rolls at the end of the semester, and a copy of this agreement is given to the college for further follow-up. For those students on financial assistance such as loans, the incomplete (I) must be made up by the agreement date. Failure to complete the agreed upon course requirements by the agreement date may result in the assignment of an "F" grade, or a "U" grade for thesis, dissertation, or research report hours. It is the student's responsibility to arrange with the instructor for the change of the "I" grade when the course requirements have been met.

All grades of "I" must be resolved within one calendar year or prior to graduation, whichever comes first. Incompletes in regular course work left unresolved will be changed to "F" if not changed in the allowed time period, and this time period may be sooner for those receiving financial assistance. The exception to this is enrollment in thesis (EAS 6971) and dissertation (EAS 7980) hours where the incomplete grade will be allowed to continue until graduation. UCF fellowship students cannot receive fellowship funds while holding incomplete grades and have thirty days from the issuance of the Incomplete to remedy it in order to continue to receive fellowship funds.

## **Graduation**

Graduation is the culmination of a challenging and arduous journey in the pursuit of a higher degree. To get to this pinnacle, it takes dedication, sacrifice, and hard work (and meeting all the bureaucratic processes and deadlines of UCF). In order to eliminate or reduce the potential for any unnecessary delays or complications with graduation, each student must be aware of and comply with all degree requirements and deadlines, and must submit all necessary forms on time.

## **Forms and Deadlines**

The following three documents are needed when applying to graduate: Intent to Graduate Form, Graduate Exit Survey, Final Plan of Study. They are to be submitted to the MSAE program assistant by the end of the semester PRIOR to the semester of graduation. For example, if a student is planning on graduating in Spring of a given year then those forms are due by the end of the preceding Fall semester. The forms can be found online or from the Academic Affairs office for the College of Engineering in ENG 1- Room 107. The final plan of study should be a typed, final document indicating every class that has been taken to satisfy the Masters requirements.

## **Overview of Important General Graduate Policies**

### **Student Responsibility to Keep Informed**

It is the student's responsibility to keep informed of all rules, regulations, and procedures required for graduate studies. Graduate program regulations will not be waived or exceptions granted because students plead ignorance of the regulations or claim failure of the adviser to keep them informed.

### **Definition of Formal Course Work**

**Formal courses** – Existing UCF courses that involve standard class instruction of a defined body of disciplinary knowledge. These courses involve interactions between a formal course instructor and the students that make up the class, and can be traditional, face-to-face courses, web courses, and media-enhanced courses. Such classes include both core/required courses as well as elective courses, seminar courses and independent study courses (EAS 6908), but are distinguished from the various categories of individualized research and scholarly courses.

**Independent Study (EAS 6908)** – A course of study created outside of the standard-format formal courses offered by the university. Independent Study must have a formally defined core of knowledge to be learned by the student(s). The core of knowledge to be learned by the student(s) must be specified in written form and approved by the student(s), the instructor, and the program coordinator prior to enrollment in Independent Study.

### **Definition of Research and Scholarly Work**

**Directed Research (EAS 6918)** – Graduate-level research/scholarly work. Research hours taken at the graduate level. These can include laboratory rotations in addition to standard research and scholarly endeavors directed toward completion of a project.

**Masters Thesis (EAS 6971)** – Research or scholarly hours taken and directed toward completion of a thesis.

### **Full-time Enrollment Requirements**

A full-time, degree-seeking, graduate student must take at least 9 credit hours in the fall and spring semesters. A half-time load is defined as enrolled in at least 4.5 credit hours in fall and spring terms. During the summer term, full-time is 6 credit hours and half-time is 3 credit hours. Graduate students receiving assistantships, tuition support, and fellowships must be enrolled full-time as degree-seeking students and maintain good academic progress.

For Masters students who have completed all course requirements and are registered for Masters Thesis (EAS 6971) hours only, full-time is 3 hours per semester until graduation. Such students must continue to enroll in at least three thesis hours each semester (including summers, without skipping a semester) until they successfully complete the thesis defense and graduate. Students who wish to enroll in part-time hours should consult their adviser.

### **Review of Academic Performance**

The primary responsibility for monitoring academic performance standards rests with the degree program. However, the academic college and the UCF College of Graduate Studies will monitor a student's progress and may dismiss any student if performance standards or academic progress as specified by the program, college or university are not maintained. Satisfactory academic performance in a program includes maintaining at least a 3.0 graduate status GPA (defined below) in all graduate work taken since admission into the program. Satisfactory performance also involves maintaining the standards of academic progress and professional integrity expected in a particular discipline or program. Failure to maintain these standards may result in dismissal of the student from the program. For more details on the process of academic probation and dismissal governed by the College of Graduate Studies, check out these [Academic Performance Policies](#).

### **Continuous Attendance**

Failure to enroll in three consecutive semesters (spring, summer, fall) is considered non-continuous enrollment.

Students are expected to maintain enrollment and to complete their graduate study expeditiously. A Special Leave of Absence should be requested when students anticipate they will not be enrolled for three consecutive semesters or more. If students are not enrolled in the university for a period of three consecutive semesters (spring, summer, fall) and do not obtain Special Leave

of Absence approval for such interruptions in their plans of study, they will be discontinued and must reapply for admission. Readmission is not guaranteed.

