Graduate Council Curriculum Subcommittee

January 31, 2007
12:00, MH 243

AGENDA

1. Approval of minutes from January 17 meeting

2. Communicative Disorders tabled courses – 2 special topics (page 1) and 3 courses (page 3). Courses are highlighted in yellow on course agenda handout.

3. BS to MS Engineering Programs

4. Course change to Nonprofit Management Graduate Certificate

5. Course changes to MSN Nursing Leadership and Management track

6. Curriculum change and catalog change for RN-MSN Program (NP, CNS, Nursing L&M Tracks) and (CNL and NEd tracks)

7. Courses and special topics

Aerospace Engineering

Description

The Aerospace Engineering program offers a Master of Science in Aerospace Engineering (M.S.A.E.) degree with two tracks: Space Systems Design and Engineering and Thermofluid Aerodynamic Systems Design and Engineering.

Space Systems Design and Engineering includes the fields of controls and dynamics, space environment, instrumentation and communications, structures and materials, thermal analysis, and design.

Thermofluid Aerodynamic Systems Design and Engineering includes the fields of controls and dynamics, aerodynamics, propulsion, thermal analysis, and design.

Degrees Offered

Master of Science in Aerospace Engineering

- Space Systems Design and Engineering Track
- Thermofluid Aerodynamic Systems Design and Engineering Track

Admission

The Master of Science degree in Aerospace Engineering (M.S.A.E.) is intended primarily for students with a B.S. degree in Aerospace Engineering or a closely related discipline obtained from a recognized and accredited institution. Minimum requirements for admission to regular status are a 3.0 grade point average (4.0=A) in the last 60 attempted hours of undergraduate study at an accredited institution and a competetive GRE score, and for international students (except those who are from countries where English is the only official language or those who have earned a degree from an accredited U.S. college or university), a score of 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL). The university requires submission of official GRE scores and transcripts of all academic work.

In certain circumstances a provisional admission may be extended to students who have a GPA below 3.0 and a less competetive GRE score but otherwise meet university requirements. Additional courses may be required to correct deficiencies. Students should contact the MMAE Graduate Coordinator for further information.

The College of Engineering and Computer Science requires that you fill out a pre-application form (www.graduate.cecs.ucf.edu) before you complete the application for graduate admission. The deadlines for the pre-application form can be found on the Prospective Student Page on the College of Engineering and Computer Science website.

Application Due Dates

All students applying for fellowships must apply by the Fall Priority deadline date.

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Master of Science in Aerospace Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Space Systems Design and Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15
Thermofluid Aerodynamic Systems Design and Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15

International Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Master of Science in Aerospace Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Space Systems Design and Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1
Thermofluid Aerodynamic Systems Design and Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1

International Transfer Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Master of Science in Aerospace Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Space Systems Design and Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15
Thermofluid Aerodynamic Systems Design and Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15

Master of Science in Aerospace Engineering

General College Requirements

Minimum Hours Required for M.S.A.E.—30-36 Credit Hours

The program offers two tracks: Space Systems Design and Engineering and Thermofluid Aerodynamic Systems Design and Engineering. Students select one of these tracks upon entering the program, and also 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.

Thesis Option—30 Credit Hours

- Required Courses (Core)—12 credit hours
- Specialization Courses (at least two)—6 credit hours
- Electives (maximum of two)—6 credit hours. (Electives should be selected in consultation with adviser and taken from optional course list and/or other support course list.)
- Thesis—6 credit hours

Nonthesis Option—36 Credit Hours

- Required Courses (Core)—12 credit hours
- Specialization Courses (at least two)—6 credit hours
- Electives—15 credit hours. (Electives should be selected in consultation with adviser or Graduate Director and taken from optional course list and/or other support course list.)
- The nonthesis option requires students to take the course EML 6085 Research Methods in MMAE, and to make a presentation on a chosen topic before a committee of faculty members.

Space Systems Design and Engineering Track

Prerequisites (or equivalent) Requirements for This Track

- MAP 2302 Mathematics Through Different Equations
- EML 3034 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

- EAS 5407 Mechatronic Systems (3 credit hours)
- EAS 6507 Topics of Astrodynamics (3 credit hours)

- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 6067 Finite Elements in Mechanical, Materials, and Aerospace Engineering I or EML 6XXX Modern Control Systems (currently EML 5311) (3 credit hours)

Select one of the following specializations.

Controls/Dynamics Specialization

- EAS 6403C Attitude Determination and Control (3 credit hours)
- EML 5271 Intermediate Dynamics (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 6808 Analysis and Control of Robot Manipulators (3 credit hours)

Structures/Materials/Thermal Specialization

- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5211 Continuum Mechanics (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 6067 Finite Elements in Mechanical, Materials and Aerospace Engineering I (3 credit hours)
- EML 6155 Convention Heat Transfer (3 credit hours)
- EML 6157 Radiation Heat Transfer (3 credit hours)

Space Environment/Instrumentation/Communications Specialization

- EAS 6808 Space Environment and Payload Instrumentation (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 5311 System Control (3 credit hours)
- EEL 5432 Satellite Remote Sensing (3 credit hours)
- EEL 5542 Random Processes I (3 credit hours)
- EEL 5881 Software Engineering I (3 credit hours)
- EEL 6530 Communication Theory (3 credit hours)

Suggested Electives (any specialization)

- EAS 6405 Advanced Flight Dynamics (3 credit hours)
- EMA 6628 Materials Failure Analysis (3 credit hours)
- EML 6227 Nonlinear Vibration (3 credit hours)
- EML 6547 Engineering Fracture Mechanics in Design (3 credit hours)
- EML 6808 Analysis and Control of Robot Manipulators (3 credit hours)
- Any course in the MMAE curriculum or other approved graduate course (3 credit hours)

Thermofluid Aerodynamic Systems Design and Engineering Track

Prerequisite (or Equivalent) Requirements For This Track

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

Required Courses—12 Credit Hours

- EAS 6138 Advanced Gas Dynamics (3 credit hours)
- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5131 Combustion Phenomena (3 credit hours)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)

Specialty Courses

- EAS 5123 Intermediate Aerodynamics (3 credit hours)
- EAS 6185 Turbulent Flow (3 credit hours)
- EAS 5315 Rocket Propulsion (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) or EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I

Suggested Electives

- EAS 5302 Direct Energy Conversion (3 credit hours)
- EAS 6807 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)
- Any course in the MMAE curriculum or approved graduate course

Other Support Course List

For both tracks and all specializations

- CDA 5106 Advanced Computer Architecture I (3 credit hours)

- COT 5405 Design and Analysis of Algorithms (3 credit hours)
- EAS 5315 Rocket Propulsion (3 credit hours)
- EAS 5535 Engineering Design for Aerospace Vehicles (3 credit hours)
- EEL 5173 Linear Systems Theory (3 credit hours)
- EEL 5245C Power Electronics (3 credit hours)
- EEL 5881 Software Engineering I (3 credit hours)
- EEL 6537 Detection and Estimation (3 credit hours)
- EEL 6543 Random Processes II (3 credit hours)
- EEL 6883 Software Engineering II (3 credit hours)
- EEL 6897 Software Development for Real-Time Engineering Systems (3 credit hours)
- EAS 5123 Intermediate Aerodynamics (3 credit hours)
- EML 5211 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)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I (3 credit hours)
- MAA 5405 Complex Variables (3 credit hours)
- MAP 5426 Special Functions (3 credit hours)

Accelerated Undergraduate and Graduate Program in Aerospace Engineering

The accelerated undergraduate/graduate program in Aerospace Engineering allows highly qualified undergraduate majors in Aerospace engineering to begin taking graduate-level courses that will count toward their master's degree while completing their baccalaureate degree program. Participation will enable completion of the Bachelor of Science and Master of Science degrees in five instead of six years for students enrolled in full-time course work.

The B.S.A.E. is awarded after completion of 71 hours of engineering courses and all other university requirements, and the M.S.A.E. 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 towards the B.S. and M.S. 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.

Graduate Requirements

Please see graduate program requirements noted above.

Financial Support

Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Financing Grad School, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Key points about financial support:

- If you are interested in financial assistance, you are strongly encouraged to apply for admission early. A complete application for admission, including all supporting documents, must be received by the priority date listed for your program under "Admissions."
- You must be admitted to a graduate program before the university can consider awarding financial assistance to you.
- If you want to be considered for loans and other need-based financial assistance, review the UCF Student Financial Assistance website at http://finaid.ucf.edu and complete the FAFSA (Free Application for Federal Student Aid) form, which is available online at http://www.fafsa.ed.gov. Apply early and allow up to six weeks for the FAFSA form to be processed.
- UCF Graduate Studies awards university graduate fellowships, with most decisions based on nominations from the colleges and programs. To be eligible for a fellowship, students must be accepted as a graduate student in a degree program and be enrolled full-time. University graduate fellowships are awarded based on academic merit and therefore are not affected by FAFSA determination of need.
- Please note that select fellowships do require students to fill out a fellowship application (either a university fellowship application, an external fellowship application, or a college or school fellowship application). For university fellowship applications, see Financing Grad School.
- For information on assistantships (including teaching, research, and general graduate assistantships) or tuition support, contact the graduate coordinator of your department.

Contact Info

Master of Science in Aerospace Engineering

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Space Systems Design and Engineering Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Thermofluid Aerodynamic Systems Design and Engineering Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Computer Engineering

Description

The CpE program in the School of Electrical Engineering and Computer Science (EECS) offers Master of Science and Doctor of Philosophy degrees in Electrical Engineering.

The Masters program offers four tracks: Computer Networking, Digital Systems, Intelligent Systems, and Software Engineering. All tracks offer a thesis option and a nonthesis option. Students in the program receive a broad background in the various tracks while specializing in a research area of their interest. The program is designed for students with a bachelor's degree in computer engineering or a closely related discipline.

The doctoral program is primarily intended for students with a Masters degree in Computer Engineering or a closely related discipline wishing to pursue a career in research or academia. Specializations include digital systems, computer architecture and VLSI design, software engineering, intelligent systems, computer networks, and simulation systems.

Research interests of the Computer Engineering faculty include digital systems, computer architecture, software engineering, artificial intelligence, expert systems, modeling and simulation, computer networking and ubiquitous computing, computer vision, and very large-scale integration (VLSI) systems.

Degrees Offered

Master of Science in Computer Engineering

- Computer Networking Track
- Digital Systems Track
- Intelligent Systems Track
- Software Engineering Track

Doctor of Philosophy in Computer Engineering

Admission

For information on general UCF graduate admissions requirements that apply to all prospective students, please visit the Admissions and Registration section of the Graduate Catalog. Applicants are encouraged to apply online. Please be sure to submit all requested material by the established deadline(s).

The College of Engineering and Computer Science requires that you fill out a pre-application form (www.graduate.cecs.ucf.edu) before you complete the application for graduate admission. The deadlines for the pre-application form can be found on the Prospective Student Page on the College of Engineering and Computer Science website.

In addition to the general admission requirements, applicants must provide the following application materials.

Masters of Science (MS) Cp.E. program:

- Bachelor's degree in Computer Engineering or a closely related discipline from an accredited institution
- Official competitive Graduate Record Examination (GRE) score from a test taken within the last five years
- GPA of 3.0 or higher in last 60 attempted semester hours of undergraduate study
- Resume
- Goals statement
- Two letters of recommendation
- International students, except those who are from countries where English is the only official language or those who have earned a degree from an accredited American college or university, are required to submit a score of at least 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language.

Students with a grade point average of less than 3.0 may be admitted on a provisional basis in some circumstances. Additional courses may also be required to correct any course deficiencies. Students should contact the graduate program director for further information.

Doctor of Philosophy program:

- Students must have completed either a master's degree in Computer Engineering or a closely related discipline with a minimum GPA of 3.5 or a bachelor's degree in Computer Engineering or a closely related discipline with a minimum GPA of 3.5 in the last 60 attempted semester hours of the bachelor's degree. A competitive score on the GRE is also required.
- Resume
- Goals statement
- Three letters of recommendation
- For applicants from countries where English is not the official language, or for an applicant whose bachelor's degree is not from an accredited U.S. institution, an official score of at least 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL) is required.

Students with a grade point average of less than 3.5 may be admitted on a trial program basis in some circumstances. Additional courses may also be required to correct any course deficiencies. Students should contact the graduate program director for further information.

Additional Notes on Admissions

In the M.S. and Ph.D. programs, for applicants from countries where English is not the official language, or for an applicant whose bachelor's degree is not from an accredited U.S. institution, an official score of at least 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL) is required.

Application Due Dates

All students applying for fellowships must apply by the Fall Priority deadline date.

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Computer Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Master of Science in Computer Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Computer Networking Track	Jan 15	Jul 15	Dec 1	Apr 15
Digital Systems Track	Jan 15	Jul 15	Dec 1	Apr 15
Intelligent Systems Track	Jan 15	Jul 15	Dec 1	Apr 15
Software Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15

International Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Computer Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Master of Science in Computer Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Computer Networking Track	Jan 15	Jan 15	Jul 1	Nov 1
Digital Systems Track	Jan 15	Jan	Jul 1	Nov 1

		15		
Intelligent Systems Track	Jan 15	Jan 15	Jul 1	Nov 1
Software Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1

International Transfer Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Computer Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Master of Science in Computer Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Computer Networking Track	Jan 15	Mar 1	Sep 1	Dec 15
Digital Systems Track	Jan 15	Mar 1	Sep 1	Dec 15
Intelligent Systems Track	Jan 15	Mar 1	Sep 1	Dec 15
Software Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15

Master of Science in Computer Engineering

Minimum Hours Required for M.S.Cp.E.—30 Credit Hours (Thesis Option); 36 Credit Hours (Nonthesis Option)

Articulation

Undergraduate articulation courses may be required for students with bachelor's and/or master's degrees in fields other than Computer Engineering. The articulation courses will be determined by recommendations from the CpE faculty to the graduate program director on a case-by-case basis. In general, all students must have had the following undergraduate courses (or equivalent) before admission to graduate study. Students who have not taken these courses may be admitted with the provision that the courses will be taken and a grade of "B" or higher obtained. Courses taken to correct deficiencies do not satisfy minimum requirement for students' Program of Study.

- Mathematics through Differential Equations (equivalent to MAC 2311, MAC 2312, MAC 2313, MAP 2302).
- College Physics with Calculus (equivalent to PHY 2048 and PHY 2049).
- Computer Organization and Design (equivalent to EEL 4767C).

- Probability and Statistics (equivalent to STA 3032).
- Numerical Methods and matrix algebra (equivalent to EGN 3420).
- Engineering Data Structures (equivalent to EEL 4851C).
- Digital Logic Circuits (equivalent to EEL 3342C).

Transfer Credits

Graduate students with a bachelor's degree in Computer Engineering from UCF may transfer up to 9 credit hours of 5000-level work toward a nonthesis M.S.Cp.E. option, and up to 3 credit hours of 5000-level work toward a thesis M.S.Cp.E. option. Up to 9 credit hours may be transferred from graduate work conducted elsewhere from a regionally accredited institution.

Thesis and Nonthesis Options

The master's program offers a thesis option (30 credit hours, including 6 credit hours of thesis) and a nonthesis option (36 credit hours) for all tracks. Students must have an adviser appointed and an official program of study submitted before completing 9 credit hours of course work.

Thesis Option

This option requires a minimum of 30 credit hours of approved course work, of which 6 are thesis work. The course requirements are as follows:

- Courses from one of the following tracks: Computer Networking, Digital Systems, Intelligent Systems, or Software Engineering. These courses will be chosen in consultation with the thesis advisor.
- No more than 6 credits of thesis will count toward the degree requirement
- At least 15 credit hours must be from 6000-level courses
- Continuous enrollment in one hour of thesis is required once six hours of thesis credits have been completed and all course work has been satisfied, until the final thesis has been received by the Division of Graduate Studies

Nonthesis Option

This option requires a minimum of 36 credit hours of course work and is intended primarily for part-time students. Program requirements are the same as the thesis option except that the thesis requirement is replaced by 12 credit hours of course work. Students in the non-thesis option need to take the required classes in one of the Computer Engineering designated tracks of Computer Networking, Digital Systems, Intelligent Systems, and Software Engineering. Non-thesis students are required to pass a final comprehensive examination or another appropriate culminating experience. Please see the graduate program coordinator for details.

Computer Networking Track

The students must choose the courses below.

- EEL 6785 Computer Network Design (3 credit hours)
- EEL 5780 Wireless Networks (3 credit hours)
- EEL 5542 Random Processes I (3 credit hours)

- EEL 6788 Advanced Topics in Computer Networks (3 credit hours)

The students must also choose any three courses from the following list.

- EEL 6543 Random Processes II (3 credit hours)
- EEL 5762 Performance Analysis of Computer and Communication Systems (3 credit hours)
- EEL 6786 Advanced Network Hardware Design (3 credit hours)
- COT 5405 Design and Analysis of Algorithms 3 (3 credit hours)
- COP 5537 Network Optimization (3 credit hours)
- EEL 5881 Software Engineering (3 credit hours)
- EEL 5708 High Performance Computer Architecture (3 credit hours)
- Electives (15 credit hours)

Digital Systems Track

The students must choose the courses below.

- EEL 5708 High Performance Computer Architecture (3 credit hours)
- EEL 5722C FPGA Design c (3 credit hours)
- EEL 5390 Full Custom VLSI Design (3 credit hours)
- EEL 6707 Parallel Processing (3 credit hours)

The student must choose any two courses from the following list.