All (domestic and international) students taking thesis or dissertation hours are required to be continuously enrolled (including summer) until the thesis or dissertation is completed.

Because of U.S. government regulations, international students must be enrolled every fall and spring semester. For students in this category, Special Leave of Absence is only available for documented medical reasons.

A student without an approved Leave of Absence who breaks continuous enrollment will lose the option of fulfilling the degree requirements originally listed in his/her official plan of study already on file, and will instead fulfill the degree requirements listed in the graduate catalog in effect at the time the student resumes his/her attendance

### **Reminder to International Students Regarding Employment**

According to U.S. Citizenship and Immigration Services (USCIS) regulations, graduate students who are on an F-1 or J-1 visa may accept employment on campus without prior USCIS approval as long as students are enrolled full-time and employment does not interfere with their studies.

Graduate students who desire to engage in off-campus employment must be approved by the International Services Center (ISC) for Curricular Practical Training (CPT) prior to beginning the employment. CPT is defined as employment that is an integral part of the established curriculum and can be in the form of an internship or cooperative educational experience. In order to qualify for CPT, there are several requirements that must be met. Please speak with an adviser at the ISC for more information on these requirements and prior to engaging in off-campus employment.

During the fall and spring semesters, on-campus employment is limited to no more than 20 hours per week while school is in session. During the summer enrollment periods, on-campus employment is limited to no more than 30 hours per week for students who are enrolled full-time as graduate assistants. Such employment may be up to 40 hours per week during the summer if students are not enrolled full-time as graduate assistants. (Please note that all graduate assistants during the summer must enroll in a full-time course load.) Employment may also be up to 40 hours per week during vacation or other break periods. Please speak with an adviser at the ISC for clarification of these policies.

On-campus employment is not permitted after completion of the plan of study, unless the student is issued a Form I-20A-B to begin a new program and intends to enroll in the next regular academic term or session.

Students who received a bachelor's degree at one school and will start a master's degree or Masters at UCF are eligible to work during the summer at UCF as long as a Form I-20A-B was issued for the new master's or Masters program.

International students on an F-1 visa are eligible to apply for one year of optional practical training (OPT) after completion of their program.

For more information about the employment of international students, contact the International Services Center at 407-823-2337 or visit the office to speak with an adviser.

### **Aerospace Engineering Program Policies**

The primary objective of Masters work is to educate students to a point of excellence in conducting, disseminating, and applying scholarly research, with the explicit goal of making original, substantive contributions to their degree discipline. The advanced nature of Masters education requires student participation, debate, evaluation, and discussion of diverse ideas and approaches. Careful analysis, independent research, and greater understanding and application of ideas are also expected.

The Masters degree program requirements will consist of required and elective courses. It may also consist of seminars, directed research, independent study, and thesis research.

- Each Masters plan of study will include a minimum of 30 semester hours of graduate credit beyond the baccalaureate degree. These graduate credits must be taken as part of an approved graduate plan of study.

- All graduate credit in a Masters program must be at 5000 level or higher.
- At least one-half of the credit hours used to meet program requirements must be in 6000-level courses, including the allowed number of research and thesis hours.
- Only graduate-level credit with a grade of "C-" or higher may be used to satisfy degree requirements.

### Course Levels

**6000- Level Courses**—A minimum of 15 credit hours must be in 6000-level courses, which are designed, respectively, for Masters students.

### Time Limitation and Continuous Enrollment

The student has seven years from the date of admission to the Masters program to complete the dissertation and complete the Masters degree. No courses used in a plan of study can be older than seven years at the time of graduation. There is no time limitation for waived or transferred hours from a completed master's degree used toward a Masters degree.

Students who anticipate being out for an extended period of three consecutive semesters or longer should apply for a Special Leave of Absence. Students who do not maintain continuous enrollment without a Special Leave of Absence (see Continuous Attendance and Special Leave of Absence in the [General Graduate Policies](#)) must file for readmission to the university, although seven years is measured from when the student was first admitted to the program.

### Transfer Credits

Graduate transfer credits consist of hours completed at a regionally accredited institution (including UCF) or recognized international institution. Hours are eligible for transfer only if they meet the following criteria:

- Only graduate-level or higher courses may be accepted as transfer credits.
- Only courses with a grade of "B-" or higher may be transferred into a plan of study.
- Only hours that are no more than seven years old may be transferred, unless part of an earned graduate degree.
- Only formal course work hours, not thesis or research hours, may be accepted as transfer credits.

The acceptance of transfer credits must be approved by the MSAE Program Coordinator. It is the policy of the MSAE program that prior to a student taking their candidacy exam, they must make an appointment and have a joint meeting with the MSAE Program Coordinator and their advisor to discuss the courses that are eligible for transfer credit. Students are encouraged to have this meeting earlier, when they prepare their first plan of study form. Students should be aware that transfers are not allowed in the semester that the student wishes to graduate.

Students with international transfer credit from recognized international institutions may be required to obtain a WES or Joseph Silny evaluation. Graduate degree programs are permitted to accept up to nine hours (more may apply for some accelerated programs) of graduate-level course work taken by a student while in undergraduate status at UCF.

**All transfer credits toward a Masters degree must be finalized simultaneously with the approval of their plan of study.**

## Curriculum

The MSAE is awarded upon completion of a minimum of 30 credit hours. Students of the program must select a thesis or nonthesis option. All students are expected to identify an adviser and file an official degree program of study prior to the completion of nine semester hours of study. At least one-half of the required credits must be taken at the 6000 level. Students should consult the Graduate Director for assistance.

The program offers three tracks: Space Systems Design and Engineering, Thermofluid Aerodynamic Systems Design and Engineering, and Accelerated BS to MSAE. Students must be pursuing a track within the discipline. The MSAE is awarded upon completion of a minimum of 30 credit hours, which includes 12 credit hours of required courses, 6 credit hours of specialization,

6-9 credit hours of electives and depending on whether a student selects a thesis or nonthesis option. Thesis option students will be required a minimum of 6 credit hours and nonthesis students will be required to take the course EML 6085 Research Methods in MAE or EML 6918 Directed Research and make a presentation on a chosen topic before a committee of faculty members.

All students are expected to identify an adviser and file an official degree program of study prior to the completion of nine semester hours of study. At least one-half of the required credits must be taken at the 6000 level. Students should consult the Graduate Director for assistance.

For the Accelerated track, the BSAE is awarded after completion of 71 hours of engineering courses and all other university requirements, and the MSAE is awarded upon completion of the master's program. Courses designated in General Education Program and Common Program Prerequisites are usually completed in the first 60 hours (see engineering major requirements in the Undergraduate Catalog).

A student with an undergraduate degree outside of the selected departmental discipline may be required to satisfy an articulation program. Substitutions to the program of study must meet with the approval of the adviser and the department. More information is available at the department website listed above.

### **Thesis Option**

The thesis option requires 30 credit hours, at least half of which must be at the 6000 level and will include 6 credit hours of thesis credit. A student pursuing the thesis program may not register for thesis credit hours until an advisory committee has been appointed and the committee has reviewed the program of study and the proposed thesis topic.

The College of Engineering and Computer Science requires that all thesis defense announcements are approved by the student's adviser and posted on the college's [website](#) and on the [Events Calendar](#) of the College of Graduate Studies website at least two weeks before the defense date.

### **Nonthesis Option**

The nonthesis option is primarily designed to meet the needs of part-time students and requires 30 credit hours of course work, at least one-half of which must be at the 6000 level. In addition, students pursuing the nonthesis option are required to take EML 6085 Research Methods in MAE as part of their 30-credit-hour course requirement. For students who are not on campus and upon prior approval from the graduate coordinator, EAS 6918 Directed Research (3 credit hours) may be substituted as the student's independent learning experience. In the case substitution EAS 6918 is approved, a letter must be provided by the member of the faculty supervising the directed research certifying independent learning.

### **MAE Department Graduate Seminar Requirement**

The MAE Graduate seminar is a zero credit hour course (S/U) that is offered each Fall and Spring academic semesters. All MAE graduate students who are pursuing the MSME are required to register, participate, and receive a satisfactory (S) grade for two semesters of MAE Graduate seminar prior to graduation.

### **Equipment Fee**

Students in the Aerospace Engineering MSAE program pay a \$90 equipment fee each semester that they are enrolled. Part-time students pay \$45 per semester.

### **Track Curriculum: Accelerated BS to MSAE**

The BSAE is awarded after completion of 128 total undergraduate student credit hours including 71 hours of engineering courses and all other university requirements, and the MSAE is awarded upon completion of the master's program. Courses designated in General Education Program and Common Program Prerequisites are usually completed in the first 60 hours (see engineering

major requirements in the Undergraduate Catalog).

Up to 12 credit hours of approved 5000- and 6000-level courses of grades "B" (3.0) or better may be counted toward the BS and MS degrees. Additional notes on the Accelerated Undergraduate and Graduate Program in Aerospace Engineering:

- Students who change degree programs and select this major must adopt the most current catalog.
- Students must earn at least a "B" (3.0) in each undergraduate and graduate engineering course for them to be counted toward the major.

## Undergraduate Requirements

Please see the current edition of the Undergraduate Catalog and the College of Engineering website listed above for additional information about academics and accelerated programs.

## Graduate Requirements

For thesis option students, at least 18 credit hours beyond the 12 credit hours counted toward the undergraduate degree are required and must include 6 credit hours of thesis (EAS 6971); for the nonthesis option, the 18 credit hours need to include either EML 6085 Research Methods in MMAE (3 credit hours) or EML 6918 Directed Research (3 credit hours). The remaining credit hours can be selected from courses from other tracks. Accelerated Aerospace students must declare their interest in either the Space Systems Design and Engineering Track or the Thermofluid Aerodynamic Systems Design and Engineering Track by completing a Program of Study with their adviser.

Additionally, all students pursuing the thesis option must enroll in the following course:

- EML 5936 Mechanical and Aerospace Seminar (0 credit hours)

Students must register for the seminar course a minimum of two times during their graduate career in the master's program (thesis option). The students must also complete the course with a satisfactory (S) grade in both attempts. If the student does not complete the course with a satisfactory grade, the student will be asked to repeat the course to meet program requirements.