- EEL 5378 CMOS Analog and Digital IC Design (3 credit hours)
- EEL 5704 Computer Aided Logic Design . (3 credit hours)
- EEL 5762 Performance Analysis of Computer and Communication Systems (3 credit hours)
- EEL 6327 High-Level VLSI Synthesis (3 credit hours)
- EEL 6763 Current Topics in Parallel Processing (3 credit hours)
- EEL 6786 Advanced Networking Hardware Design (3 credit hours)
- Electives (18 credit hours)

Intelligent Systems Track

The students must choose courses from the course list below.

- EEL 4872 Engineering Applications of Intelligent Systems (3 credit hours)*
- EEL 5874 Expert Systems and Knowledge Engineering (3 credit hours)
- EEL 5881 Software Engineering I (3 credit hours)
- EEL 6875 Engineering of Artificial Intelligence Systems (3 credit hours)
- EEL 6876 Current Topics in Artificial Intelligence in Engineering Systems (3 credit hours)
- EEL 6878 Modeling and Artificial Intelligence (3 credit hours)
- EEL 6883 Software Engineering II (3 credit hours)
- Electives (15 credit hours)

* If the student has taken this course or an equivalent as an undergraduate, then an elective, chosen in consultation with the adviser, can be used to replace this course.

Software Engineering Track

The students must choose the courses below.

- EEL 5708 High Performance Computer Architecture (3 credit hours)
- EEL 5874 Expert Systems and Knowledge Engineering (3 credit hours)
- EEL 5881 Software Engineering I (3 credit hours)
- EEL 6883 Software Engineering II (3 credit hours)

The student must also choose any two courses from the following list.

- EEL 6885 Software Engineering Quality Assurance Methods (3 credit hours)
- EEL 6887 Software Engineering Life-Cycle Control (3 credit hours)
- EEL 6897 Software Development for Real-Time Engineering Systems (3 credit hours)
- Electives (18 credit hours)

Accelerated BS to MS Computer Engineering Program

The accelerated undergraduate/graduate program offers the opportunity for UCF undergraduates to finish both the B.S. and M.S. degrees in five years after they have entered UCF as freshmen. Students must meet the following requirements in order to graduate with both B.S. and M.S. degrees:

- Must maintain a cumulative grade point average of at least 3.25 for all course work taken as a junior, senior or graduate student during their five-year accelerated undergraduate and graduate program
- Transfer to graduate status after 128-credit hours are completed. At this time the bachelor's degree will be awarded
- Follow the guidelines of the M.S. degree with thesis option, once they attain a graduate status (30 credit hours needed beyond the B.S. with 6 hours of thesis), or
- Follow the guidelines of the M.S. degree with nonthesis option once they attain a graduate status (36 credit hours needed beyond the B.S.)
- Students must have an adviser appointed and an official program of study submitted before completing 9 credit hours of graduate course work
- Up to 12 credit hours of graduate coursework with grades "B-" or better may be counted toward the bachelor's and master's degrees (double counting of 12 credit hours).

Notes:

- A student pursuing an accelerated undergraduate/graduate degree must maintain a cumulative 3.25 grade point average by the end of every semester of their junior, senior, or graduate studies years. If their grade point average drops below the 3.25 grade point average, they will automatically be dropped from the accelerated

undergraduate/graduate program and their status will be reverted to an undergraduate student status.

- At any point in time after their admission into the accelerated undergraduate/graduate program the student has the option to abandon the pursuit of a five-year accelerated undergraduate/graduate program. In order to do so the student needs to e-mail the corresponding program director with their intention. The graduate director will then initiate steps to revert the student status from the accelerated undergraduate/graduate status to an undergraduate status.
- The intended duration of this program is five years. If for any approved reason the student delays the completion of the necessary credit hours, the duration of this program will be extended beyond five years.

Accelerated Undergraduate and Graduate Program in Computer Engineering

The accelerated undergraduate/graduate program in Computer Engineering allows highly qualified undergraduate majors in Computer engineering to begin taking graduate-level courses that will count toward their master's degree while completing their baccalaureate degree program. Participation will enable completion of the Bachelor of Science and Master of Science degrees in five instead of six years for students enrolled in full-time course work.

The B.S.Cp.E. is awarded after completion of 71 hours of engineering courses and all other university requirements, and the M.S.Cp.E. 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 or 6000 level courses of grades B (3.0) or better may be counted towards the B.S. and M.S. degrees. Additional notes on the Accelerated Undergraduate and Graduate Program in Computer 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.

Graduate Requirements

Please see graduate program requirements noted above.

Doctor of Philosophy in Computer Engineering

Minimum Hours Required for Ph.D. — 72 credit hours beyond bachelor's degree; 36 credit hours beyond nonthesis master's degree or 42 hours beyond thesis option master's degree.

The Doctor of Philosophy (Ph.D.) degree is primarily intended for students with a Master's degree in Computer Engineering or a closely related discipline who wish to pursue a career in research or academia. Specializations include Computer Networking, Digital Systems, Intelligent Systems and Software Engineering.

Degree Requirements

The Ph.D. degree requires a minimum of 72 credit hours beyond the bachelor's degree. Of these 72 hours, a minimum of 36 credit hours should be regular course work and a minimum of 15 credit hours should be dissertation hours. No more than 12 credit hours of Independent Study and or Doctoral Research hours are allowed.

The Ph.D. degree requires a minimum of 36 credit hours beyond the Masters degree (depending on the number of transfer credits from the masters degree). Of the 72 hours required for the Ph.D., a minimum of 36 hours need to be regular course work and a minimum of 15 credit hours should be dissertation hours. No more than 12 credit hours of Independent Study and or Doctoral Research hours are allowed.

At least 6 credit hours must be taken outside the student's program while at UCF. There is a residency requirement of two contiguous semesters in full-time graduate student status (minimum of 9 credit hours) after acceptance to the graduate program at UCF. The program of study must be developed in consultation with an adviser within the first 9 credit hours of course work and must meet with departmental approval, at which time transfer credit will be evaluated on a course-by-course basis.

Transfer Credits

Up to 6 credit hours of 4000-level course work are acceptable if transferred from a master's degree program. A limited number of up to 36 credit hours may be transferred from a master's degree toward these requirements.

Commented [e1]: Is this first sentence true?...I thought that we do not accept 4000 level course any more…please correct appropriately…

Qualifying Examination

Doctoral students must take a written qualifying examination. This exam covers relevant material typically learned at the undergraduate and graduate levels, and serves to verify the student's capability and readiness for the Ph.D. program. It is expected that a Ph.D. student will pass the qualifying examination within the first year of graduate studies. The exam consists of a four-hour written test, held twice a year on the first Friday of November and April of each year. The written exam may be followed by an oral exam, to be held approximately within two weeks from the evaluation of the written examination. The oral exam is required at the discretion of the Computer Engineering Graduate Committee. The qualifying exam allows the use of open books. It is the policy of the Computer Engineering Program that any calculator used during the qualifying examination may not be used to store user-defined programs.

Written Exam Format

The exam is comprised of problems in at most four areas. The student must respond to a total of 9 questions. The student must respond to 4 questions in their one primary area and 2 questions in their one secondary area. The primary area and secondary areas need to be chosen prior to the exam date by notifying the CpE Graduate Secretary, or at the exam date. The primary area and secondary area can be chosen from the following list of

areas.

Software Engineering
Digital Systems & Computer Architecture

The student must also respond to questions in a tertiary breadth area. Three (3) questions should be answered in not more than two of the areas listed below (either 3 in one area, or 2 in one area and 1 in another area).

Intelligent systems
Modeling and Simulation
Computer Networks
Communications
Digital signal processing
Controls
Electro optics
Electromagnetics
Physical electronics
Analog electronics
Circuits

The exam is open books. No notes are allowed during exam time. It is the policy of the CpE program that any calculator used during the qualifying examination may not be used to store user-defined programs.

Candidacy Examination

The Candidacy Examination evaluates the student's preparation to begin research in their dissertation topic. A student may sit for the Candidacy Examination upon: (1) passing the Qualifying Examination; (2) completing all conditions placed as a result thereof; and (3) completing all but six credits or less of the courses prescribed in the plan of study. The Candidacy Examination consists of the following:

- A Candidacy Proposal developed by the student to identify the chosen area of research.
- An oral presentation of the Candidacy Proposal to the dissertation committee by the student.
- A written Candidacy Examination based on the student's chosen area of research may be required by the major professor. The major professor determines the format in consultation with the dissertation committee.

Upon successful completion of the Candidacy Examination, the student can be accepted into Candidacy status, allowing him/her to enroll for dissertation credit hours.

The final step in the process is the Dissertation Defense Examination, which is an oral examination taken in defense of the written dissertation before the dissertation committee.

Dissertation Committee

Doctoral students must have a Dissertation Advisory Committee prior to the Candidacy Examination. The Committee will consist of a minimum of four members. At least three members must be qualified regular faculty members from the students department (or college, if a college-wide program) at UCF, one of whom must serve as the chair of the committee. One member must be from either outside the School of EECS or outside the university.

The committee chair must be a member of the department graduate faculty approved to direct dissertations. Joint faculty members serve as department-faculty committee members. 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. Graduate Studies reserves the right to review appointments to advisory committees, place a representative on any advisory committee, or appoint a co-adviser.

In unusual cases, with approval from the program director, two professors may chair the committee jointly. Joint faculty members may serve as committee chairs, but off-campus experts and adjunct faculty may not serve as committee chairs. Particular programs may have more stringent requirements. 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.

Financial Support

Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Financing Grad School, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Key points about financial support:

- If you are interested in financial assistance, you are strongly encouraged to apply for admission early. A complete application for admission, including all supporting documents, must be received by the priority date listed for your program under "Admissions."
- You must be admitted to a graduate program before the university can consider awarding financial assistance to you.
- If you want to be considered for loans and other need-based financial assistance, review the UCF Student Financial Assistance website at http://finaid.ucf.edu and complete the FAFSA (Free Application for Federal Student Aid) form, which is available online at http://www.fafsa.ed.gov. Apply early and allow up to six weeks for the FAFSA form to be processed.
- UCF Graduate Studies awards university graduate fellowships, with most decisions based on nominations from the colleges and programs. To be eligible for a fellowship, students must be accepted as a graduate student in a degree program and be enrolled full-time. University graduate fellowships are awarded based on academic merit and therefore are not affected by FAFSA determination of need.
- Please note that select fellowships do require students to fill out a fellowship application (either a university fellowship application, an external fellowship application, or a college or school fellowship application). For university fellowship applications, see Financing Grad School.

- For information on assistantships (including teaching, research, and general graduate assistantships) or tuition support, contact the graduate program director of your major.

Contact Info

Doctor of Philosophy in Computer Engineering

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Master of Science in Computer Engineering

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Computer Networking Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Digital Systems Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Intelligent Systems Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Software Engineering Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Electrical Engineering

Description

The EE program in the School of Electrical Engineering and Computer Science (EECS) offers Master of Science and Doctor of Philosophy degrees in Electrical Engineering. Students in the Electrical Engineering program receive a broad background in areas such as communications, controls/robotics, digital signal processing, electromagnetics, power electronics and electronics, electro-optics/photonics, solid state and microelectronics, and very large-scale integration (VLSI) while specializing in a research area of their interest.

Research interests of the Electrical Engineering faculty include antennas, microwave and millimeter circuits and devices, communication systems, digital signal/image processing, power electronics, electronic circuits, IFF devices, electromagnetic theory, radar and microwave remote sensing, speech processing, VLSI design, spread spectrum systems, SAW and ACT devices, spectral estimation, solid state device modeling and computer-aided design (CAD) techniques, communication networks, integrated services digital networks, neural networks, systems and controls, robotics, robust control, computer control, microelectronics, semiconductors, thin films, power system stability, bipolar device modeling, solid state lasers, optical propagation, fiber optics, optical signal processing, laser-induced damage, optical testing, diffractive optics, phase conjunction, infrared detectors, Fourier optics, lens design, and nonlinear optics.

Degrees Offered

Master of Science in Electrical Engineering

- Communications Track
- Controls and Robotics Track
- Digital Signal Processing Track
- Electro-Optics Track

- Electromagnetics Track
- Electro-optics Track
- Photonics Track
- Power Electronics and Electronics Track
- Solid State and Microelectronics Track
- VLSI Design Track

Doctor of Philosophy in Electrical Engineering

Admission

For information on general UCF graduate admissions requirements that apply to all prospective students, please visit the Admissions and Registration section of the Graduate Catalog. Applicants must apply online. Please be sure to submit all requested material by the established deadline(s).

The College of Engineering and Computer Science requires that you fill out a pre-application form (www.graduate.cecs.ucf.edu) before you complete the application for graduate admission. The deadlines for the pre-application form can be found on the Prospective Student Page on the College of Engineering and Computer Science website.

In addition to the general admission requirements, applicants must provide the following application materials.

MS (Masters of Science) EE Program

The Master of Science degree in Electrical Engineering (M.S.E.E.) is intended for students with a baccalaureate degree in Electrical Engineering or a related field from a regionally accredited institution. In addition to the general admission requirements, applicants must provide:

- Minimum GPA of 3.0 on the last 60 attempted credit hours of the bachelor's degree
- Competitive score on the Graduate Record Examination (GRE)
- Resume
- Goals statement
- Two letters of recommendation

Students with a grade point average of less than 3.0 may be admitted on a provisional basis in some circumstances. Additional courses may also be required to correct any course deficiencies. Students should contact the graduate program director for further information.

Doctor of Philosophy Program

For the Doctor of Philosophy in Electrical Engineering (Ph.D.) program, students must satisfy university requirements and:

- Have completed either a master's degree in Electrical Engineering or a closely related discipline with a minimum GPA of 3.5 and a competitive score on the GRE, or
- Have a bachelor's degree in Electrical Engineering or a closely related discipline with a minimum GPA of 3.5 in the last 60 attempted credit hours of the bachelor's degree, and a competitive score on the GRE
- Submit a resume, goal statement, and three letters of recommendation

Students with a grade point average of less than 3.5 may be admitted on a provisional basis in some circumstances. Additional courses may also be required to correct any course deficiencies. Students should contact the graduate program director for further information.

Additional Notes on Admissions

In the M.S. and Ph.D. programs, for applicants from countries where English is not the official language, or for an applicant whose bachelor's degree is not from an accredited U.S. institution, an official score of at least 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL) is required.

Application Due Dates

All students applying for fellowships must apply by the Fall Priority deadline date.

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Electrical Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Master of Science in Electrical Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Communications Track	Jan 15	Jul 15	Dec 1	Apr 15
Controls and Robotics Track	Jan 15	Jul 15	Dec 1	Apr 15
Digital Signal Processing Track	Jan 15	Jul 15	Dec 1	Apr 15
Electro-Optics Track	Jan 15	Jul 15	Dec 1	Apr 15
Electromagnetics Track	Jan 15	Jul 15	Dec 1	Apr 15
Photonics Track	Jan 15	Jul 15	Dec 1	Apr 15
Power Electronics and Electronics Track	Jan 15	Jul 15	Dec 1	Apr 15

Solid State and Microelectronics Track	Jan 15	Jul 15	Dec 1	Apr 15
VLSI Design Track	Jan 15	Jul 15	Dec 1	Apr 15

International Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Electrical Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Master of Science in Electrical Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Communications Track	Jan 15	Jan 15	Jul 1	Nov 1
Controls and Robotics Track	Jan 15	Jan 15	Jul 1	Nov 1
Digital Signal Processing Track	Jan 15	Jan 15	Jul 1	Nov 1
Electro-Optics Track	Jan 15	Jan 15	Jul 1	Nov 1
Electromagnetics Track	Jan 15	Jan 15	Jul 1	Nov 1
Photonics Track	Jan 15	Jan 15	Jul 1	Nov 1
Power Electronics and Electronics Track	Jan 15	Jan 15	Jul 1	Nov 1
Solid State and Microelectronics Track	Jan 15	Jan 15	Jul 1	Nov 1
VLSI Design Track	Jan 15	Jan 15	Jul 1	Nov 1

International Transfer Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Electrical Engineering	Jan 15	Mar 1	Sep 1	Dec 15

Master of Science in Electrical Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Communications Track	Jan 15	Mar 1	Sep 1	Dec 15
Controls and Robotics Track	Jan 15	Mar 1	Sep 1	Dec 15
Digital Signal Processing Track	Jan 15	Mar 1	Sep 1	Dec 15
Electro-Optics Track	Jan 15	Mar 1	Sep 1	Dec 15
Electromagnetics Track	Jan 15	Mar 1	Sep 1	Dec 15
Photonics Track	Jan 15	Mar 1	Sep 1	Dec 15
Power Electronics and Electronics Track	Jan 15	Mar 1	Sep 1	Dec 15
Solid State and Microelectronics Track	Jan 15	Mar 1	Sep 1	Dec 15
VLSI Design Track	Jan 15	Mar 1	Sep 1	Dec 15

Master of Science in Electrical Engineering

The Master of Science in Electrical Engineering degree offers tracks in Communications, Controls and Robotics, Digital Signal Processing, Electromagnetics, Electro-optics, Power Electronics and Electronics, Photonics, Solid State and Microelectronics and VLSI Design. The program is intended for students with a baccalaureate degree in electrical engineering or a related field. Detailed information on the tracks and research activities is available in the department or on the school website.

Research studies are required in one or more courses. The research study and report will focus on reviewing and analyzing contemporary research in a student's particular specialization within the profession in order to help students acquire knowledge and skills pertaining to research-based best practices in that specialization area. In addition, students may engage in directed independent studies, directed research or a research report during their studies.

Articulation

Undergraduate articulation courses may be required for students with BS and/or MS degrees in fields other than Electrical Engineering. The articulation courses will be determined by the graduate program director in consultation with student's research adviser on a case-by-case basis. In general, students with a non-Electrical Engineering degree must have had the equivalent course work or satisfy the following articulation program:

- Mathematics through Differential Equations (MAP 2302 or equivalent)

- Physics with Calculus (PHY 2048, PHY 2049 or equivalent)
- Electronics I (EEL 3307C or equivalent)
- Electromagnetic Fields (EEL 3470 or equivalent)
- Signal Analysis and Communications (EEL 3552C or equivalent)
- Semiconductor Devices I (EEL 3306 or equivalent)

Additional courses may also be required to correct any undergraduate course deficiencies. Courses taken to correct deficiencies cannot be used to satisfy minimum degree requirements.

Transfer Credits

Graduate students (subject to approval from an adviser) with a bachelor's degree from Electrical Engineering at UCF may transfer up to 9 credit hours of 5000-level work toward an M.S. non-thesis option and up to 3 credit hours of 5000-level work toward an M.S. thesis option. Up to 9 credit hours may be transferred from graduate work conducted elsewhere or in non-degree status from a regionally accredited institution.

Thesis or Nonthesis Option

The master's program offers a thesis option (30 credit hours, including 6 credit hours of thesis) and a nonthesis option (36 credit hours) for all tracks. Students must have an adviser appointed and an official program of study submitted before completing 9 credit hours of course work.

Thesis Option

This option requires a minimum of 30 credit hours of approved course work, of which 6 are thesis work. The course requirements are as follows:

- Required courses from one of the following tracks: Communications, Controls and Robotics, Digital Signal Processing, Electromagnetics, Power Electronics and Electronics, Electro-optics, Photonics, Solid State and Microelectronics, or VLSI Design
- One course from any other two areas listed above (6 credit hours total)
- No more than 6 credits of thesis will count toward the degree requirement
- The remainder of the program courses is chosen in conjunction with an adviser in an approved program of study
- At least 15 credit hours must be from 6000-level courses
- Continuous enrollment in one hour of thesis is required once six hours of thesis credits have been completed and all course work has been satisfied, until the final thesis has been received by the Division of Graduate Studies

Nonthesis Option

This option requires a minimum of 36 credit hours of course work and is intended primarily for part-time students. Program requirements are the same as the thesis option except that the thesis requirement is replaced by 12 credit hours of course work. Students are required to pass a final comprehensive examination or another appropriate culminating experience. Please see the graduate program coordinator for details.

Communications Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—12 Credit Hours

- EEL 5542 Random Processes I (3 credit hours)
- EEL 6530 Communication Theory (3 credit hours)
- One course from two of the following tracks: Controls and Robotics, Digital Signal Processing, Electromagnetics, Power Electronics and Electronics, Electro-optics, Photonics, Solid State and Microelectronics, or VLSI Design (6 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

- EEL 6504 Communications Systems Design (3 credit hours)
- EEL 6543 Random Processes II (3 credit hours)
- EEL 6537 Detection and Estimation (3 credit hours)
- EEL 5555C RF and Microwave Communications (3 credit hours)
- EEL 5762 Performance Analysis of Computer and Communication Systems (3 credit hours)
- EEL 5547 Introduction to Radar Systems (3 credit hours)
- EEL 6785 Computer Network Design (3 credit hours)
- EEL 6590 Advanced Topics in Communications (3 credit hours)

Controls and Robotics Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—12 Credit Hours

- EEL 5630 Digital Control Systems (3 credit hours)
- EEL 5173 Linear Systems Theory (3 credit hours)
- One course from two of the following tracks: Communications, Digital Signal Processing, Electromagnetics, Power Electronics and Electronics, Electro-optics, Photonics, Solid State and Microelectronics, or VLSI Design (6 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Electives in Controls

- EEL 6621 Nonlinear Control Systems (3 credit hours)
- EEL 6671 Modern and Optimal Control Systems (3 credit hours)
- EEL 6674 Optimal Estimation for Control (3 credit hours)
- EEL 6617 Fundamentals of Modern Multivariable Control (3 credit hours)
- EEL 6616 Adaptive Control (3 credit hours)
- EEL 6680 Advanced Topics in Modern Control Systems (3 credit hours)

Digital Signal Processing Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—9 Credit Hours

- EEL 5513 Digital Signal Processing Applications (3 credit hours)
- One course from two of the following tracks: Communications, Controls/Power, Electromagnetics, Power Electronics and Electronics, Electro-optics, Photonics, Solid State and Microelectronics (6 credit hours)

Thesis Option—21 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—27 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

- EEL 6502 Adaptive Digital Signal Processing (3 credit hours)
- EEL 6505 Multidimensional Digital Processing (3 credit hours)
- EEL 6558 Advanced Topics in Digital Signal Processing (3 credit hours)
- EEL 5820 Image Processing (3 credit hours)
- EEL 6823 Image Processing II (3 credit hours)
- EEL 5825 Pattern Recognition (3 credit hours)

- EEL 6812 Introduction to Neural Networks (3 credit hours)

Electromagnetics Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—12 Credit Hours

- EEL 6488 Electromagnetic Fields (3 credit hours)
- One course from two of the following tracks: Communications, Controls/Power, Digital Signal Processing, Electronics, Electro-optics, Photnics, Solid State and Microelectronics, or VLSI Design (6 credit hours)

One of the following courses is required:

- EEL 5462C Antenna Analysis and Design (3 credit hours)
- EEL 5434 Microwave Circuits and Devices (3 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

- EEL 5432 Satellite Remote Sensing (3 credit hours)
- EEL 5555C RF and Microwave Communications (3 credit hours)
- EEL 6463 Antenna Analysis and Design II (3 credit hours)
- EEL 6492 Advanced Topics in Electromagnetics and Microwaves (3 credit hours)

Power Electronics and Electronics Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—12 Credit Hours

- EEL 6371 Advanced Electronics I (3 credit hours)
- One course from two of the following tracks: Communications, Controls/Power, Digital Signal Processing, Electromagnetics, Electro-optics, Photonics, Solid State and Microelectronics, or VLSI Design (6 credit hours)

One of the following courses is required:

- EEL 5245C Power Electronics (3 credit hours)
- EEL 5378 CMOS Analog and Digital Circuit Design (3 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

- EEL 5353 Semiconductor Device Modeling and Simulation (3 credit hours)
- EEL 5370 Operational Amplifiers (3 credit hours)
- EEL 6354 Advanced Semiconductor Device I (3 credit hours)
- EEL 6372 Advanced Topics in Electronics (3 credit hours)
- EEL 6246 Power Electronics II (3 credit hours)

Electro-optics Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—15 Credit Hours

- OSE 5041 Introduction to Wave Optics (3 credit hours)
- OSE 6525 Laser Engineering (3 credit hours)
- OSE 6211 Fourier Optics (3 credit hours)
- One course from two of the following tracks: Communications, Controls/Power, Digital Signal processing, Electronics, Solid State and Microelectronics, or VLSI Design (6 credit hours)

Thesis Option—15 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (15 credit hours)

Nonthesis Option—21 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

Courses from the following tracks can serve as electives: Communications, Controls and Robotics, Digital Signal Processing, Electromagnetics, Electronics, Solid State and

Microelectronics, or VLSI Design. The elective courses depend on the sub-option chosen in the Electro-optics track. The sub-options are: Photonics, Optical Communications, Electro-optics Systems, Imaging Systems, Remote Sensing, and Laser Engineering. More details of these sub-options can be obtained from the graduate office in the School of Electrical and Engineering and Computer Science.

Photonics Track

Total Hours Required for M.S.E.E.—30 or 36 hours

Required Courses—12 Credit Hours

The required courses in this proposed Photonics track are three of the following four courses:

- OSE 5143 Fiber Optics Communication (3 credit hours)
- OSE 5414 Fundamentals of Optoelectronic Devices (3 credit hours)
- OSE 6432 Fundamentals of Photonics (3 credit hours)
- OSE 6525 Laser Engineering (content will be modified) (3 credit hours)

And one of the following two courses:

- EEL 6488 Electromagnetic Fields (3 credit hours)
- OSE 5111 Optical Wave Propagation (3 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- 12 hours of electives

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Electives Courses

- OSE 5115 Interference and Diffraction (3 credit hours)
- OSE 5421 Integrated Optics (3 credit hours)
- OSE 6445 High Speed Photonics (3 credit hours)
- OSE 6455L Photonics Laboratory (3 credit hours)
- OSE 6615L Optoelectronic Device Fabrication Laboratory (3 credit hours)
- EEL 5462C Antenna Analysis and Design (3 credit hours)
- EEL 5434 Microwave Circuits and Devices (3 credit hours)
- EEL 5432 Satellite Remote Sensing (3 credit hours)
- EEL 5555C RF and Microwave Communications (3 credit hours)
- EEL 6463 Antenna Analysis and Design II (3 credit hours)
- EEL 6492 Advanced Topics in Electromagnetics and Microwaves (3 credit hours)

Notes:

- The Photonics track follows all the guidelines of the other EE master's tracks (i.e., all the required courses in the track are included, two courses (one from two other tracks) are included, 6 thesis hours are included, and other related electives are included.
- If independent study courses are taken, they will be of the EEL designation.
- In a typical Photonics track program of study at least 50 percent of the hours should be of the EEL designation.

Solid State and Microelectronics Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—12 Credit Hours

- EEL 5355C Fabrication of Solid-State Devices (4 credit hours)
- EEL 6354 Advanced Semiconductor Device I (3 credit hours)
- One course from two of the following tracks: Communications, Controls and Robotics, Digital Signal Processing, Electromagnetics, Power Electronics and Electronics, Electro-optics, Photonics, or VLSI Design (6 credit hours)

Thesis Option—18 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (12 credit hours)

Nonthesis Option—24 Additional Credit Hours

- Electives (24 credit hours)

Elective Courses

- EEL 5332C Thin Film Technology (3 credit hours)
- EEL 5353 Semiconductor Device Modeling and Simulation (3 credit hours)
- EEL 5378 CMOS Analog and Digital Circuit Design (3 credit hours)
- EEL 5517 Surface Acoustic Wave Devices and Systems (3 credit hours)
- EEL 5352 Semiconductor Material and Device Characterization (3 credit hours)
- EEL 6354 Advanced Semiconductor Device I (3 credit hours)
- EEL 6338 Advanced Topics in Microelectronics (3 credit hours)

VLSI Design Track

Total Hours Required for M.S.E.E.—30 or 36 Credit Hours

Required Courses—6 Credit Hours

- EEL 5390 Full-Custom VLSI Design (3 credit hours)

- EEL 5378 CMOS Analog and Digital Circuit Design (3 credit hours)

Thesis Option—24 Additional Credit Hours

- EEL 6971 Thesis (6 credit hours)
- Electives (18 credit hours)

Nonthesis Option—30 Additional Credit Hours

- Electives (30 credit hours)

Elective Courses

- EEL 5353 Device Modeling and Simulation (3 credit hours)
- EEL 5370 Operational Amplifiers (3 credit hours)
- EEL 5434 Microwave Circuits and Devices (3 credit hours)
- EEL 5708 High-Performance Computer Architecture (3 credit hours)
- EEL 5722C Field Programmable Gate Array (FPGA) Design (3 credit hours)
- Additional electives selected in consultation with adviser

Accelerated Undergraduate and Graduate Program in Computer Engineering

The accelerated undergraduate/graduate program in Computer Engineering allows highly qualified undergraduate majors in Computer engineering to begin taking graduate-level courses that will count toward their master's degree while completing their baccalaureate degree program. Participation will enable completion of the Bachelor of Science and Master of Science degrees in five instead of six years for students enrolled in full-time course work.

The B.S.Cp.E. is awarded after completion of 71 hours of engineering courses and all other university requirements, and the M.S.Cp.E. 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 or 6000 level courses of grades B (3.0) or better may be counted towards the B.S. and M.S. degrees. Additional notes on the Accelerated Undergraduate and Graduate Program in Computer 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.

Graduate Requirements

Please see graduate program requirements noted above.

Doctor of Philosophy in Electrical Engineering

Total Hours Required for Ph.D.—Minimum of 72 credit hours beyond the bachelor's degree; minimum of 36 credit hours beyond the master's degree

The Doctor of Philosophy (Ph.D.) degree is primarily intended for students with a Master's degree in Electrical Engineering or a closely related discipline who wish to pursue a career in research or academia. Specializations include Communications, Digital Signal Processing/Image Processing, Controls and Robotics, Electromagnetics, Electro-Optics, Photonics, Power Electronics and Electronics, Solid-State/Microelectronics, and VLSI Design.

Degree Requirements

The Ph.D. degree requires a minimum of 72 credit hours beyond the bachelor's degree. Of these 72 hours, a minimum of 36 credit hours should be regular course work and a minimum of 15 credit hours should be dissertation hours. No more than 12 credit hours of Independent Study and or Doctoral Research hours are allowed.

The Ph.D. degree requires a minimum of 36 credit hours beyond the masters degree (depending on the number of transfer credits from the masters degree). Of the 72 hours required for the Ph.D., a minimum of 36 hours need to be regular course work and a minimum of 15 credit hours should be dissertation hours. No more than 12 credit hours of Independent Study and or Doctoral Research hours are allowed.

At least 6 credit hours must be taken outside the student's program while at UCF. There is a residency requirement of two contiguous semesters in full-time graduate student status (minimum of 9 credit hours) after acceptance to the graduate program at UCF. The program of study must be developed in consultation with an adviser within the first 9 credit hours of course work and must meet with departmental approval, at which time transfer credit will be evaluated on a course-by-course basis.

Transfer Credits

Up to 6 credit hours of 4000-level course work are acceptable if transferred from a master's degree program. A limited number of up to 36 credit hours may be transferred from a master's degree toward these requirements.

Commented [e1]: Is this first sentence true?...I thought that we do not accept 4000 level course any more…please correct appropriately…

Qualifying Examination

Students are required to pass a qualifying examination, after which the student must form a dissertation committee. The degree must be completed within seven years of the entry date to the doctoral program. The prospective doctoral student must take a written qualifying exam before being admitted to full doctoral student status. This exam covers relevant material typically learned at the undergraduate and graduate levels, and serves to verify the student's capability and readiness for the Ph.D. program.

The exam consists of a written four-hour test, given on the first Friday of April and first Friday of November of each year. Open books are allowed, but no notes are allowed during the Qualifying examination. It is the policy of the Electrical Engineering Program that any calculator used during the exam may not be used to store user-defined programs.

Exam Format

The student declares a major area prior to taking the exam by notifying the Electrical Engineering Graduate Secretary, or during the exam time. During the exam the student has to solve three problems in the declared major area and six other problems that can be selected from at least two and at most four other chosen areas. The areas from which the student can select problems from are the following:

- Circuits
- Communications
- Digital Signal Processing
- Controls and Robotics
- Digital Systems and Computer Architecture
- Electro-optics/Photonics
- Electromagnetics
- Physical Electronics
- Powr Electronics/Electronics

Candidacy Examination

The Candidacy Examination evaluates the student's preparation to undertake research in his/her dissertation topic area. A student may sit for the Candidacy Examination upon: (1) Passing the Qualifying Examination; (2) Completing all conditions placed as a result thereof; and (3) Completing all but six credits or less of the courses prescribed in the plan of study. The Candidacy Examination consists of the following:

- A Candidacy Proposal developed by the student to identify the chosen area of research.
- An oral presentation of the Candidacy Proposal by the student to the dissertation committee.
- A written Candidacy Examination based on the student's chosen area of research may be required by the major professor. The format is determined by the major professor in consultation with the dissertation committee.

Upon successful completion of the Candidacy Examination, the student can be accepted into Candidacy status, allowing him/her to enroll for dissertation credit hours.

The final step in the process is the Dissertation Defense Examination, which is an oral examination taken in defense of the written dissertation before the dissertation committee.

Dissertation Committee

Doctoral students must have a Dissertation Advisory Committee prior to the Candidacy Examination. The Committee will consist of a minimum of four members. At least three members must be qualified regular faculty members from the students department (or college, if a college-wide program) at UCF, one of whom must serve as the chair of the committee. One member must be from either outside the School of EECS or outside the university.

The committee chair must be a member of the department graduate faculty approved to direct dissertations. Joint faculty members serve as department-faculty committee members. 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. Graduate Studies reserves the right to review appointments to advisory committees, place a representative on any advisory committee, or appoint a co-adviser.

In unusual cases, with approval from the program director, two professors may chair the committee jointly. Joint faculty members may serve as committee chairs, but off-campus experts and adjunct faculty may not serve as committee chairs. Particular programs may have more stringent requirements. 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.