## Equipment Fee

Students in the Aerospace Engineering MSAE program pay a \$90 equipment fee each semester that they are enrolled.

## Track Curriculum: Space Systems Design and Engineering

The MSAE is awarded upon completion of a minimum of 30 credit hours, including 12 credit hours of required courses, 12 credit hours of elective courses selected from an approved list of courses, and an additional 6 credit hours in either a thesis or nonthesis option.

All students must identify an adviser and file an official degree program of study prior to the completion of 9 credit hours of study. The program of study must be approved by the department and therefore students should consult with the MMAE Graduate Director for assistance in filling out their program of study.

A student with an undergraduate degree outside of the selected departmental discipline may also be required to satisfy an articulation program. Substitutions to the program of study must meet with the approval of the adviser and the department.

## Prerequisites (or equivalent)

- MAP 2302 Differential Equations



- EML 3034C Modeling Methods in Mechanical and Aerospace Engineering
- EAS 4134 High-Speed Aerodynamics
- EAS 4105 Flight Mechanics or EAS 4400 Spacecraft Attitude Dynamics
- EAS 4200 Flight Structures or EAS 4210 Space Structural Dynamics

### Required Courses—12 Credit Hours

- EML 5060 Mathematical Methods (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 5311 System Control (3 credit hours)

Select one of the following courses:

- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)

### Elective Courses—12 Credit Hours

All students, both thesis and nonthesis, must complete at least 12 credit hours of electives. The following list are suggested electives to be taken in the program of study.

- EAS 6403C Attitude Determination and Control (3 credit hours)
- EAS 6415 Guidance, Navigation and Control (3 credit hours)
- EEL 6616 Adaptive Control (3 credit hours)
- EEL 6621 Nonlinear Control Systems (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6211 Continuum Mechanics (3 credit hours)
- EML 6233 Fundamentals of Fatigue Analysis (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 6155 Convection Heat Transfer (3 credit hours)
- EML 6157 Radiation Heat Transfer (3 credit hours)
- EAS 6808 Space Environment and Payload Instrumentation (3 credit hours)
- EEL 5432 Satellite Remote Sensing (3 credit hours)
- EEE 5542 Random Processes I (3 credit hours)
- EEL 5881 Software Engineering I (3 credit hours)

### Thesis Option—6 Credit Hours

The thesis option requires 30 credit hours, at least half of which must be at the 6000 level and will include 6 credit hours of thesis credit. A student pursuing the thesis program may not register for thesis credit hours until an advisory committee has been appointed and the committee has reviewed the program of study and the proposed thesis topic.

- EAS 6971 Thesis (6 credit hours)

Additionally, students pursuing the thesis option must enroll in the following course:

- EML 5090 Mechanical and Aerospace Seminar (0 credit hours)

Students must register for the course a minimum of two times during their graduate career in the master's program (thesis option). The students must also complete the course with a satisfactory (S) grade in both attempts. If the student does not complete the course with a satisfactory grade, the student will be asked to repeat the course to meet program requirements.

### Nonthesis Option—6 Credit Hours

The nonthesis option is primarily designed to meet the needs of part-time students and requires 30 credit hours of course work, at least one-half of which must be at the 6000 level. Students pursuing the nonthesis option are required to take one additional elective and take either EML 6085 Research Methods in MMAE (or XXX 6918 Directed Research, with approval)\* as part of their 30-credit-hour course requirement.

- Elective (3 credit hours)
- EML 6085 Research Methods in MMAE (3 credit hours)

\*For students who are not on campus and upon prior approval from the graduate coordinator, XXX 6918 Directed Research (3 credit hours) may be substituted as the student's independent learning experience. If the substitution of XXX 6918 is approved, a letter must be provided by the member of the faculty supervising the directed research certifying independent learning.

EML 6085 and XXX 6918 fulfill the independent learning requirement and either course is required for nonthesis students.

## Equipment Fee

Students in the Aerospace Engineering MSAE program pay a \$90 equipment fee each semester that they are enrolled.

## Track Curriculum: Thermofluid Aerodynamic Systems Design and Engineering

The MSAE is awarded upon completion of a minimum of 30 credit hours, including 12 credit hours of required courses, 12 credit hours of elective courses selected from an approved list of courses, and an additional 6 credit hours in either a thesis or nonthesis option.

All students must identify an adviser and file an official degree program of study prior to the completion of 9 credit hours of study. The program of study must be approved by the department and therefore students should consult with the MMAE Graduate Director for assistance in filling out their program of study. Both thesis and nonthesis options require 30 credit hours of courses and at least half of the credit hours in the program of study must be at the 6000 level.

A student with an undergraduate degree outside of the selected departmental discipline may be required to satisfy an articulation program. Substitutions to the program of study must meet with the approval of the adviser and the department.