Financial Support

Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Financing Grad School, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Key points about financial support:

- If you are interested in financial assistance, you are strongly encouraged to apply for admission early. A complete application for admission, including all supporting documents, must be received by the priority date listed for your program under "Admissions."
- You must be admitted to a graduate program before the university can consider awarding financial assistance to you.
- If you want to be considered for loans and other need-based financial assistance, review the UCF Student Financial Assistance website at http://finaid.ucf.edu and complete the FAFSA (Free Application for Federal Student Aid) form, which is available online at http://www.fafsa.ed.gov. Apply early and allow up to six weeks for the FAFSA form to be processed.
- UCF Graduate Studies awards university graduate fellowships, with most decisions based on nominations from the colleges and programs. To be eligible for a fellowship, students must be accepted as a graduate student in a degree program and be enrolled full-time. University graduate fellowships are awarded based on academic merit and therefore are not affected by FAFSA determination of need.
- Please note that select fellowships do require students to fill out a fellowship application (either a university fellowship application, an external fellowship application, or a college or school fellowship application). For university fellowship applications, see Financing Grad School.
- For information on assistantships (including teaching, research, and general graduate assistantships) or tuition support, contact the graduate program director of your major.

Contact Info

Doctor of Philosophy in Electrical Engineering

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Master of Science in Electrical Engineering

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Communications Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Controls and Robotics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Digital Signal Processing Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Electro-Optics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Electromagnetics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Photonics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Power Electronics and Electronics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Solid State and Microelectronics Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

VLSI Design Track

Michael Georgiopoulos, Ph.D., Professor
Phone Number: 407-823-5338
michaelg@mail.ucf.edu

Industrial Engineering & Management Systems

Description

The Department of Industrial Engineering and Management Systems offers a Master of Science in Industrial Engineering (M.S.I.E.) degree, a Master of Science (M.S.) degree, and a Doctor of Philosophy (Ph.D.) in Industrial Engineering. Industrial Engineering focuses on the design and improvement of systems, products, and processes. A total systems approach is used to optimize the various aspects of operations in both manufacturing and service industries. Industrial engineers use many analytical approaches to improve productivity, safety, and quality of working life while reducing operating costs.

The Master of Science degree programs are designed to produce highly skilled industrial engineers, engineering managers, technical professionals, and leaders for the global economy. The M.S. program offers specialization tracks in the areas of Engineering Management, Human Engineering/Ergonomics, Operations Research, Manufacturing Engineering, Quality Engineering, Interactive Simulation and Training Systems, Simulation Modeling and Analysis, and Systems Engineering and Management.

The Ph.D. program is designed to produce highly skilled researchers with both broad knowledge of industrial engineering and in-depth knowledge of specialty fields for careers in academia, industry, and government. The program allows a candidate ~~student~~ to thoroughly study some aspect of industrial engineering, such as manufacturing, engineering management, operations research, simulation modeling, interactive simulation, quality, and human engineering/ergonomics.

The industrial engineering graduate programs are structured to support the emergence of central Florida as a national center of high technology as well as supporting the diverse service industries in the region and throughout the nation.

Additional information can be found in http://www.iems.ucf.edu/ver40/about/graduate.htm ~~IEMS Graduate Handbook~~.

Degrees Offered

Master of Science

- Engineering Management Track
- Human Engineering/Ergonomics Track
- Interactive Simulation and Training Systems Track
- Manufacturing Engineering Track
- Operations Research Track
- Quality Engineering Track
- Simulation Modeling and Analysis Track
- Systems Engineering and Management Track

Master of Science in Industrial Engineering
Doctor of Philosophy in Industrial Engineering

Admission

For information on general UCF graduate admissions requirements that apply to all prospective students, please visit the Admissions and Registration section of the Graduate Catalog. Applicants must apply online. Please be sure to submit all requested material by the established deadline(s).

The College of Engineering and Computer Science requires that applicants fill out a pre-application form (www.graduate.cecs.ucf.edu) before completing the application for graduate admission. The deadlines for the pre-application form can be found on the Prospective Student Page on the College of Engineering and Computer Science website.

Master's Degree Programs

In addition to the general UCF graduate admission requirements and the College of Engineering and Computer Science master's programs admission requirements, applicants must provide:

- Official, competitive scores on the Graduate Record Examination (GRE), which must have been taken within the last five years. An undergraduate GPA of 3.0/4.0 in the last two years (60 semester hours) of study is required for admission as a regular graduate student. Alternatively a GPA of 2.8/4,0 combined with a GRE score (verbal and quantitative) of 1000 or higher will satisfy admission requirements as as a regular graduate student. In addition, an undergraduate GPA of 2.8 on a 4.0 scale combined with a GRE score (verbal + quantitative) of 1100 or higher will satisfy admission as a conditional graduate student, where the condition is to maintain a graduate GPA exceeding 3.25 over the first nine hours of graduate work. An undergraduate GPA under 2.8 on a 4.0 scale makes a student ineligible to be admitted in an IEMS graduate Master's program, unless exempted by the Department Chair and admitted provisionally with a condition to maintain a graduate GPA exceeding 3.25 over the first nine hours of graduate work. All students must complete the GRE regardless of GPA.
- Students who have previous GMAT scores may use them in place of the GRE. The minimum acceptable GMAT score is 550 (575 if their GPA is 2.8).
- For applicants from countries where English is not the official language, or for an applicant whose bachelor's degree is not from an accredited U.S. institution, an official score of at least 220 (computer-based test; or equivalent score on the paper-based test) or a score of at least 83 in the Internet-based version on the Test of English as a Foreign Language (TOEFL) is required and also a curriculum vitae/resume and an essay accompanied by goals statement is required.

Additional information for MS:

- Students interested in scholarship support must have submitted a complete application by the priority deadline.
- Thesis students must pass an oral Thesis Defense and non-thesis students must pass an oral comprehensive examination at the end of their program of study.

Doctoral Degree Program

In addition to the general UCF graduate admission requirements, and the College of Engineering and Computer Science Doctoral program admission requirements, applicants must provide:

- Evidence of a master's degree in Industrial Engineering or a closely related discipline from a recognized institution, and have demonstrated above average performance at the master's level
- Curriculum vitae/resume and an essay accompanied by goals statement
- Three letters of recommendation
- Official, competitive scores on the Graduate Record Examination (GRE), which must have been taken within the last five years. In general, applicants with GRE scores (verbal and quantitative) of less than 1000, together with a grade index at the Master's level of less than 3.5 are discouraged from pursuing the Ph.D. degree unless other evidence of a high level of professional capability is presented.
- For applicants from countries where English is not the official language, or for an applicant whose bachelor's degree is not from an accredited U.S. institution, an official score of at least 220 (computer-based test; or equivalent score on the paper-based test) or a score of at least 83 in the Internet-based version on the Test of English as a Foreign Language (TOEFL) is required.

Additional Information (Ph.D.)

Selected outstanding applicants who have a GPA of at least 3.4 in the last 60 attempted semester hours of their undergraduate degrees and have GRE scores above the 80th percentile in both the verbal and the quantitative sections of the GRE will be considered for direct entrance as pre-doctoral students with Bachelor of Science degrees. Scholarships may be awarded based on the student's GPA, GRE scores, and curriculum vitae.

Students must complete any needed articulation course work and pass a Ph.D. qualifying examination in order to be admitted as a regular doctoral student. This exam is normally taken within the first year after all articulation work is completed. The department makes decisions about the continuation in the program based in part on qualifying examination results. In addition, the student must pass a Candidacy Examination, a Dissertation Proposal Examination and a Dissertation Defense Examination.

Application Due Dates

All students applying for fellowships must apply by the Fall Priority deadline date.

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Industrial Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Master of Science in Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Engineering Management Track	Jan 15	Jul 15	Dec 1	Apr 15
Human Engineering/Ergonomics Track	Jan 15	Jul 15	Dec 1	Apr 15

Interactive Simulation and Training Systems Track	Jan 15	Jul 15	Dec 1	Apr 15
Manufacturing Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15
Operations Research Track	Jan 15	Jul 15	Dec 1	Apr 15
Quality Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15
Simulation Modeling and Analysis Track	Jan 15	Jul 15	Dec 1	Apr 15
Systems Engineering and Management Track	Jan 15	Jul 15	Dec 1	Apr 15
Master of Science in Industrial Engineering	Jan 15	Jul 15	Dec 1	Apr 15

International Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Industrial Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Master of Science in Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Engineering Management Track	Jan 15	Jan 15	Jul 1	Nov 1
Human Engineering/Ergonomics Track	Jan 15	Jan 15	Jul 1	Nov 1
Interactive Simulation and Training Systems Track	Jan 15	Jan 15	Jul 1	Nov 1
Manufacturing Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1
Operations Research Track	Jan 15	Jan 15	Jul 1	Nov 1
Quality Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1
Simulation Modeling and Analysis Track	Jan 15	Jan 15	Jul 1	Nov 1
Systems Engineering and Management Track	Jan 15	Jan 15	Jul 1	Nov 1
Master of Science in Industrial Engineering	Jan 15	Jan 15	Jul 1	Nov 1

International Transfer Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Industrial	Jan 15	Mar 1	Sep 1	Dec 15

Engineering				
Master of Science in Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Engineering Management Track	Jan 15	Mar 1	Sep 1	Dec 15
Human Engineering/Ergonomics Track	Jan 15	Mar 1	Sep 1	Dec 15
Interactive Simulation and Training Systems Track	Jan 15	Mar 1	Sep 1	Dec 15
Manufacturing Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15
Operations Research Track	Jan 15	Mar 1	Sep 1	Dec 15
Quality Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15
Simulation Modeling and Analysis Track	Jan 15	Mar 1	Sep 1	Dec 15
Systems Engineering and Management Track	Jan 15	Mar 1	Sep 1	Dec 15
Master of Science in Industrial Engineering	Jan 15	Mar 1	Sep 1	Dec 15

Review of Academic Performance

The department of Industrial Engineeering and Management Systems monitors student progress and may revert any student to non-degree status if performance standards or academic progress are not maintained. Satisfactory academic performance in a program includes, but is not limited to, maintaining at least a 3.0 GPA in all graduate work taken as part of (or transferred into) the program of study. Satisfactory performance also involves maintaining the standards of academic progress and professional integrity expected in our discipline. Failure to maintain these standards may result in termination of the student from the program.

As stated elsewhere in this catalog, up to two "Cs" are permitted in a program of study. Grades lower than "C" (including "C-") are not acceptable. If the course where a "C-" or lower was awarded is an elective course, the student will be required to replace that elective in the program of study (the grade will still affect the GPA). If the course in question is a required course, the student may not be allowed to enroll in graduate courses in that major and will be removed from courses currently being taken in that major. If a student is reverted to non-degree-seeking status, reinstatement to graduate student status in that major can occur only through a formal appeal to the Department's Graduate Committee.

M.S.I.E. and M.S. Degrees

Minimum Hours Required for M.S.I.E. or M.S.—30 Credit Hours for Thesis Option or 36 Credit Hours for Non-thesis Option

The M.S.I.E. degree requires either an undergraduate degree in Industrial Engineering or another engineering discipline. It is offered as a 36-credit-hour program without a thesis; however, Bachelor of Science in Industrial Engineering (B.S.I.E.) graduates may elect a 30-credit-hour program that includes a thesis. The M.S. degree requires an undergraduate degree in Engineering or a closely related discipline and is also available with thesis (30 credit hours) or non-thesis (36 credit hours) options. Thesis students conduct an oral defense of their theses. Non-thesis students must pass an oral comprehensive examination at the end of their program of study.

Research studies are required in one or more courses. The research study and report will focus on reviewing and analyzing contemporary research in a student's particular specialization within the profession in order to help students acquire knowledge and skills pertaining to research-based best practices in that specialization area. In addition, students may engage in directed independent studies, directed research or a research report during their studies.

A program of study must be developed with the graduate program director and meet with departmental approval. Required courses vary depending on the program and are supplemented by electives that may include courses offered by other departments. A student with an undergraduate degree outside of the selected departmental discipline may be required to satisfy an articulation program.

Students on assistantships must take 9 credit hours per semester to satisfy the university requirement for full-time status. Most students working full time take 6 credit hours per semester. At that rate, the program can be completed in 6 semesters or less. However, students with more time available and an early start on a thesis can finish the program in 3 semesters.

Note: At least one-half of the credit hours (including thesis hours) required in a master's program of study must be taken in 6000-level courses.

The Florida Engineering Educational Delivery System (FEEDS)

Many of the graduate courses offered by the department or required in the M.S.I.E./M.S. programs (except for those with laboratories) are offered through the Florida Engineering Educational Delivery System (FEEDS), which provides video-streamed versions of classes over the Internet. The following M.S. program options are available entirely through FEEDS:

- Master of Science in Industrial Engineering
- Engineering Management Track
- High Performance Internal Combustion Engine Optimization Focus
- Interactive Simulation and Training Systems Track
- Operations Research Track
- Quality Engineering Track
- Simulation Modeling and Analysis Track

In addition, all required courses for a Ph.D. in Industrial Engineering are offered through FEEDS.

General College Requirements

Master of Science in Industrial Engineering (M.S.I.E.)

The M.S.I.E. curriculum builds on an undergraduate engineering degree to develop a stronger systems focus and analytical capability.

The following two options are available for students with a B.S.I.E.:

Option 1: Generalist—This program can be taken entirely through FEEDS.

The following requirements must be satisfied:

- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis **or** ESI 6358 Decision Analysis (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)
- Four 6000-level electives and two other electives (nonthesis option), **or** 6000-level elective, thesis, and one additional elective

Option 2: Follow the requirements for any M.S. track.

This program can be taken entirely through FEEDS. The following courses are required for students with other Bachelor of Science degrees in Engineering:

Prerequisites

- Computer programming capability. C, C++, or Java recommended.
- EIN 3314C Work Measurement and Design (3 credit hours)
- EIN 4333C Industrial Control Systems (3 credit hours)
- EIN 4391C Manufacturing Engineering (3 credit hours)

Program of Study

- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 5248C Ergonomics (3 credit hours)
- EIN 6336 Production and Inventory Control (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)
- Two 6000-level electives

Master of Science

The M.S. curriculum offers tracks in Engineering Management, Human Engineering/Ergonomics, Operations Research, Manufacturing Engineering, Quality Engineering, Interactive Simulation and Training Systems, and Simulation Modeling and Analysis.

Engineering Management Track

Engineering Management focuses on effective decision-making in engineering and technological organizations. Addressing the needs of engineers and scientists moving into management positions, engineering management complements their technical backgrounds with the human aspects, organizational and financial issues, project considerations, resource allocation, and the extended analytical tools required for effective decision-making and program management. This program is designed for technically qualified individuals who plan to assume a management role in project or program-oriented environments in industry or government. It provides the analytical, organizational, and managerial skills to bridge the gap between a technical specialty and technical management.
This program can be completed through FEEDS.

Prerequisites

- Mathematics through Calculus III (MAC 2313)
- Computer programming capability. C, C++, or Java recommended

Required Courses—12 Credit Hours

- EIN 5108 The Environment of Technical Organizations (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 6182 Engineering Management (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- ESI 6224 Quality Management (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet the requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Human Engineering/Ergonomics Track

As technology has become more sophisticated, the need to design for the human user has become more difficult, yet even more important. Human engineering and ergonomics assists in ensuring that as technology advances, the abilities, limitations, and needs of humans are considered in the system design. This not only supports the needs of the user, it also optimizes the efficiency and usability of the system designed. Traditionally, ergonomics has been associated with biomechanical issues and work measurement and performance issues in physical system design, as well as occupational and industrial safety. The broader focus of human engineering encompasses those issues as well as incorporating the reaction and effectiveness of human interaction with systems, both physical systems and virtual systems such as computer-based models. This option is designed for students who have an undergraduate degree in Engineering or a closely related discipline. The program is designed to provide students with the necessary knowledge in human engineering and ergonomics to effectively design tasks, industrial systems, and work environments that maximize human performance, safety, and overall productivity.

Prerequisites

- MAC 2313 Mathematics through Calculus III
- EIN 3314C Work Measurement and Design
- EIN 4243C Human Engineering (or equivalent)
- Computer programming capability. C, C++, or Java recommended

Required Courses—12 Credit Hours

- EIN 5248C Ergonomics (3 credit hours)
- EIN 6279C Biomechanics (3 credit hours) **or** EIN 6270C Work Physiology (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 5140 Project Engineering (3 credit hours)
- EIN 6215 System Safety Engineering and Management (3 credit hours)
- EIN 6258 Human Computer Interaction (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)

- Psychology Elective (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet the requirement.

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Interactive Simulation and Training Systems Track

The Interactive Simulation and Training Systems Track focuses on providing a fundamental understanding of significant topics relative to systems and the requirements, design, development, and use of such systems for knowledge transfer in the technical environment. Additionally, the Interactive Simulation and Training Systems Track addresses the evolving and multiple discipline application of interactive simulation by providing a wealth of electives to support development of individual student interests and talents. In conjunction with UCF's Institute for Simulation and Training, industrial organizations involved in simulation in the central Florida region, military organizations, and other governmental organizations, the program provides exposure to both military and commercial interactive simulation and training systems.

The track's emphasis is on the application and development of interactive simulation and training systems to meet various requirements including, but not limited to: simulators, skill trainers, organizational learning systems, computer and web-based interactive simulation systems and other novel interactive simulation efforts. The interactive simulation and training systems curriculum prepares individuals with an undergraduate degree in engineering, science, education, psychology, mathematics or other related disciplines for careers in simulation, focusing particularly on the interactive simulation and training systems industries.

This program can be taken entirely through FEEDS.