## Prerequisites (or equivalent)

- MAP 2302 Differential Equations
- EML 3034C Modeling Methods in Mechanical and Aerospace Engineering
- EAS 4134 High-Speed Aerodynamics
- EAS 4300 Aerothermodynamics of Propulsion Systems or EML 4703 Fluid Mechanics II
- EAS 4105 Flight Mechanics
- EML 4142 Heat Transfer

## Required Courses—12 Credit Hours

- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)

Select one of the following courses:

- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 5311 System Control (3 credit hours)

## Elective Courses—12 Credit Hours

All students, both thesis and nonthesis, must complete at least 12 hours of electives from the list below after conferring with their adviser.

- EAS 5123 Intermediate Aerodynamics (3 credit hours)
- EAS 6185 Turbulent Flow (3 credit hours)
- EAS 5315 Rocket Propulsion (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6131 Combustion Phenomena (3 credit hours)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)
- EML 5402 Turbomachinery (3 credit hours)
- EML 5105 Gas Kinetics and Statistical Thermodynamics (3 credit hours)
- EML 6155 Convection Heat Transfer (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I (3 credit hours)
- EAS 5302 Direct Energy Conversion (3 credit hours)
- EAS 6807C Aerospace Measurements Instrumentation (3 credit hours)
- EML 6124 Two-Phase Flow (3 credit hours)
- EML 6726 Computational Fluid Dynamics and Heat Transfer II (3 credit hours)
- EML 6154 Conduction Heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6157 Radiation Heat Transfer (3 credit hours)
- EAS 5123 Intermediate Aerodynamics (3 credit hours)
- EML 6211 Continuum Mechanics (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EML 5546 Engineering Design with Composite Materials (3 credit hours)
- EML 6547 Engineering Fracture Mechanics in Design (3 credit hours)

## Thesis Option—6 Credit Hours

The thesis option requires 6 credit hours of thesis in addition to the required and elective courses listed above. A student pursuing the thesis program may not register for thesis credit hours until an advisory committee has been appointed and the committee has reviewed the program of study and the proposed thesis topic.

- EAS 6971 Thesis (6 credit hours)

Additionally, all students pursuing the thesis option must enroll in the following course:

- EML 5090 Mechanical and Aerospace Seminar (0 credit hours)

Students must register for the seminar course a minimum of two times during their graduate career in the master's program (thesis option). The students must also complete the course with a satisfactory (S) grade in both attempts. If the student does not complete the course with a satisfactory grade, the student will be asked to repeat the course to meet program requirements.

## Nonthesis Option—6 Credit Hours

The nonthesis option is primarily designed to meet the needs of part-time students and requires one additional elective and EML 6085 Research Methods in MMAE (or XXX 6918 Directed Research, with approval)\* as part of their 30-credit-hour course requirement.

- Elective (3 credit hours)
- EML 6085 Research Methods in MMAE (3 credit hours)

\* For students who are not on campus and upon prior approval from the graduate coordinator, XXX 6918 Directed Research (3 credit hours) may be substituted as the student's independent learning experience. If the substitution of XXX 6918 is approved, a letter must be provided by the member of the faculty supervising the directed research.

EML 6085 (or XXX 6918) fulfills the independent learning requirement for nonthesis students.

## Equipment Fee

Students in the Aerospace Engineering MSAE program pay a \$90 equipment fee each semester that they are enrolled.

## Timeline for Completion

### Optional Timeline for Students with Mechanical Background (thesis option)

#### 1st Year of Graduate Training

Fall	Spring	Summer
<ul style="list-style-type: none"> <li>• EML 5060 Math Methods in MMAE (3 hours)</li> <li>• Required course (3 hours)</li> <li>• Elective (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Required courses (6 hours)</li> <li>• Elective (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Optional</li> </ul>
Semester Total: 9 hours	Semester Total: 9 hours	Semester Total: 6 hours

#### 2nd Year of Graduate Training

Fall	Spring	Summer
<ul style="list-style-type: none"> <li>• EML 6971 Thesis (3 hours)</li> <li>• Electives (6 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• EML 6971 Thesis (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Optional</li> </ul>
Semester Total: 9 hours	Semester Total: 3 hours	Semester Total: 6 hours

### Optional Timeline for Students with Mechanical Background (non-thesis option)

#### 1st Year of Graduate Training

Fall	Spring	Summer
<ul style="list-style-type: none"> <li>• EML 5060 Math Methods in MMAE (3 hours)</li> <li>• Required course (3 hours)</li> <li>• Elective (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Required courses (6 hours)</li> <li>• Elective (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Optional</li> </ul>
Semester Total: 9 hours	Semester Total: 9 hours	Semester Total: 6 hours

#### 2nd Year of Graduate Training

Fall	Spring	Summer
<ul style="list-style-type: none"> <li>• EML 6085 Research Methods (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Elective (3 hours)</li> </ul>	<ul style="list-style-type: none"> <li>• Optional</li> </ul>

- Electives (6 hours)

Semester Total: 9 hours

Semester Total: 3 hours Semester Total: 6 hours

## Thesis Requirements

### University Thesis Requirements

**A thesis is optional for this program; the following information is intended for those choosing to complete a thesis.**

The College of Graduate Studies [Thesis and Dissertation](#) page contains information on the university's requirements for thesis formatting, format review, defenses, final submission, and more. A step-by-step completion guide is also available at [Completing Your Thesis or Dissertation](#).