Prerequisites

- Computer programming capability. C, C++, or Java recommended
- Mathematics through Differential Equations (MAP 2302)

Required Courses—9 Credit Hours

- EIN 5255C Interactive Simulation (3 credit hours)
- EIN 5317 Training System Design (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)

Restricted Electives—12 Credit Hours

Select four of the following courses.

- EIN 6645 Real-Time Simulation Agents (3 credit hours)
- EIN 6649C Intelligent Tutoring Training System Design (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6532 Object-Oriented Simulation (3 credit hours)
- EIN 6258 Human Computer Interaction(3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 6647 Intelligent Simulation (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Manufacturing Engineering Track

The design and operation of manufacturing systems requires a broad knowledge of manufacturing processes and systems, an understanding of the information base required for effective system operation, and the integration of information with those processes and systems to improve productivity. The Manufacturing Engineering graduate program provides that basic knowledge and supports education in new manufacturing concepts such as concurrent design and manufacturing, the virtual factory, and agile manufacturing. The Manufacturing Engineering curriculum builds on an undergraduate degree in Engineering, Mathematics, Computer Science, or an allied field to develop a strong understanding of manufacturing engineering, manufacturing systems, and the tools required to design, improve, and manage those systems.

Prerequisites

- Computer programming capability. C, C++, or Java recommended
- Mathematics through Differential Equations (MAP 2302)

Required Courses

- EIN 6336 Production and Inventory Control (3 credit hours)
- EIN 5368C Integrated Factory Automation Systems (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- EGN 5858C Prototyping and Product Realization (3 credit hours) **or** EIN 6459 Concurrent Engineering (3 credit hours)

Restricted Electives—12 Credit Hours

Select three of the following courses.

- EIN 6339 Operations Engineering (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 5607C Computer Control of Manufacturing Systems (3 credit hours)
- EIN 5248C Ergonomics (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

High Performance Internal Combustion Engine Optimization Focus

The High Performance Engine Optimization Focus of the Manufacturing Engineering Track focuses on developing both the theoretical basis and the practical skills necessary to develop racing engines. The theoretical basis includes advanced concepts for the induction, combustion and exhaust systems, component design, data analysis and systems design. The practical skills include instrumentation, dynamometer operation, flow bench operation, engine assembly, and metrology. This balance between the theoretical and practical prepares the student for a position with a professional racing team or as an engineer with an engine development organization.

Students selecting to pursue a focus on High Performance Internal Combustion Engine Optimization must take the following course work.

Prerequisites

- Computer programming capability. C, C++, or Java recommended
- Mathematics through Differential Equations (MAP 2302)

Required Courses—12 Credit Hours

- EGN 5720 Internal Combustion Engine Analysis and Optimization (3 credit hours)

- EGN 6721C Experimental Methods for High Performance Engine Manufacturing (3 credit hours)
- EIN 5607C Computer Control of Manufacturing Systems (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)*

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 5368C Integrated Factory Automation Systems (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)
- EGN 5858C Prototyping and Product Realization (3 credit hours) **or** EIN 6459 Concurrent Engineering (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Operations Research Track

Operations Research uses mathematics and computer-based systems to model operational processes and decisions in order to develop and evaluate alternatives that will lead to gains in efficiency and effectiveness. Drawing on probability, statistics, simulation, optimization, and stochastic processes, Operations Research provides many of the analytic tools used by industrial engineers as well as by other analysts to improve processes, decision-making, and management by individuals and organizations. This track is designed for students who have an undergraduate degree in engineering, mathematics, or science. The Operations Research curriculum builds on an undergraduate Engineering, Mathematics, or Science degree to develop a strong modeling and analytical capability to improve processes and decision-making.

This program can be taken entirely through FEEDS.

Prerequisites

- Mathematics through Differential Equations (MAP 2302)
- Operations Research (ESI 4312)

- Computer programming capability. C, C++, or Java recommended

Required Courses—12 Credit Hours

- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 6418 Linear Programming and Extensions (3 credit hours) **or** ESI 5419C Engineering Applications of Linear and Nonlinear Optimization (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- ESI 6336 Queueing Systems (3 credit hours)

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 6336 Production and Inventory Control (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6217 Statistical Aspects of Digital Simulation (3 credit hours)
- ESI 6532 Object-oriented Simulation (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Electives (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Quality Engineering Track

Quality Engineering focuses on improving product and process quality in manufacturing and service industries. Quality Engineering provides both the quantitative tools for measuring quality and the managerial focus and organizational insight required to implement effective continuous improvement programs and incorporate the voice of the customer. The Quality Engineering curriculum builds on an undergraduate degree in Engineering, Science, Mathematics, or a closely related discipline to provide the necessary knowledge to plan, control, and improve the product assurance function in government, military, service, or manufacturing organizations.

This program can be taken entirely through FEEDS.

Prerequisites

- Computer programming capability. C, C++, or Java recommended
- Mathematics through Differential Equations (MAP 2302)

Required Courses—12 Credit Hours

- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6224 Quality Management (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 5140 Project Engineering (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- ESI 5227 Total Quality Improvement (3 credit hours)
- EIN 6336 Production and Inventory Control (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)
- EIN 5368C Integrated Factory Automation Systems (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (non-thesis option)

Simulation Modeling and Analysis Track

Simulation Modeling and Analysis focuses on providing a fundamental understanding of the functional and technical design requirements for simulation in manufacturing and service industries. The track is based on a systems modeling paradigm and provides coding and development capability in the context of a broader systems framework. Significant exposure to design and analysis aspects is a core element of the track. The Simulation Modeling and Analysis curriculum prepares individuals with an undergraduate degree in Engineering, Science, Mathematics, or a closely related discipline for careers in simulation, focusing particularly on using simulation as an analysis and design tool for the manufacturing and service industries.

This program can be taken entirely through FEEDS.

Prerequisites

- Computer programming capability. C, C++, or Java recommended
- Mathematics through Differential Equations (MAP 2302)
- Operations Research (ESI 4312)*

* This requirement may be met by taking ESI 5316 as part of the program of study.

Required Courses—12 Credit Hours

- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6532 Object-Oriented Simulation (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 6217 Statistical Aspects of Digital Simulation (3 credit hours)

Restricted Electives—9 Credit Hours

Select three of the following courses.

- EIN 5255C Interactive Simulation (3 credit hours)
- EIN 5317 Training System Design (3 credit hours)
- EIN 6258 Human-Computer Interaction (3 credit hours)
- EIN 6645 Real-Time Simulation Agents (3 credit hours)
- ESI 6336 Queueing Systems (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)

Thesis Option—9 Credit Hours

- EIN 6971 Thesis (6 credit hours)
- Additional Elective (3 credit hours)

Non-thesis Option—15 Credit Hours

- Electives (15 credit hours), including 6000-level courses as needed to meet requirement

Minimum Hours Required for M.S.—30 credit hours (thesis option) or 36 credit hours (nonthesis option)

Systems Engineering and Management Track

This Systems Engineering and Management program is designed for the working professional and will offer an accelerated process for obtaining a Master of Science degree in 21 months. This is a special program that is not currently available to all students. In order to assure consistency, the program is offered to students in cohort groups on site and only at KSC. This program is

based on a systems modeling paradigm and its structure will provide the many educational services typically included in executive style programs.

Required Courses—36 Credit Hours

To successfully complete the degree program students must complete 36 credit hours of course work which includes two 3-credit hour capstone experience courses. Active participation in the program will require the students to take courses in a lock-step sequence as a cohort group, to provide the professional interaction, intellectual stimulation, support and networking opportunities for participants in the program.

- EIN 5140 Project Engineering (3 credit hours)
- EIN 5117 Management Information Systems I (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- ESI 6224 Quality Management (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6551C Systems Engineering (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours)
- EIN 5108 The Environment of Technical Organizations (3 credit hours)
- EIN 6182 Engineering Management (3 credit hours)
- EIN 6938 Space Industry Capstone Experience I (3 credit hours)

Non-thesis Option—36 Credit Hours

Note: Thesis Option Not Available

Accelerated Undergraduate and Graduate Program in Industrial Engineering

The accelerated undergraduate/graduate program in Industrial Engineering allows highly qualified undergraduate majors in Industrial engineering to begin taking graduate-level courses that will count toward their master's degree while completing their baccalaureate degree program. Participation will enable completion of the Bachelor of Science and Master of Science degrees in five instead of six years for students enrolled in full-time course work.

The B.S.I.E. is awarded after completion of 71 hours of engineering courses and all other university requirements, and the M.S.I.E. 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 or 6000 level courses of grades B (3.0) or better may be counted towards the B.S. and M.S. degrees. Additional notes on the Accelerated Undergraduate and Graduate Program in Industrial 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.

Graduate Requirements

Please see graduate program requirements noted above.

Doctor of Philosophy in Industrial Engineering

The Ph.D. is primarily intended for a student with a master's degree in Industrial Engineering or a closely related discipline. The program is intended to allow a student to study in depth, with emphasis on some aspect of industrial engineering, such as manufacturing, engineering management, operations research, simulation and modeling, interactive simulation, quality, or human engineering/ergonomics.

General College Requirements

Degree Requirements

Total Hours Required for Ph.D.—Minimum of 81 credit hours beyond the bachelor's degree; minimum of 45-51 credit hours beyond the master's degree.

The Ph.D. degree requires a minimum of 81 credit hours of graduate course work, 24 of which will be dissertation hours. For students entering with an M.S. degree, the minimum required additional hours (including dissertation) will be 45 (if the student's M.S. degree had 36 hours of study) or 51 hours (if the student's M.S. degree had 30 hours). Graduate course work includes 5000 or higher level courses, with a maximum of 12 credit hours of independent study or directed research. A total of 30 to 33 credit hours are specified in required Industrial Engineering subjects. Additional course work is usually taken in the student's research area. While at UCF, at least 6 credit hours must be taken outside of the student's area of specialization. There is a residency requirement of two continuous semesters in full-time graduate student status (minimum of 9 total credit hours) after acceptance into the doctoral program at UCF.

As a pre-doctoral student at the beginning of the Ph.D. program, a preliminary program of study must be developed with the graduate program coordinator and meet with departmental approval. At this time transfer credit will be evaluated on a course-by-course basis. After completion of the Qualifying Examination and admission as a doctoral student, the official program of study is developed with an advisor and must meet with departmental approval. The student's dissertation committee approves the final program of study after passing the Candidacy Examination. The degree must be completed within seven years from the date of admission as a pre-doctoral student and within four years of passing the Candidacy Examination.

This program can be taken entirely through FEEDS.

Transfer Credits

A maximum of 36 semester credit hours of graduate course work may be transferred toward these requirements.

Examinations

In addition to the Qualifying Examination, the student must pass a Candidacy Examination, a Dissertation Proposal Examination, and a Dissertation Defense Examination. The Candidacy Examination may be taken any time after successful completion of the qualifying examination and typically consists of a written and oral presentation of a research area to the Dissertation Committee followed by a written examination to determine if the student has the breadth and depth of knowledge required to conduct independent research in the proposed area. The Dissertation Proposal Examination consists of a written and oral presentation of a detailed dissertation proposal. The Dissertation Defense Examination is an oral examination taken in defense of the written dissertation.

Prerequisites/Co-requisites

Students must have background in the following areas.

- Computer programming capability. C, C++, or Java recommended
- Calculus through Differential Equations

Required Courses—21 Credit Hours

- EIN 5140 Project Engineering (3 credit hours)
- EIN 6336 Production and Inventory Control (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)

Articulation

Students without a B.S.I.E. (or M.S.I.E. from UCF) degree or without the F.E. or the P.E. in I.E. have four additional required courses. These students must take at least one course from each of the following areas and a second course from one of the areas.

Ergonomics

- EIN 6270C Work Physiology (3 credit hours)
- EIN 6264C Industrial Hygiene (3 credit hours)
- EIN 6258 Human-Computer Interaction (3 credit hours)
- EIN 6279C Biomechanics (3 credit hours)
- EIN 6215 Systems Safety Engineering and Management (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 5248C Ergonomics (3 credit hours)

Quality/Manufacturing

- ESI 6225 Quality Design and Control (3 credit hours)
- ESI 6224 Quality Management (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 5227 Total Quality Improvement (3 credit hours)

- EIN 6398 Advanced and Nontraditional Manufacturing Processes (3 credit hours)
- EIN 6330 Quality Control in Automation (3 credit hours)
- EIN 5607C Computer Control of Manufacturing System (3 credit hours)s
- EIN 5415C Tool Engineering and Manufacturing Analysis (3 credit hours)
- EIN 5392C Manufacturing Systems Engineering (3 credit hours)
- EIN 5368C Integrated Factory Automation Systems (3 credit hours)
- EGN 5858C Prototyping and Product Realization (3 credit hours)
- EGN 5855C Metrology (3 credit hours)

Other

- EIN 5117 Management Information Systems I (3 credit hours)
- ESI 6336 Queueing Systems (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- ESI 5359 Risk Assessment and Management (3 credit hours)
- EIN 5346 Engineering Logistics (3 credit hours)
- EIN 5388 Forecasting (3 credit hours)

Required Specialization Core—9-12 Credit Hours

Select one of the following areas of specialization.

Industrial Engineering

- EIN 5117 Management Information Systems I (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)
- ESI 6418 Linear Programming and Extensions (3 credit hours)

Interactive Simulation

- EIN 5255 Interactive Simulation (3 credit hours)
- EIN 5317 Training System Design (3 credit hours)
- EIN 6645 Real-Time Simulation Agents (3 credit hours)
- EIN 6649C Intelligent Tutoring Training System Design (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)

Simulation Modeling and Analysis

- ESI 6217 Statistical Aspects of Digital Simulation (3 credit hours)
- ESI 6532 Object-oriented Simulation (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)

Operations Research

- ESI 6336 Queueing Systems (or STA 5825 Stochastic Processes and Applied Probability Theory) (3 credit hours)
- ESI 6418 Linear Programming and Extensions (3 credit hours)

- STA 6236 Regression Analysis (3 credit hours)

Quality

- ESI 5227 Total Quality Improvement (3 credit hours) or ESI 6224 Quality Management (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)

Human Engineering/Ergonomics

- EIN 5248C Ergonomics (3 credit hours)
- EIN 6279C Biomechanics (3 credit hours)
- EIN 6258 Human Computer Interaction (3 credit hours)

Manufacturing

- EIN 5368C Integrated Factory Automation Systems (3 credit hours)
- EIN 5392C Manufacturing Systems Engineering (3 credit hours)
- EIN 6459 Concurrent Engineering (3 credit hours)

Management Systems

- EIN 5108 The Environment of Technical Organizations (3 credit hours)
- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 6182 Engineering Management (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)

Two courses at UCF outside of student's area of specialization—6 Credit Hours

Electives—24-30 Credit Hours

Dissertation—24 Credit Hours

Dissertation Committee

- The Dean, through the Chairs, is responsible for committee formation, additions, and deletions. The doctoral committee must consist of a minimum of five members: three must be faculty members from within the students department, and one must be at large from outside the Industrial Engineering Management Systems Department. The committee Chair must be a member of the department graduate faculty approved to direct dissertations. Faculty members with joint appointments in IEMS serve as department-faculty committee members. Adjunct

faculty and off-campus experts may serve as the outside-the-department person in the committee as well as serve as co-chairs of the committee, with the approval of the department Chair. Program areas may further specify additional committee membership. The Division of Graduate Studies reserves the right to review appointments to advisory committees, place a representative on any advisory committee, or appoint a co-advisor.

- In unusual cases, with approval from the program Chair, two professors may chair the committee jointly. 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.

IEMS Graduate Courses by Areas of Study

Engineering Management

- EIN 5108 The Environment of Technical Organizations (3 credit hours)
- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 5356 Cost Engineering (3 credit hours)
- EIN 5346 Engineering Logistics (3 credit hours)
- EIN 6182 Engineering Management (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours)

Ergonomics

- EIN 5248C Ergonomics (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 6215 System Safety Engineering and Management (3 credit hours)
- EIN 6279C Biomechanics (3 credit hours)
- EIN 6258 Human Computer Interaction (3 credit hours)
- EIN 6264C Industrial Hygiene (3 credit hours)
- EIN 6270C Work Physiology (3 credit hours)

Manufacturing/Operations Management

- EGN 5720 Internal Combustion Engine Analysis and Optimization (3 credit hours)

- EGN 6721C Experimental Methods for High Performance Engine Manufacturing (3 credit hours)
- EIN 5368C Integrated Factory Automation Systems (3 credit hours)
- EIN 5388 Forecasting (3 credit hours)
- EIN 5392C Manufacturing Systems Engineering (3 credit hours)
- EIN 5607C Computer Control of Manufacturing Systems (3 credit hours)
- EIN 6336 Production and Inventory Control (3 credit hours)
- EIN 6459 Concurrent Engineering (3 credit hours)
- EIN 6425 Scheduling and Sequencing (3 credit hours)
- EIN 6930 Manufacturing Engineering Seminar (3 credit hours)
- EGN 5858C Rapid Prototyping

Operations Research

- ESI 5306 Operations Research (3 credit hours)
- ESI 5419C Engineering Applications of Linear and Nonlinear Optimization (3 credit hours)
- ESI 6336 Queueing Systems (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- ESI 6418 Linear Programming and Extensions (3 credit hours)
- ESI 6448 Network Analysis and Integer Programming (3 credit hours)
- ESI 6551C Systems Engineering (3 credit hours)

Simulation

- EIN 5255C Interactive Simulation (3 credit hours)
- EIN 5317 Training System Design (3 credit hours)
- EIN 6645 Real-Time Simulation Agents (3 credit hours)
- EIN 6647 Intelligent Simulation (3 credit hours)
- EIN 6649C Intelligent Tutoring Training System Design (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6217 Statistical Aspects of Digital Simulation (3 credit hours)
- ESI 6529 Advanced Systems Simulation (3 credit hours)
- ESI 6532 Object-oriented Simulation (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)

Statistics and Quality Control

- ESI 5227 Total Quality Improvement (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6224 Quality Management (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)
- ESI 5219 Engineering Statistics (3 credit hours)

Other

- EIN 5936 Seminar in Industrial Engineering: Doctoral Research (1 credit hour)

Financial Support

Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Financing Grad School, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Key points about financial support:

- If you are interested in financial assistance, you are strongly encouraged to apply for admission early. A complete application for admission, including all supporting documents, must be received by the priority date listed for your program under "Admissions."
- You must be admitted to a graduate program before the university can consider awarding financial assistance to you.
- If you want to be considered for loans and other need-based financial assistance, review the UCF Student Financial Assistance website at http://finaid.ucf.edu and complete the FAFSA (Free Application for Federal Student Aid) form, which is available online at http://www.fafsa.ed.gov. Apply early and allow up to six weeks for the FAFSA form to be processed.
- UCF Graduate Studies awards university graduate fellowships, with most decisions based on nominations from the colleges and programs. To be eligible for a fellowship, students must be accepted as a graduate student in a degree program and be enrolled full-time. University graduate fellowships are awarded based on academic merit and therefore are not affected by FAFSA determination of need.
- Please note that select fellowships do require students to fill out a fellowship application (either a university fellowship application, an external fellowship application, or a college or school fellowship application). For university fellowship applications, see Financing Grad School.
- For information on assistantships (including teaching, research, and general graduate assistantships) or tuition support, contact the graduate program director of your major.

Contact Information

All programs:

Mr. Mark Calabrese, PE, Executive Officer
Phone Number: 407-823-4557
gradiems@mail.ucf.edu

Graduate Certificate in Applied Operations Research

Description

Operations research (OR) models and solution techniques provide a powerful arsenal for solving complex resource allocation and management problems. For instance, OR has been used to solve many of the scheduling, distribution, staffing and design problems in industry. As more powerful desktop computers and software become available, the potential to apply OR models and methods to such problems will grow. This graduate certificate program gives students a good overview of OR tools, develops competence in modeling programs and provides practice and hands-on experience with OR tools.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Applied Operations Research		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5306 Operations Research (3 credit hours)
- ESI 5419C Engineering Applications of Linear and Nonlinear Optimization (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

Graduate Certificate in Design for Usability

Description

Too often we hear about products, services, or systems that are supposedly designed with the user in mind, only to discover that the design is ineffective or unfriendly to users. The Graduate Certificate in Design for Usability educates students in the methods of user-centered design and usability engineering that can be used to assess and assure usability throughout a product, service or system development cycle. Students will learn how to design products that are both ergonomically sound and "user-friendly," as well as how to plan and conduct usability tests, analyze related data and use the results to improve the design of a product, service or system.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Design for Usability		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- EIN 5248C Ergonomics (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 6258 Human Computer Interaction (3 credit hours)
- ESI 6247 Experimental Design and Taguchi Methods (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

Graduate Certificate in Industrial Ergonomics and Safety

Description

Because of increasing costs due to injuries, on-the-job accidents, and rehabilitation, interest in injury and accident prevention has increased dramatically. Designing workplaces to accommodate human workers is a key to improving worker safety and occupational health. The Graduate Certificate in Industrial Ergonomics and Safety prepares students in the design and implementation of an effective human engineering/ergonomics effort within an occupational setting.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Industrial Ergonomics and Safety		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—15 Credit Hours Minimum

- EIN 5248C Ergonomics (3 credit hours)
- EIN 6215 System Safety Engineering and Management (3 credit hours)
- EIN 6279C Biomechanics (3 credit hours)
- EIN 6264C Industrial Hygiene (3 credit hours)
- EIN 6270C Work Physiology (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

Graduate Certificate in Project Engineering

Description

Engineers increasingly are found in leadership positions. They must have certain management skills in order to be effective in such a role. The Graduate Certificate in Project Engineering is designed to meet the needs of engineers moving into management and other leadership roles by complementing their technical backgrounds with the human aspects, organizational and financial issues, project considerations, and analytical tools for effective decision making.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Project Engineering		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- EIN 5108 The Environment of Technical Organizations (3 credit hours)
- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5140 Project Engineering (3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (3 credit hours) **or**
  ESI 6358 Decision Analysis (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

GRADUATE CERTIFICATE IN QUALITY ASSURANCE

Description

Much of the resurgence of U.S. products in the global marketplace has been due to an increased emphasis on quality. Today's consumers are offered many alternatives to meet their needs, and they have consequently become very discriminating in their purchases. In addition, companies seek to be known as a quality organization, not merely the producer of quality products. The Graduate Certificate in Quality Assurance provides students with the knowledge they need to improve the quality and reliability of the goods and services they produce and to institute steps to make their organizations more competitive through an overall commitment to quality.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Quality Assurance		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5227 Total Quality Improvement (3 credit hours) **or**
  ESI 6224 Quality Management (3 credit hours)
- ESI 5236 Reliability Engineering (3 credit hours)
- ESI 6225 Quality Design and Control (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

GRADUATE CERTIFICATE IN SYSTEMS SIMULATION

Description

Discrete event simulation provides very powerful modeling capabilities to engineers. Simulation is particularly valuable because models of complex systems can be constructed and probabilistic or random forces can be represented in those models. The Graduate Certificate in Systems Simulation for engineers provides students with the necessary background in probability and statistics, fundamental simulation modeling skills, essentials for designing and analyzing simulation experiments, and an introduction to an area of advanced simulation modeling.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Systems Simulation		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- ESI 5219 Engineering Statistics (3 credit hours)
- ESI 5531 Discrete Systems Simulation (3 credit hours)
- ESI 6217 Statistical Aspects of Digital Simulation (3 credit hours)
- ESI 6532 Object-oriented Simulation (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

Graduate Certificate in Training Simulation

Description

Because of the tremendous growth in military and commercial training simulation, many people in this industry are facing the need for additional education. The Graduate Certificate in Training Simulation provides a fundamental understanding of the significant topics regarding systems, requirements, design, development and use of training simulations.

Admission

Admission is open to those with a bachelor's degree from a regionally accredited institution. An application to the graduate certificate program and official transcripts must be submitted. Applicants must apply online.

Application Due Dates

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Graduate Certificate in Training Simulation		Jul 15	Dec 1	Apr 15

Requirements

Required Courses—12 Credit Hours Minimum

- EIN 5255C Interactive Simulation (3 credit hours)
- EIN 5317 Training System Design (3 credit hours)
- EIN 6645 Real-Time Simulation Agents (3 credit hours)
- EIN 6649C Intelligent Tutoring Training System Design (3 credit hours)

Contact Info

José Sepúlveda, Ph.D., P.E., Associate Professor
Phone Number: 407-823-5307
gradiems@mail.ucf.edu

Mechanical Engineering

Description

The Master of Science degree in Mechanical Engineering (M.S.M.E.) is intended primarily for a student with a bachelor's degree in Mechanical or Aerospace engineering or a closely related discipline obtained from a recognized accredited institution. The master's program offers the following tracks: Computer-Aided Mechanical Engineering, Mechanical Systems, Miniature Engineering Systems, Professional, and Thermofluids.

The Doctor of Philosophy (Ph.D.) degree in Mechanical Engineering is intended for a student with a master's or a bachelor's degree in Mechanical or Aerospace engineering or a closely related discipline. The doctoral program is intended to allow a student to study in depth, with emphasis on research in Aerospace Systems, Mechanical Systems, or Thermofluids.

Degrees Offered

Master of Science in Mechanical Engineering

- Computer-Aided Mechanical Engineering Track
- Mechanical Systems Track
- Miniature Engineering Systems Track
- Professional Track
- Thermofluids Track

Doctor of Philosophy in Mechanical Engineering

Admission

For information on general UCF graduate admissions requirements that apply to all prospective students, please visit the Admissions and Registration section of the Graduate Catalog. Applicants must apply online. Please be sure to submit all requested material by the established deadline(s).

The College of Engineering and Computer Science requires that you fill out a pre-application form (www.graduate.cecs.ucf.edu) before you complete the application for graduate admission. The deadlines for the pre-application form can be found on the Prospective Student Page on the College of Engineering and Computer Science website.

Master of Science in Mechanical Engineering (M.S.M.E.)

The Master of Science degree in Mechanical Engineering (M.S.M.E.) is intended primarily for students with a bachelor's degree in Mechanical or Aerospace engineering or a closely related discipline obtained from a recognized accredited institution. Minimum requirements for admission to regular status are a 3.0 grade point average (A=4.0) in the last 60 attempted hours of undergraduate study from an accredited institution, a competitive score on the Graduate Record Examination (GRE), and for international students (except those who are from countries where English is the only official language or those who have earned a degree from an accredited U.S. college or university), a score of 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL).

In certain circumstances a provisional admission may be extended to students who have a grade point average below 3.0 but otherwise meet university requirements. Additional courses may be required to correct deficiencies. Students should contact the MMAE Graduate Coordinator for more information.

Doctor of Philosophy in Mechanical Engineering

The Doctor of Philosophy (Ph.D.) degree in Mechanical Engineering is intended primarily for students with a master's or a bachelor's degree in Mechanical or Aerospace engineering or a closely related discipline obtained from a recognized accredited institution. Minimum requirements for admission to regular status are a 3.0 grade point average (A=4.0) in the last 60 attempted hours of undergraduate study from an accredited institution, a competitive score on the Graduate Record Examination (GRE), and for international students (except those who are from countries where English is the only official language or those who have earned a degree from an accredited U.S. college or university), a score of 220 (computer-based test; or equivalent score on the paper-based test) on the Test of English as a Foreign Language (TOEFL).

In certain circumstances a provisional admission may be extended to students who have a grade point average below 3.0 but otherwise meet university requirements. Additional courses may be required to correct deficiencies. Students should contact the MMAE Graduate Coordinator for more information.

Students must submit an application for graduate admission, including a resume, goals statement, and three letters of recommendation.

Admission to doctoral status requires that the student (1) pass a Ph.D. Qualifying Examination, (2) establish a Doctoral Advisory Committee and (3) submit a departmentally approved Program of Study. These steps are normally completed within the first year of study beyond the master's degree.

Application Due Dates

All students applying for fellowships must apply by the Fall Priority deadline date.

U.S. Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Mechanical Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Master of Science in Mechanical Engineering	Jan 15	Jul 15	Dec 1	Apr 15
Computer-Aided Mechanical Engineering Track	Jan 15	Jul 15	Dec 1	Apr 15
Mechanical Systems Track	Jan 15	Jul 15	Dec 1	Apr 15
Miniature Engineering Systems Track	Jan 15	Jul 15	Dec 1	Apr 15
Professional Track	Jan 15	Jul 15	Dec 1	Apr 15
Thermofluids Track	Jan 15	Jul 15	Dec 1	Apr 15

International Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Mechanical Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Master of Science in Mechanical Engineering	Jan 15	Jan 15	Jul 1	Nov 1
Computer-Aided Mechanical Engineering Track	Jan 15	Jan 15	Jul 1	Nov 1
Mechanical Systems Track	Jan 15	Jan 15	Jul 1	Nov 1
Miniature Engineering Systems Track	Jan 15	Jan 15	Jul 1	Nov 1
Professional Track	Jan 15	Jan 15	Jul 1	Nov 1
Thermofluids Track	Jan 15	Jan 15	Jul 1	Nov 1

International Transfer Applicants

Program(s)	Fall Priority	Fall	Spring	Summer
Doctor of Philosophy in Mechanical Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Master of Science in Mechanical Engineering	Jan 15	Mar 1	Sep 1	Dec 15
Computer-Aided Mechanical Engineering Track	Jan 15	Mar 1	Sep 1	Dec 15
Mechanical Systems Track	Jan 15	Mar 1	Sep 1	Dec 15
Miniature Engineering Systems Track	Jan 15	Mar 1	Sep 1	Dec 15
Professional Track	Jan 15	Mar 1	Sep 1	Dec 15
Thermofluids Track	Jan 15	Mar 1	Sep 1	Dec 15

Master of Science in Mechanical Engineering

Degree Requirements

General College Requirements

All students are expected to identify an adviser and file an official degree program of study prior to the completion of 9 credit hours of study. Students should consult with the MMAE Graduate Director for assistance in filling out a program of study. The M.S.M.E. degree is offered as a thesis or a nonthesis program in each of the five departmental tracks: Computer-Aided Mechanical Engineering, Mechanical Systems, Miniature Engineering Systems, Professional, and Thermofluids. A program of study, satisfying track requirements, must be developed prior to the completion of 9 credit hours and meet with departmental approval.

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 nonthesis option is primarily designed to meet the needs of part-time students and requires 30 credit hours of course work, at least 15 of which must be at the 6000 level. In addition, students pursuing the nonthesis option are required to take EML 6085: Research Methods in MMAE as part of their 30-credit-hour course requirement.

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 from the MMAE Department.

Computer-Aided Mechanical Engineering Track

Prerequisites (or equivalent)

- Mathematics through Differential Equations (MAP 2302)
- Modeling Methods in Mechanical and Aerospace Engineering (EML 3034)
- Thermodynamics of Mechanical Systems (EML 3101)
- Structure and Properties of Materials (EGN 3365)
- Machine Design and Analysis (EML 3500)

Minimum Hours Required for M.S.M.E.—30 (thesis option) or 30 (nonthesis option) Credit Hours

Required Courses—12 Credit Hours

All students must take the following four required courses.

- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5211 Continuum Mechanics (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 6067 Finite Elements in Mechanical, Materials and Aerospace Engineering I (3 credit hours)

Students must take at least two courses from the track specialty courses listed below. Additional courses to satisfy total credit hour requirements (30 credit hours thesis option, 30 credit hours nonthesis option) may be taken from the list of representative electives below or from the remaining MMAE course offerings. Students should consult with their faculty adviser (or Graduate Coordinator if they do not have a faculty adviser) prior to registering for classes. Note that thesis option students must take 6 credit hours of thesis and nonthesis option students must take EML 6085 Research Methods in MMAE and make a presentation on a chosen topic before a committee of faculty members. Thesis students must continue to enroll in one credit hour of thesis course work (EML 6971) until the thesis requirement is satisfied, beyond the minimum of 6 credit hours of thesis.

Track Specialty Courses—6 Credit Hours Minimum

- EGN 5858C Prototyping and Product Realization (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5025C Engineering Design Practice (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EML 6062 Boundary Element Methods in Engineering (3 credit hours)
- EML 6547 Engineering Fracture Mechanics in Design (3 credit hours)
- EML 6305C Experimental Mechanics (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I (3 credit hours)
-

Representative Electives

- EAS 6138 Advanced Gas Dynamics (3 credit hours)
- EAS 6185 Turbulent Flow (3 credit hours)
- EML 5105 Gas Kinetics and Statistical Thermodynamics (3 credit hours)
- EML 5402 Turbomachinery (3 credit hours)
- EML 6155 Convection Heat Transfer (3 credit hours)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)
- EML 5066 Computational Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5131 Combustion Phenomena (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EML 6154 Conduction Heat Transfer (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5546 Engineering Design with Composite Materials (3 credit hours)
- EML 6971 Thesis (6 credit hours)
- EML 6085 Research Methods in MMAE (required for nonthesis option) (3 credit hours)

Mechanical Systems Track

Prerequisites (or equivalent)

- Mathematics through Differential Equations (MAP 2302)
- Modeling Methods in Mechanical and Aerospace Engineering (EML 3034)
- Machine Design and Analysis (EML 3500)
- Vibration Analysis (EML 4220)
- Experimental Techniques in Mechanics and Materials (EMA 3012C)
- Feedback Control (EML 3312C)

Minimum Hours Required for M.S.M.E.—30 (thesis option) or 30 (nonthesis option) Credit Hours

Required Courses—12 Credit Hours

All students must take the following four required courses.

- EML 5060 Mathematical Methods in Mechanical, Materials, and Aerospace Engineering (3 credit hours)
- EML 5211 Continuum Mechanics (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 6067 Finite Elements in Mechanical, Materials and Aerospace Engineering I (3 credit hours)

Students must take at least two courses from the track specialty courses listed below. Additional courses to satisfy total semester hour requirements (30 credit hours thesis option, 30 credit hours nonthesis option) may be taken from the list of representative electives below or from the remaining MMAE course offerings. Students should consult with their faculty adviser (or Graduate Coordinator if they do not have a faculty adviser) prior to registering for classes. Note that thesis option students must take 6 credit hours of thesis and nonthesis option students must take EML 6085 Research Methods in MMAE and make a presentation on a chosen topic before a committee of faculty members. Thesis students must continue to enroll in one credit hour of thesis course work (EML 6971) until the thesis requirement is satisfied, beyond the minimum of 6 credit hours of thesis.