All university deadlines are listed in the [Academic Calendar](#). Your program or college may have other earlier deadlines; please check with your program and college staff for additional deadlines.

The following requirements must be met by thesis students in their final term:

- Submit a properly formatted file for initial format review by the format review deadline
- Submit the Thesis and Dissertation Release Option form well before the defense
- Defend by the defense deadline
- Receive format approval (if not granted upon initial review)
- Submit signed approval form by final submission deadline
- Submit final thesis document by final submission deadline

Students must format their thesis according to the standards outlined at [Formatting the ETD](#). Formatting questions or issues can be submitted to the Format Help page in the [Thesis and Dissertation Services](#) site. Format reviews and final submission must be completed in the [Thesis and Dissertation Services](#) site. The Thesis Approval Form is also available in the Thesis and Dissertation Services site.

The College of Graduate Studies offers several thesis and dissertation [Workshops](#) each term. Students are highly encouraged to attend these workshops early in the thesis process to fully understand the above policies and procedures.

The College of Graduate Studies thesis and dissertation office is best reached by email at [editor@ucf.edu](mailto:editor@ucf.edu).

### Thesis Advisory Committee Membership (For Thesis Option)

Masters students must have a Thesis Advisory Committee prior to registering for Thesis hours. The Committee must consist of a minimum of three members: two must be faculty members of the graduate program faculty approved to direct dissertations, one of whom is qualified to serve as Chair, and one must be at large from outside the degree program. The committee Chair must be a member of the graduate faculty approved to direct dissertations. Adjunct faculty and off-campus experts may serve as the outside-the-college person in the committee. Program areas may further specify additional committee membership.

The College of Graduate Studies reserves the right to review appointments to advisory committees, place a representative on any advisory committee, or appoint a co-adviser. Graduate Faculty members must form the majority of any given committee. Additional information regarding the criteria for serving as a member, co-chair, or chair of a Dissertation Advisory Committee is provided in the updated [Graduate Faculty policy](#).

Committee membership must be approved by the Program Coordinator and submitted to the College of Graduate Studies. All members must have expertise in fields related to the dissertation topic. The UCF College of Graduate Studies reserves the right to review appointments to a thesis advisory committee, place a representative on any thesis advisory committee, or appoint a co-chair. A student may request a change in membership of the thesis advisory committee with the approval of the program director and re-submission to the College of Graduate Studies.

In unusual cases, with approval from the department Chair, a professor may serve as a co-chair of a committee. Joint faculty members may serve as committee chairs, but off-campus experts and adjunct faculty may not serve as committee chairs.

All members vote on acceptance or rejection of the dissertation proposal and the final dissertation. The dissertation proposal and final dissertation must be approved by a majority of the advisory committee.

### **Responsibilities of Members of Masters Advisory Committees**

See [Graduate Faculty policy](#) for the source of this text.

### **Responsibilities of all members of Masters advisory committees**

1. To meet at regular intervals at least once per year to: (i) discuss and approve the proposed dissertation research and the plans for carrying out research; and (ii) to assess progress toward the dissertation and give the student a yearly letter of evaluation in addition to S/U grades awarded for 6971 courses.
2. To review the results from the Review for Original Work through iThenticate.com.
3. To participate in the candidacy and/or dissertation prospectus examination. The entire committee shall be present for the oral part of the examination and it shall be conducted on campus, unless there is an accepted arrangement that has been approved by the graduate program committee.
4. To participate in the thesis defense to assure: (i) that the dissertation is acceptable as original research and a contribution to the discipline; and (ii) that it meets the standards of the university. No fewer than three faculty members, including all members of the advisory committee, shall be present with the student during the examination. Only members of the advisory committee may sign the thesis, and a majority must approve of the thesis. The thesis defense must be conducted on campus, unless there is an accepted joint degree program with another university that specifies a different arrangement that has been approved by the university.

### **Responsibilities of the chair (and co-chair) of Masters advisory committees**

1. In cooperation with the program director, to review the plan of study, the research, and all other degree requirements by meeting with the student early in the program and immediately after appointment as chair/co-chair.
2. To suggest to the student possible committee members who could serve on the advisory committee. To establish timelines for the research, set expectations, and evaluate the student progress based upon these.
3. To meet at regular intervals with the student to discuss the proposed dissertation research and the plans for carrying out research.
4. To review in a timely manner all written materials submitted by students and offer suggested revisions.
5. To meet once per year with the student and the dissertation advisory committee to assess progress towards the dissertation and give the student a yearly letter of evaluation in addition to S/U grades awarded for 7980 courses. The chair shall write this letter and send it to the program director and the College of Graduate Studies after consultation with the advisory committee.
6. To coordinate the ongoing efforts of the committee as its chair, and to participate fully in the responsibilities of the committee members as a member of the advisory committee.
7. To chair the candidacy and/or dissertation prospectus examinations. The entire committee shall be present for the oral portion of the examination and it shall be conducted on campus, unless there is an accepted arrangement that has been approved by the graduate program committee.
8. To chair the dissertation defense, ensure its proper conduct as described above, and submit to the program director for the student's records all necessary grades, forms and other materials.