Track Specialty Courses—6 Credit Hours Minimum

- EML 6305C Experimental Mechanics (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 6223 Advanced Vibrational Systems (3 credit hours)
- EGM 6653 Theory of Elasticity (3 credit hours)
- EML 6547 Engineering Fracture Mechanics in Design (3 credit hours)

Representative Electives

- EML 5311 System Control (3 credit hours)
- EML 5546 Engineering Design with Composite Materials (3 credit hours)
- EML 6068 Finite Elements in Mechanical and Aerospace Engineering II (3 credit hours)
- EML 6062 Boundary Element Methods in Engineering (3 credit hours)
- EML 6227 Nonlinear Vibrations (3 credit hours)
- EML 5025C Engineering Design Practice (3 credit hours)
- EML 5066 Computational Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5224 Acoustics (3 credit hours)
- EML 5228C Modal Analysis (3 credit hours)
- EML 5245 Tribology (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EML 5572 Probabilistic Methods in Mechanical Design (3 credit hours)
- EML 6808 Analysis and Control of Robot Manipulators (3 credit hours)
- EML 6226 Analytical Dynamics (3 credit hours)
- EML 6971 Thesis (3 credit hours)
- EML 6085 Research Methods in MMAE (for nonthesis option) (3 credit hours)

Miniature Engineering Systems Track

Required Courses—12 Credit Hours

All students must take the following four required courses.

- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)

- EML 5290 Introduction to MEMS and Micromachining (3 credit hours)
- EML 6296 MEMS Mechanism and Design (3 credit hours)
- EEL 6326C MEMS Fabrication Laboratory (3 credit hours), or EEL 5355C Fabrication of Solid-State Devices (3 credit hours)

Students must take at least two courses from the track specialty courses listed below. Additional courses to satisfy total credit hour requirements (30 credit hours thesis option, 30 credit hours nonthesis option) may be taken from the list of representative electives below or from the remaining MMAE course offerings. Students should consult with their faculty adviser (or Graduate Coordinator, if they do not have a faculty adviser) prior to registering for classes. Note that thesis option students must take 6 credit hours of thesis and nonthesis option students must take EML 6085 Research Methods in MMAE and make a presentation on a chosen topic before a committee of faculty members. Thesis students must continue to enroll in one credit hour of thesis course work (EML 6971) until the thesis requirement is satisfied, beyond the minimum of 6 credit hours of thesis.

Track Specialty Courses—6 Credit Hours Minimum

- EML 5292 Fundamental Phenomena and Scaling Laws in Miniature Engineering Systems (3 credit hours)
- EML 5291 MEMS Materials (3 credit hours)
- EML 6299 Advanced Topics on Miniaturization (3 credit hours)
- EML 6297 MEMS Characterization (3 credit hours)
- EML 6295 Sensors and Actuators for Micro Mechanical Systems (3 credit hours)

Elective Courses

- EML 5211 Continuum Mechanics (3 credit hours)
- EML 5025C Engineering Design Practice (3 credit hours)
- ENG 5858C Prototyping and Product Realization (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)
- EML 6155 Convective heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6725 Computational Fluid Dynamics (3 credit hours)
- EML 6104 Classical Thermodynamics (3 credit hours)
- EML 5402 Turbomachinery (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EAS 5407 Mechatronics (3 credit hours)
- EML 6157 Radiation Heat Transfer (3 credit hours)
- EML 5245 Tribology (3 credit hours)
- EML 5311 System Control (3 credit hours)
- EML 5105 Gas Kinetics and Statistical Thermodynamics (3 credit hours)
- EEL 5625 Applied Control System (3 credit hours)
- EML 5546 Engineering Design with Composite Materials (3 credit hours)
- EML 6203 Advanced Vibrational Systems (3 credit hours)

- EML 6067 Finite Elements inMechanical, Materials and Aerospace Engineering I (3 credit hours)

Minimum Hours Required for M.S.M.E.—30 (thesis option) or 30 (nonthesis option) Credit Hours

Professional Track

Prerequisites (or equivalent)

- Mathematics through Differential Equations (MAP 2302)
- Modeling Methods in Mechanical and Aerospace Engineering (EML 3034)
- Thermodynamics of Mechanical Systems (EML 3101)
- Structure and Properties of Materials (EGN 3365)
- Mechanics of Materials (EGN 3331)

Minimum Hours Required for M.S.M.E.—30 (thesis option) or 30 (nonthesis option) Credit Hours

Required Courses—12 Credit Hours

All students must take the following four required courses.

- EML 5060 Mathematical Methods in Mechanical, Materials, and Aerospace Engineering (3 credit hours)
- EML 5211 Continuum Mechanics (3 credit hours)
- EML 5271 Intermediate Dynamics (3 credit hours)
- EML 6067 Finite Elements in Mechanical, Materials and Aerospace Engineering I (3 credit hours)

Students must take at least two courses from the track specialty courses listed below. Additional courses to satisfy total semester hour requirements (30 credit hours thesis option, 30 credit hours nonthesis option) may be taken from the list of representative electives below or from the remaining MMAE course offerings. Students should consult with their faculty adviser (or Graduate Coordinator if they do not have a faculty adviser) prior to registering for classes. This track is intended mainly for part-time students and may be taken under nonthesis or thesis options. Thesis option students must take 6 credit hours of thesis and nonthesis option students must take EML 6085 Research Methods in MMAE and make a presentation on a chosen topic before a committee of faculty members. Thesis students must continue to enroll in one credit hour of thesis course work (EML 6971) until the thesis requirement is satisfied, beyond the minimum of 6 credit hours of thesis.

Track Specialty Courses—6 Credit Hours Minimum

- EML 5131 Combustion Phenomena (3 credit hours)
- EML 5402 Turbomachinery (3 credit hours)
- EML 5532C Computer-Aided Design for Manufacture (3 credit hours)
- EML 6062 Boundary Element Methods in Engineering (3 credit hours)

- EML 6155 Convection Heat Transfer (3 credit hours)
- EML 6226 Analytical Dynamics (3 credit hours)
- EML 6305C Experimental Mechanics (3 credit hours)
- EML 6547 Engineering Fracture Mechanics in Design (3 credit hours)
- EML 6712 Mechanics of Viscous Flow (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I (3 credit hours)

Representative Electives

- EML 5025C Engineering Design Practice (3 credit hours)
- EML 5105 Gas Kinetics and Statistical Thermodynamics (3 credit hours)
- EAS 6138 Advanced Gas Dynamics (3 credit hours)
- EAS 6185 Turbulent Flow (3 credit hours)
- EML 5066 Computational Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5131 Combustion Phenomena (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6068 Finite Elements in Mechanical, Materials, and Aerospace Engineering II (3 credit hours)
- EML 6726 Computational Fluid Dynamics and Heat Transfer II (3 credit hours)
- EML 5237 Intermediate Mechanics of Materials (3 credit hours)
- EML 5546 Engineering Design with Composite Materials (3 credit hours)
- EML 6971 Thesis (6 credit hours)
- EML 6085 Research Methods in MMAE (required for nonthesis option) (3 credit hours)

Thermofluids Track

Prerequisites (or equivalent)

- Mathematics through Differential Equations (MAP 2302)
- Modeling Methods in Mechanical and Aerospace Engineering (EML 3034)
- Thermodynamics of Mechanical Systems (EML 3101)
- Measurements in Thermal Systems (EML 4304C)
- Fluid Mechanics II (EML 4703)
- Heat Transfer (EML 4142)

Minimum Hours Required for M.S.M.E.—30 (thesis option) or 30 (non-thesis option) Credit Hours

Required Courses—12 Credit Hours

All students must take the following four required courses.

- EML 5060 Mathematical Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 6712 Viscous Flow (3 credit hours)
- EML 5152 Intermediate Heat Transfer (3 credit hours)
- EML 6104 Classical Thermodynamics (3 credit hours)

Students must take at least two courses from the track specialty courses listed below. Additional courses to satisfy total semester hour requirements (30 credit hours thesis option, 30 credit hours nonthesis option) may be taken from the list of representative electives below or from the remaining MMAE course offerings. Students should consult with their faculty adviser (or Graduate Coordinator if they do not have a faculty adviser) prior to registering for classes. Note that thesis option students must take 6 credit hours of thesis and nonthesis option students must take EML 6085 Research Methods in MMAE and make a presentation on a chosen topic before a committee of faculty members. Thesis students must continue to enroll in one credit hour of thesis course work (EML 6971) until the thesis requirement is satisfied, beyond the minimum of 6 credit hours of thesis.

Track Specialty Courses—6 Credit Hours Minimum

- EML 5402 Turbomachinery (3 credit hours)
- EML 6155 Convection Heat Transfer (3 credit hours)
- EML 6157 Radiation Heat Transfer (3 credit hours)
- EML 6725 Computational Fluid Dynamics and Heat Transfer I (3 credit hours)
- EML 5131 Combustion Phenomena (3 credit hours)
- EML 6154 Conduction Heat Transfer (3 credit hours)
- EAS 6185 Turbulent Flow (3 credit hours)
- EAS 6138 Advanced Gas Dynamics (3 credit hours)

Representative Electives

- EAS 5302 Direct Energy Conversion (3 credit hours)
- EAS 5315 Rocket Propulsion (3 credit hours)
- EML 5025C Engineering Design Practice (3 credit hours)
- EML 5066 Computational Methods in Mechanical, Materials and Aerospace Engineering (3 credit hours)
- EML 5105 Gas Kinetics and Statistical Thermodynamics (3 credit hours)
- EML 5713 Intermediate Fluid Mechanics (3 credit hours)
- EML 6062 Boundary Element Methods in Engineering (3 credit hours)
- EML 6124 Two-Phase Flow (3 credit hours)
- EML 6158 Gaseous Radiation Heat Transfer (3 credit hours)
- EML 6144 Boiling and Condensation Heat Transfer (3 credit hours)
- EML 6726 Computational Fluid Dynamics and Heat Transfer II (3 credit hours)
- EML 6971 Thesis (6 credit hours)
- EML 6085 Research Methods in MMAE (required for nonthesis option) (3 credit hours)

Accelerated Undergraduate and Graduate Programs in Mechanical Engineering and Materials Science and Engineering

The accelerated undergraduate/graduate programs in Mechanical Engineering and Materials Science and engineering allow highly qualified undergraduate majors in Mechanical engineering to begin taking graduate-level courses that will count toward their master's degree while completing their baccalaureate degree program. Participation will enable completion of the Bachelor of Science and Master of Science degrees in five instead of six years for students enrolled in full-time course work.

The B.S.M.E. is awarded after completion of 71 hours of engineering courses and all other university requirements, and the M.S.M.E. or M.S.M.S.E are 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 or 6000 level courses of grades B (3.0) or better may be counted towards the B.S. and M.S. degrees. Additional notes on the Accelerated Undergraduate and Graduate Program in Mechanical 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.

Graduate Requirements

Please see graduate program requirements noted above.

Doctor of Philosophy in Mechanical Engineering

The Doctor of Philosophy (Ph.D.) degree in Mechanical Engineering degree is intended for students with a master's or a bachelor's degree in Mechanical or Aerospace engineering or a closely related discipline. The program is designed to allow students to study in depth, with emphasis on research in Aerospace Systems, Mechanical Systems or Thermofluids.

Degree Requirements

General College Requirements

Graduate Student Entering the Ph.D. Program with a B.S.

For a graduate student with a B.S. degree, the following are the minimum Mechanical Engineering Ph.D. program requirements: 72 credit hours of graduate course work, of which 57 credit hours are the minimum hours of course work (may include up to 12 credit hours of directed research with approved Program of Study) and 15 credit hours are the minimum hours of dissertation. The rest of the hours in the Ph.D. program can be chosen by the student in consultation with the adviser and the dissertation committee and with the approval of the Graduate Coordinator.

Minimum Course Work (may include up to 12 credit hours of directed research)—57 Credit Hours

Doctoral Dissertation—15 Credit Hours

Minimum Hours Required for Ph.D.—72 Credit Hours

Graduate Student Entering the Ph.D. Program with an M.S.

For a graduate student with an M.S. degree the following are the minimum Mechanical Engineering Ph.D. program requirements: 36 - 42 credit hours of graduate course work beyond the master's degree, of which 21 - 27 credit hours are the minimum number of hours of course work and 15 credit hours are the minimum hours of doctoral dissertation hours. The rest of the hours in the Ph.D. program can be chosen by the student in consultation with the adviser and the dissertation committee and with the approval of the Graduate Coordinator. These credit hours may include doctoral directed research hours or doctoral dissertation hours. Nonthesis M.S. degree students may take up to 9 credit hours of directed research, while M.S. thesis option students may take up to 12 credit hours of directed research toward fulfillment of additional minimum course work beyond the M.S.

Minimum Course Work (may include up to 12 credit hours of directed research)—21 (27) Credit Hours*

Doctoral Dissertation—15 Credit Hours

Minimum Hours Required for Ph.D.—36 (42) Credit Hours*

* For students who have completed a thesis option and a total of 30 credit hours at the master's level, the minimum requirement for course work will be 27 hours.

Notes:

- UCF requires that a full-time Ph.D. student be registered for 9 hours Fall and Spring semesters and 6 credit hours Summer semester.
- The University of Central Florida requires that a Ph.D. student be registered for at least 3 hours of doctoral dissertation hours upon completion of the candidacy exam and every semester thereafter until graduation.
- The MMAE department requires that a Ph.D. student submits his/her candidacy exam the academic semester immediately following his/her successfully passing the Ph.D. Qualifying Exam.
- No more than 12 credit hours of directed doctoral research may be taken toward fulfilling degree program of study course work requirements.
- Unless a completed (signed) program of study (POS) itemizing the study plan is approved prior to the end of the first semester of studies, the Graduate Coordinator of the MMAE department may choose not to accept any part of the course work (including independent studies and/or directed research) taken by the student on a program of study subsequently submitted by the student.

Examinations

In addition to the Qualifying Examination discussed above, the student must pass a Candidacy Examination and a Dissertation Defense Examination. The Candidacy Examination is taken near the end of the course work and consists of a written and oral presentation of a research proposal. The Dissertation Defense Examination is an oral examination taken in defense of the written dissertation. More information on these examinations and other requirements of the Ph.D. program are contained in the Graduate Handbook available from the MMAE Department (http://www.mmae.ucf.edu).

Dissertation Committee

- The Dean, through the Chairs, is responsible for committee formation, additions, and deletions. The doctoral committee must consist of a minimum of five members: three must be faculty members from within the student's department, and one must be at large from outside the Mechanical, Materials, and Aerospace Engineering Department. The committee Chair must be a member of the department graduate faculty approved to direct dissertations. Joint faculty members serve as department-faculty committee members as well as chairs of dissertation committees. 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. UCF Graduate Studies reserves the right to review appointments to advisory committees, place a representative on any advisory committee, or appoint a co-adviser.
- In unusual cases, with approval from the program Chair, two professors may chair the committee jointly. 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.

Financial Support

Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Financing Grad School, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Key points about financial support:

- If you are interested in financial assistance, you are strongly encouraged to apply for admission early. A complete application for admission, including all supporting documents, must be received by the priority date listed for your program under "Admissions."
- You must be admitted to a graduate program before the university can consider awarding financial assistance to you.
- If you want to be considered for loans and other need-based financial assistance, review the UCF Student Financial Assistance website at http://finaid.ucf.edu and complete the FAFSA (Free Application for Federal Student Aid) form, which is

available online at http://www.fafsa.ed.gov. Apply early and allow up to six weeks for the FAFSA form to be processed.

- UCF Graduate Studies awards university graduate fellowships, with most decisions based on nominations from the colleges and programs. To be eligible for a fellowship, students must be accepted as a graduate student in a degree program and be enrolled full-time. University graduate fellowships are awarded based on academic merit and therefore are not affected by FAFSA determination of need.
- Please note that select fellowships do require students to fill out a fellowship application (either a university fellowship application, an external fellowship application, or a college or school fellowship application). For university fellowship applications, see Financing Grad School.
- For information on assistantships (including teaching, research, and general graduate assistantships) or tuition support, contact the Graduate Coordinator of your department.

Contact Info

Doctor of Philosophy in Mechanical Engineering

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Master of Science in Mechanical Engineering

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Computer-Aided Mechanical Engineering Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Mechanical Systems Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Miniature Engineering Systems Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Professional Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

Thermofluids Track

C. Suryanarayana, Ph.D., Professor
Phone Number: 407-823-6662
gradmmae@mail.ucf.edu

University of Central Florida

M E M O R A N D U M

To:	UCF Curriculum Committee
Via:	COHPA Graduate Office
From:	Dr. Mary Ann Feldheim, Chair, Public Administration Coordinator, Nonprofit Programs
Subject:	Elective Change for Graduate Certificate in Nonprofit Management
Date:	February 22, 2017

The Department of Public Administration is requesting a change to the restricted electives for its Graduate Certificate in Nonprofit Management program. The program consists of 18 credit hours, three of which are a restricted elective.

Currently, one of the electives is SOW 6246 Policy Analysis and Social Change, which has only two credit hours. Students who choose this elective would be required to take a second elective to meet the 18-credit hour program requirement.

We are requesting that SOW 6246 be deleted from the restricted elective options and that SOW 6383 Social Work Administration (3 credit hours) be added. The pre-requisite for SOC 6383 is “Graduate Standing.” The information in this course would be invaluable to students who elect a profession in a nonprofit organization that supports the social welfare of its clients.

Thank you for your consideration of this matter.

University of Central Florida

School of Nursing

To: Graduate Curriculum Committee

From: Jean Kijek

Re: Proposed revision in Master of Science Nursing Leadership Management Track

Date: October 18, 2006

Attached please find the materials requesting a change in the MSN Nursing Leadership and Management track. It is currently 41 credits and we are proposing changes to reduce it to 36 credit hours.
Our rationale is that we have developed two new tracks, Clinical Nurse Leader and Nurse Educator Tracks which are 36 credit hours preparing non clinical specialties and want to be consistent within our non clinical specialization tracks of 36 hours. The proposed revision is now focused on preparing nurse leaders in a traditional lateral organization with focus on the larger organization systems.

College of Health and Public Affairs
P.O. Box 162210 • Orlando, FL 32816-2210 • 407-823-2744 • FAX 407-823-5675

The School of Nursing proposed changes in the MSN Nursing Leadership and Management track. It is currently 41 credits and we are proposing changes to reduce it to 36 credit hours.
Our rationale is that we have developed two new tracks, Clinical Nurse Leader and Nurse Educator Tracks which are 36 credit hours preparing non clinical specialties and we want to be consistent within our non clinical specialization tracks of 36 hours. The proposed revision is now focused on preparing nurse leaders in a traditional lateral organization with focus on the larger organization systems. The revised curriculum meets the American Nurses Credentialing Center educational requirements for national certification.

In doing course reviews, the course Nursing Environment Management Systems was found to include much of the same content as NGR 6724 (Nursing Leadership & Management II). Therefore, NGR 6723 was revised to include the content needed from NGR 6724. Consequently, NGR 6724L is not needed (was clinical for NGR 6724). NGR 6723L has been increased to 3 credit hours to add the time needed for the additional practice for the revised NGR 6723 course. To be consistent with the other non clinical specialization tracks, NGR 6946 Nursing Leadership Internship for 135 hours has been added and the track is requiring 1 graduate elective instead of 2 electives.

Nursing Leadership and Management Track – proposed changes 10-17-06

PROGRAM OF STUDY

	Current		**Proposed**	
Core Courses				
NGR 5800	Theory for APN	3	Theory for APN	3
NGR 5801	Research Methodology for APN	3	Research Methodology for APN	3
NGR 5744	Hlth Care Systems, Policy & Hlth Prof	1	Hlth Care Sys, Policy & Hlth Prof	1
NGR 5746	Cultural and Legal issues in APN	1	Cultural and Legal issues in APN	1
NGR 5745	Prof. Role Obligations & Act in APN	1	Prof. Role Obligations & Act APN	1
NGR 6813	Evidenced Based Practice for APN	3	Evidenced Based Practice for APN	3
Graduate Elective		3	Graduate Elective	3
Total		**15**		**15**
NLM Courses				
NGR 5720	Organizational Dynamics	3	Organizational Dynamics	3
NGR 5871	Health Care Informatics	3	Health Care Informatics	3
NGR 6874	Nursing Env Mngmt	3	Nursing Env Mngmt	3
NGR 6722	Financial Mngt & Resource Devel	3	Financial Mngt & Resource Devel	3
NGR 6723	Nursing Leadership and Management I	3	Nursing Leadership and Mngt	3
NGR 6723L	Nsg Ldshp Role Specialization Pract 1	2	Nsg Ldshp & Management Pract	3
NGR 6724	Nursing Leadership and Management II	3		
NGR 6724L	Nsg Ldshp Role Specialization Pract II	3	Nsg Ldshp & Mngmnt Internship	3
Electives		3		0
Total		**26**		**21**
TOTAL		**41**		**36**

College of Health and Public Affairs
P.O. Box 162210 • Orlando, FL 32816-2210 • 407-823-2744 • FAX 407-823-5675

University of Central Florida

School of Nursing
Course revision

Course Number: NGR 6723

Course Title: Nursing Leadership and Management (delete I from title)

Credit Hours: 3 (3,0)

Prerequisites: NGR 5720

Course Description: ~~Analysis, synthesis, and application of principles related to health care leadership including health care delivery systems across the continuum, patient care delivery models, staffing, personnel management, and legal and regulatory requirements.~~

In depth analysis of human resources management, regulatory compliance and systems leadership in nursing.

Course Objectives: Upon completion of the course the student will:

1. Integrate the functions and activities of the nurse as a leader in professional practice.
2. Describe and evaluate the organization of health care delivery systems, including community and population- based systems.
3. Evaluate the implications and outcomes of selected patient care delivery and staffing models in specific health care settings across the continuum.
4. Generate strategies for effective program planning, implementation, and evaluation.
5. Analyze principles of effective supervision and the management of human resources.
6. Analyze alternative approaches to recruitment and retention, starting with school age children
7. Analyze legal, regulatory and accreditation requirements in health care and their implications for nurse leaders and educators.
8. Identify and implement strategies for self-development and professional growth. (added from ngr 6724)

Topical outline:

- Critical thinking and decision making
- Macro-thinking: population based care
- Health care delivery systems globally and nationally
- Patient care delivery
- Staffing
- Personnel management-assessing, planning, and organizing

- Personnel management-Developing, directing, and intervening
- Evaluation and retention
- Nursing ethics and standards
- Health care law, regulation and accreditation (reworded)
- Emergency Preparedness (updated)
- Nurse leader professional role development

Potential textbook: pending
Extensive web resources will also be used.

Methods of evaluation: will be based on class/ cyberparticipation, course assignments, and project

Letter grades are assigned as follows:
92 - 100 = A
83 - 91 = B
75 - 82 = C
69 - 74 = D
68 or below = F

UNIVERSITY OF CENTRAL FLORIDA
SCHOOL OF NURSING
(Course Revision)

Course Number: NGR 6723L

Course Title: Nursing Leadership and Management Practicum

Course Description: Preceptor experience with a nurse leader in area of role specialization. Experience will focus on the analysis, synthesis, and application of principles related to health care leadership including health care delivery systems across the continuum, patient care delivery models, staffing, personnel management, and legal and regulatory requirements.

Credit Hours: 3 (0, 3) = 135 hours increased from two credits

Prerequisites: Admission to the MSN Program
NGR 5720 Organizational Dynamics

Co-requisites: Concurrent enrollment in NGR 6723

Course Objectives: Course work should provide students with the knowledge and skills to:

1. Observe and evaluate the role, functions, activities and behaviors of the advanced practice nurse as a leader in the specified professional practice role.
2. Integrate the professional practice specialty role within the organization of health care delivery systems.
3. Assess the relationship of health care services in a chosen delivery system to the role of the specialized professional practitioner.
4. Propose outcome indicators to measure effectiveness of specialty's contributions to chosen delivery system.
5. Generate and pilot strategies for effective program planning, implementation, and evaluation.
6. Apply principles of effective supervision to optimize function of specialty organization.
7. Apply alternative approaches to recruitment and retention, starting with school age children
8. Develop and evaluate core competencies for effective functioning in nursing role specialization.
9. Determine legal and regulatory requirements in health care and/or education and describe their impact on specialty area and role.
10. Demonstrate professional role development strategies for self and mentorship of others.

Teaching/Learning Strategies:
This course will combine practicum experience, cyber discussion and a written clinical journal.

Evaluation Methods Clinical:
Pass/Fail To pass the clinical portion of the course, students must complete all required hours, receive a satisfactory evaluation from their preceptor and faculty and have satisfactory cyber discussion and written work.

Required Textbooks:
Pending

Textbooks will be augmented by extensive role specfic, **interdisciplinary web resources** throughout the IDL modules.

Academic Integrity
The following information is from the University of Central Florida Office of Student Rights and Responsibilities:

YOUR ENROLLMENT STATUS MAY BE AT RISK! Academic Dishonesty in any form will not be tolerated!!!

The University of Central Florida has recently started an account with turnitin.com., an automated system which instructors can use to quickly and easily compare each student's report to billions of web sites, as well as an enormous database of student papers that grows with each submission. After submission of the paper, instructors receive a report that states if and how another author's work was used.
Violations of student academic behavior standards are outlined in The Golden Rule: the University of Central Florida's Student Handbook. See http://www.ucf.edu/goldenrule for further details.
1. Cheating whereby non-permissible written, visual or oral assistance including that obtained from another student is utilized on examinations, course assignments or projects. The unauthorized possession or use of examination or course related material shall also constitute cheating.
2. Plagiarism whereby another's work is deliberately used or appropriated without any indication of the source. Thereby attempting to convey the impression that such work is the student's own. Any student failing to properly credit ideas or materials taken from another has plagiarized.
3. A student who has assisted another in any of the aforementioned breach of standards shall be considered equally culpable.

ACADEMIC ACTION
* Taken by Instructor, Chair, or Dean of College*

- Counseling
- Loss of credit for specific assignment, examination or project.
- Removal from course with a grade of "F"

and/or

CONDUCT REVIEW ACTION *Taken by the Office of Student Conduct*

- Warning
- Probation
- Suspension
- Expulsion
- Permanent conduct record with UCF accessible by other institutions by request.

Date: December 6, 2006

To: College of Nursing Faculty

From: Master's Curriculum Committee and
Undergraduate Curriculum Committee

RE: Curriculum change and catalog change for RN-MSN Program (NP, CNS, Nursing L&M Tracks)

Creation of Clinical Nurse Leader (CNL) and Nurse Educator (NEd) tracks RN-MSN program

The original proposal and approval for the RN-MSN program was for NP, CNS and Nursing L&M tracks. All of these programs have had curriculum revisions. In addition, new MSN tracks have been created and are not included in the original RN-MSN program approved by the university.

The present curriculum changes are being requested so that the undergraduate nursing curriculum for RNs is consistent with the changes that were approved last year for the basic undergraduate nursing program.

The RN-MSN program has been streamlined to eliminate two courses that were unique to the RN-MSN students, which resulted in low enrollment and inefficient use of faculty resources. In addition, this revised curriculum provides more appropriate graduate course substitution for undergraduate courses.

The major change requested is a **reduction in the total number of shared undergraduate and graduate nursing credits.** The NP, CNL, NL&M, NEd Tracks will share 9 credits; the CNS track will share 12 credits toward the UG and Graduate degrees. These curriculum changes would take effect Summer, 2007.

There is **no change** in the required type or number of pre-requisites; no change in general education courses; no change in GPA or GRE requirements or total number of student credit hours. Students must still apply to the specific program and meet criteria to be accepted into the program.

Your approval is requested by electronic vote so that the changes can be submitted for inclusion in both the undergraduate and graduate catalog revisions for 2007-2008.
Thank you,

Prepared by Linda M. Hennig
RN-BSN and RN-MSN Coordinator

RN-MSN Leadership & Management Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	*Dimensions of Professional Practice* *No pre-requisites*	3
NUR 3065 & NUR 3065L	*Health Assessment* Health Assessment Lab	2 1
NUR 3165	Nursing Research *Pre or co-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics*	3
NUR 3XXX	Community Health Nursing	3
NUR 4XXX	*Pre-requisite NUR 3805*	
NUR 4837	Public Health Nursing	2
	Health Care Issues, Policy and Economics	3
NUR 4XXX	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
NGR 5720	Shared Courses:	
NGR 5781	Organizational Dynamics (for 4xxx Leadershp & Mgmt)	**3**
NUR 5800	Healthcare Informatics (for UG elective)	**3**
	Theory for APN or NGR 5XXX Grad Elective (for Elective)	**3**
	Total Required for BSN	**30**

Nurse Educator/Clinical Nurse Leader and Nurse Practitioner RN-MSN Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	Dimensions of Professional Practice No pre-requisites	3
NUR 3165	Nursing Research Pre or co-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics	3
NUR 3XXX	Community Health Nursing Pre-requisite NUR 3805	3
NUR 4XXX	Public Health Nursing	2
NUR 4837	Health Care Issues, Policy and Economics	3
NUR 4XXX	Leadership, Management, and Role Transition	3
NUR 4XXX	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
	Shared Courses:	
NGR 5003 & NGR 5004L NGR 5638 NGR 5141	Advanced Health Assessment AND Advanced Health Assessment Lab (for NUR 3065) Health Promotion (for UG elective) Pathophysiology (for UG elective)	**2** **1** **3** **3**
	Total Required for BSN	**30**

Clinical Nurse Specialist RN-MSN Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	Dimensions of Professional Practice No pre-requisites	3
NUR 3165	Nursing Research Pre-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics	3
NUR 3XXX	Community Health Nursing Pre-requisite NUR 3805	3
NUR 4XXX	Public Health Nursing	2
NUR 4837	Health Care Issues, Policy and Economics	3
NUR 4XXX	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
	Shared Courses:	
NGR 5003 &	Advanced Health Assessment (for UG 3065)	**2**
NGR 5004L	Advanced Health Assessment Lab (for 3065L)	**1**
NGR 5720	Organizational Dynamics (for Nur 4xxx Leadership/mgmt) Pathophysiology (for UG elective)	**3**
NGR 5141	Theory for APN (for UG elective)	**3**
NGR 5800		**3**
	Total Required for BSN	**30**

Date: December 6, 2006

To: College of Nursing Faculty

From: Master's Curriculum Committee and
Undergraduate Curriculum Committee

RE: Curriculum change and catalog change for RN-MSN Program (NP, CNS, Nursing L&M Tracks)

Creation of Clinical Nurse Leader (CNL) and Nurse Educator (NEd) tracks RN-MSN program

The original proposal and approval for the RN-MSN program was for NP, CNS and Nursing L&M tracks. All of these programs have had curriculum revisions. In addition, new MSN tracks have been created and are not included in the original RN-MSN program approved by the university.

The present curriculum changes are being requested so that the undergraduate nursing curriculum for RNs is consistent with the changes that were approved last year for the basic undergraduate nursing program.

The RN-MSN program has been streamlined to eliminate two courses that were unique to the RN-MSN students, which resulted in low enrollment and inefficient use of faculty resources. In addition, this revised curriculum provides more appropriate graduate course substitution for undergraduate courses.

The major change requested is a **reduction in the total number of shared undergraduate and graduate nursing credits.** The NP, CNL, NL&M, NEd Tracks will share 9 credits; the CNS track will share 12 credits toward the UG and Graduate degrees. These curriculum changes would take effect Summer, 2007.

There is **no change** in the required type or number of pre-requisites; no change in general education courses; no change in GPA or GRE requirements or total number of student credit hours. Students must still apply to the specific program and meet criteria to be accepted into the program.

Your approval is requested by electronic vote so that the changes can be submitted for inclusion in both the undergraduate and graduate catalog revisions for 2007-2008.
Thank you,

Prepared by Linda M. Hennig
RN-BSN and RN-MSN Coordinator

RN-MSN Leadership & Management Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	*Dimensions of Professional Practice* *No pre-requisites*	3
NUR 3065 & NUR 3065L	*Health Assessment* Health Assessment Lab	2 1
NUR 3165	Nursing Research *Pre or co-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics*	3
NUR 3XXX NUR 4XXX	Community Health Nursing *Pre-requisite NUR 3805*	3
NUR 4837	Public Health Nursing	2
NUR 4XXX	Health Care Issues, Policy and Economics	3
	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
NGR 5720	Shared Courses:	
NGR 5781	Organizational Dynamics (for 4xxx Leadershp & Mgmt)	**3**
NUR 5800	Healthcare Informatics (for UG elective)	**3**
	Theory for APN or NGR 5XXX Grad Elective (for Elective)	**3**
	Total Required for BSN	**30**

Nurse Educator/Clinical Nurse Leader and Nurse Practitioner RN-MSN Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	Dimensions of Professional Practice No pre-requisites	3
NUR 3165	Nursing Research Pre or co-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics	3
NUR 3XXX	Community Health Nursing Pre-requisite NUR 3805	3
NUR 4XXX	Public Health Nursing	2
NUR 4837	Health Care Issues, Policy and Economics	3
NUR 4XXX	Leadership, Management, and Role Transition	3
NUR 4XXX	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
	Shared Courses:	

NGR 5003 &	Advanced Health Assessment AND	**2**
NGR 5004L	Advanced Health Assessment Lab (for NUR 3065)	**1**
NGR 5638	Health Promotion (for UG elective)	**3**
NGR 5141	Pathophysiology (for UG elective)	**3**
	Total Required for BSN	**30**

Clinical Nurse Specialist RN-MSN Curriculum		
Course No.	**Course**	**Credits**
NUR 3805	Dimensions of Professional Practice No pre-requisites	3
NUR 3165	Nursing Research Pre-requisite: NUR 3805 Dimensions of Professional Practice AND Statistics	3
NUR 3XXX	Community Health Nursing Pre-requisite NUR 3805	3
NUR 4XXX	Public Health Nursing	2
NUR 4837	Health Care Issues, Policy and Economics	3
NUR 4XXX	Community/Public Health Nursing Practicum for RNs (final course – 180 hours)	4
	Shared Courses:	
NGR 5003 &	Advanced Health Assessment (for UG 3065)	**2**
NGR 5004L	Advanced Health Assessment Lab (for 3065L)	**1**
NGR 5720	Organizational Dynamics (for Nur 4xxx Leadership/mgmt)	**3**
NGR 5141	Pathophysiology (for UG elective) Theory for APN (for UG elective)	**3**
NGR 5800		**3**
	Total Required for BSN	**30**