### **Responsibilities of the external committee member of a dissertation advisory committee**

1. External committee membership will entail the full responsibilities of other committee membership
2. External committee members should bring specific disciplinary knowledge or research expertise to the committee.
3. External committee members may be appointed from outside of the university or outside of the college (if the committee is for a college-wide program). The external committee member may not be affiliated in any way with the department of the

committee, such as through joint or secondary joint appointments.

4. Graduate faculty scholars are external members.

It is the responsibility of the student, with agreement from their committee members, to schedule the date, time and location of their thesis defense. There are room reservation programs available online, which can be used to schedule a classroom and/or conference room on campus. The student can seek the assistance of the MSAE program assistant if they need assistance with scheduling the room facilities.

## Enrollment in Thesis Hours

The university requires all Masters students to take a minimum of 6 credit hours of Masters thesis hours; however, specific programs may require more than this minimum. Thesis research is considered to be a full-time effort, and enrollment in at least three Masters thesis (EAS 6971) credit hours constitutes full-time graduate status. Masters students who have begun taking Masters thesis hours (EAS 6971) must enroll in at least three dissertation hours each semester (including summers, without skipping a semester) and continue doing so until they complete the dissertation and graduate. Students wishing to enroll in part-time hours should consult with their adviser.

## Thesis Defense

### Scheduling a Room

It is the student's responsibility to schedule a room for their Masters defense. They must make sure that it can seat all who may be in attendance and is equipped with all the necessary media capabilities that would be required for their defense presentation. [Room reservation](#) assistance is available online through the College of Engineering. Students may also speak with the program assistant if needing guidance regarding choosing a room for their defense. Students must make sure to reserve the room well in advance of their defense date to ensure a quality location.

### Defense Announcement

All students, upon agreement and approval from the dissertation chair/faculty advisor, must supply a defense announcement TWO WEEKS prior to their defense date, as it will be posted on the College of Engineering website. The defense announcement should include the following information: date, time, location, committee member names, dissertation title, abstract and that the defense is open to the public. Below is an example of a well-formatted defense announcement.

### Committee Members Present

To participate in the thesis prospectus examination, the entire committee shall be present for the oral part of the examination. It shall be conducted on campus, unless there is an accepted joint degree program with another university that specifies a different arrangement that has been approved by the university.

### Paperwork/Forms Completed During Defense

Prior to every defense, the program assistant will organize all necessary paperwork that needs to be completed by committee chair and all other committee members during the student's Masters defense. It is the responsibility of the student to pick up these forms, have them filled out by the appropriate members, and submitted back to the program assistant for filing.

### Example of Masters Defense Announcement

Announcing the Final Examination of Ni Li for the degree of Master of Science

Time and Location: April 1, 2013 at 12:30 PM in Engineering 1 307

Title: Vision Based Trajectory Tracking of Space Debris in Close Proximity via Integrated Estimation and Control

The increasingly cluttered environment in space is placing a premium on techniques capable of tracking and estimating the trajectory of space debris. Unlike the debris smaller than 1 cm or larger than 10 cm, it is always a challenge for spacecraft or satellite mission designers to consider explicitly the ones ranged from 1 cm to 10 cm a priori. To tackle this challenge, in this paper a vision based debris' trajectory tracking method in close proximity is presented using two cameras on-board of satellites in a formation. Also to differentiate the target debris from other clutters, a data association technique is investigated. A two-stage nonlinear robust controller is developed to adjust the attitude of the satellites such that the desired field of view can be achieved for the target debris. Capabilities of the proposed integrated estimation and control methods are validated in the simulations.

Major: Aerospace

Educational Career:

Bachelor's of Engineering, 2008, Northwestern Polytechnical University

Committee in Charge:

Dr. Yunjun Xu, Chair, MMAE

Dr. Kuo-Chi Lin, MMAE

Dr. Marcel Ilie, MMAE

Approved for distribution by Dr. Yunjun Xu, Committee Chair, on December 3, 2011.

## Graduate Research

Research is a vital part of graduate education, particularly for Masters students. The development of research skills and the practice of good research ethics begin with graduate study. The Faculty serve a crucial role and are the primary source for teaching research skills and modeling research ethics.

1. In the Mechanical Engineering program, much of our research is carried out as a part of contracted sponsored research. Faculty obtain sponsored research from many different government agencies, and/or industry, and thus commit the university to doing certain research tasks. Students are typically hired to help the faculty conduct the research, and as such are contractually obligated to give their "best efforts" to accomplishing the research tasks. In most cases, students who are supported on contracts may use the results of their work as the basis for their thesis or dissertation.
2. It is important to be honest and ethical in conducting research as well as in taking classes. Report all data factually and completely. Please see the Graduate Catalog for policies pertaining to [Academic Behavior Standards](#).
3. Patents and inventions may arise from the faculty and graduate student research. UCF has clear guidelines and a [Patent Invention Policy](#) detailed in the UCF Graduate Catalog.
4. There are specific Laboratory Safety Procedures that must be followed by each student working in a lab. It is the program policy that each student is responsible for knowing and following the Safety Procedures. Please see the laboratories manager and/or your faculty advisor to get a copy of the Safety Procedures for the appropriate lab.

## Financial Support

Financial support is a major concern for graduate students, especially since many rely on financial support from the University to pursue graduate study. In combination, the College, the University, and the Department provide financial assistance to graduate students in several ways: (1) fellowships and scholarships are available to academically outstanding students, (2) Graduate Teaching Assistantships – GTA's (for grading or for lab teaching) are available in limited numbers, (3) Graduate Research Assistantships – GRA's (for assisting faculty with research) are more widely available in the MSAE program and depend on the research funding available to individual faculty.

### Assistantships

All students are expected to maintain a 3.0 GPA in their Plan of Study. They must not make any more than two 'C' grades, and those must be balanced with two 'A' grades. Students on contract are expected to work 10 to 20 hours per week on their assigned tasks (whether it be grading, lab teaching, or research), while they are maintaining satisfactory progress in completing their academic courses.



Students must meet their obligations to continue to receive their financial support. If the students are on time cards, the cards must be filled out properly and filed on time. If they are on contract, they must maintain satisfactory work as defined by their supervisor. Also, being on contract requires that the students register for the proper number of hours of classes in time to process tuition waivers and to meet other academic requirements.

The duration of financial support may vary from one academic year at a time to up to a 4-year renewable fellowship.

International students are expected to be here as full-time students, and may not work off campus except under very strict conditions. For more information regarding [International student employment](#), please see the Graduate Catalog.

### **Tuition Support and Health Insurance**

Tuition support and student health insurance correspond with a student's assistantship. If a student is working full-time (20 hours/week) as a Graduate Research Assistant (GRA) or a Graduate Teaching Assistant (GTA), they automatically qualify for health insurance and for re-classification as "in-state" for tuition purposes and the academic portion of their in-state tuition will either be waived (if GTA) or paid on their behalf by their research advisor (if GRA). [Tuition remission information](#) along with frequently asked questions concerning tuition waivers can be found on the College of Graduate Studies website. Information regarding paid [health insurance coverage](#) for qualifying graduate assistantship and university fellowship students can also be located on the College of Graduate Studies website.

### **Important Contacts**

International Services Center [www.intl.ucf.edu](http://www.intl.ucf.edu).

Financial Aid, [finaid.ucf.edu](http://finaid.ucf.edu).

UCF Graduate Catalog, [www.graduatecatalog.ucf.edu](http://www.graduatecatalog.ucf.edu).

## **Graduate Student Associations**

**The Graduate Student Association (GSA)** is UCF's graduate organization committed to enrich graduate students' personal, educational and professional experience. To learn more or get involved, please visit [www.gsa.ucf.edu](http://www.gsa.ucf.edu). For individual department or graduate program organizations, please see program advisor.

## **Professional Development**

In this section, we identify university resources available to students for professional development. A graduate student's professional development goes beyond completing course work, passing exams, conducting research for a thesis or dissertation, and meeting degree requirements. Professional development also involves developing the academic and non-academic skills needed to become successful in the field of choice. UCF has an active professional development program for graduate students, including the following programs:

- Preparing Tomorrow's Faculty Program, sponsored by Faculty Center for Teaching and Learning
- GTA Certificate Program, sponsored by Faculty Center for Teaching and Learning
- Career Services and Experiential Learning
- Pathways to Success Workshops
- Graduate Research forum, sponsored by the College of Graduate Studies and GSA
- Facilitate summer internships for graduate students and inform students of such opportunities.

The following are Special Award Recognition programs:

- Award for Excellence by a Graduate Teaching Assistant
- Award for Excellence in Graduate Student Teaching
- Award for the Outstanding Master's Thesis

Students have many opportunities to further their careers while pursuing graduate work here at the university. While working with faculty advisors, they are able to present papers and posters at various conferences, develop their grant writing skills while assisting with proposals and gain notoriety through their publications.

## Job Search

UCF's Career Services department offers a wide range of programs and services designed to assist graduate students. These services include evaluation and exploration of career goals, preparation for the job search and job search resources. To learn more, visit their website at [www.career.ucf.edu](http://www.career.ucf.edu).

## Forms

- [College of Engineering and Computer Science- Forms](#)  
A list of general forms and files within the college.
- [College of Graduate Studies Forms](#)  
A listing of general forms and files for graduate students including student services and records and graduation forms.
- [Special Registration Access Form](#)  
Also available in the Academic Affairs office, ENG 1 - Room 107. All special registration access forms (for Independent Study, Directed Research, Masters Research and Dissertation) are required to be submitted to CECS at least one week prior to the start date of classes. The pain of not making this deadline is that late registration fees may be assessed on the student.

## Useful Links

- [College of Graduate Studies links](#)
- [UCF Library](#)
- [Office of Student Involvement](#)
- [University Writing Center](#)
- [The Counseling Center](#)
- [UCF Academic Calendar](#)
- [Thesis and Dissertation Information](#)
- [Graduate Student Association](#)
- [Graduate Student Center](#)
- [Pathways to Success](#)

[Graduate Catalog](#) | [About Graduate Handbooks](#) | [Events Calendar](#) | [Apply Now!](#)



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