GRADUATE PROGRAMS IN ELECTRICAL ENGINEERING

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In addition to full-time faculty, we employ several adjunct faculty in various areas of specialization.

Graduate Study in Electrical Engineering
The Electrical Engineering program at the University of Detroit Mercy focuses on you, the student. You’ll get personal attention, in small classes and research seminars from faculty who place teaching first. Our relevant and practical research and close connections with industry help create an exciting learning environment that will guarantee your success.

Degrees
The Department of Electrical and Computer Engineering offers graduate degrees with specializations in robotics, computer engineering, mechatronics, and signals and systems. Students may elect to complete a Master of Engineering or Doctor of Engineering in Electrical and Computer Engineering, or a Master of Engineering Management.

Program Strengths
• Graduate Co-op Program
Qualified individuals can choose to work in industry on either alternating semesters or during the summer semesters. A rich variety of advanced engineering opportunities are available in the Southeastern Michigan region.

• Design and Project Oriented
Participate in exciting hands-on projects that integrate theory and application. For example, currently students are working on the design and development of an internationally competitive autonomous vehicle to participate in the Intelligent Ground Vehicle Competition (www.IGVC.org). In the 2008, 2009, & 2010 competitions our teams obtained the 1st place Grand Award among 45-55 teams.

• Student Centered
Take advantage of small class sizes and opportunities for one-on-one contact with professors. Most courses include opportunities to work in teams and advance the professional and personal skills so vital to long term career success in industry.
Admission Requirements
The requirements for admission to the Masters and Doctoral programs in the ECE department include the following:

- An undergraduate overall GPA of at least 3.00 or a graduate GPA of 3.0 on a previously completed engineering or science graduate degree. The undergraduate degree must be in electrical engineering or computer engineering. If the degree is in a related field such as computer science, physics, or another engineering field, additional undergraduate electrical engineering courses will be required.
- A completed application form and fee;
- Official transcripts from all current and previous colleges;
- Three letters of recommendation, and
- A letter of intent describing your graduate study interests. Although not required, GRE and TOEFL scores are welcome.

Degree Requirements
Masters Program Completion Options
The masters program provides two paths for degree completion. The first is via a 5-year Bachelors/Masters of engineering program that extends elements of a student’s undergraduate financial aid package to cover the masters (open to UDM undergraduates in electrical and computer engineering with a GPA of at least 3.25). The second degree path for study is via the traditional two-year masters of engineering degree. All graduate courses in the program are offered in the late afternoon and evening in order to accommodate those already in the work force.

The Master of Engineering in Electrical and Computer Engineering may be completed by either a thesis or a non-thesis plan. The thesis plan includes 24 credit hours of coursework, six credit hours of thesis, and an oral defense of the thesis to the departmental thesis committee and the public. Acceptance in the thesis degree option requires demonstration of strong academic performance and the ability to secure a thesis supervision agreement with one of the ECE Department faculty. The non-thesis plan consists of 33 credit hours of coursework. A student's plan of study must consist of at least seven courses with a 5000 level designation. Furthermore, the student's program of study must consist of no fewer than six courses from the Electrical and Computer Engineering Department.

Doctoral Degree Requirements
The Doctor of Engineering in Electrical and Computer Engineering adheres to the College’s general requirements for admission to and candidacy in a Doctor of Engineering program with some department specific modification/additions.

Doctoral Coursework
The doctoral program requires 51-54 credit hours of coursework beyond the engineering baccalaureate or 21-24 hours past an approved Masters Degree (depending on masters option chosen). Up to 36 graduate credit hours can be transferred but at least 21 additional graduate credits must be accrued at UDM. Coursework is divided into Doctoral Core, Concentration Core, and Discipline Specific. There are three Doctoral Core courses (or equivalent): ENGR 5020 Design of Experiments; ENGR 5200 Optimization; and ENGR 5300 Advanced Engineering Mathematics. For Concentration Core courses, each concentration has a number of associated courses, all of which must be taken to fulfill the requirements for the concentration. Discipline Specific courses are those related to Electrical and Computer Engineering. All Doctoral courses must be at the 5000 level (unless specifically approved by the advisor/committee and the department chairperson). Also, all doctoral programs of study must be approved by the faculty advisor/committee and the department chairperson.

Dissertation
Dissertation credits consist of research credits under the guidance of a Doctoral Dissertation committee headed by a faculty member who acts as the supervisor. Although Doctoral research is independent, novel, and advances the state of the art, the committee members can provide guidance, advice and technical expertise. A minimum 30 dissertation credits are required for the Doctor of Engineering degree.

Examination
Examinations comprise three stages: Qualifying, Dissertation Topic, and Final. The Qualifying Examination is administered and interpreted by the college-level Doctoral Graduate Committee. The exam consists of two parts: Mathematics, and Discipline Specific (for Electrical and Computer Engineering, separate major and minor exams are given with the topic areas chosen by the individual examinee in consultation with his/her committee). The Mathematics qualifying exam should be taken within the first year of study and the area exams must be taken as soon as the student has completed the doctoral core courses. Students passing the qualifying exam are allowed to advance in the Doctoral program. Students can repeat the qualifying exam once. Students failing the qualifying exam for the second time are dismissed from the doctoral program. The Dissertation Topic Examination consists of the formal presentation of the dissertation topic to the supervisory committee. The committee provides feedback to the student regarding scope, depth and relevancy of the topic. With approval of the committee, the student can proceed with the research and subsequent accrual of dissertation credits. Final Examination consists of the formal and public presentation of the dissertation results. The written dissertation must also be approved and accepted by the supervisory committee. The Final Examination, in concert with submission of the approved version of the written dissertation, constitutes the last step in completion of the Doctor of Engineering degree.

Concentration in Robotics
Robotics, the combination of sensing, computation and actuation in the real world, is experiencing rapid growth. This
growth is driven by the decreased cost and increased availability of advanced sensors, high-performance computing devices, and actuators and by national needs for defense and security, elder care, automation of household tasks, customized manufacturing, and interactive entertainment. The robotics specialization at UDM is structured to integrate three elements of robotics: Computation, Sensing, and Action. These three elements thus define the courses and projects as students explore Perception, Cognition, Control and Dynamics as well as experiential areas related to environment interaction such as Learning, Power Systems and Mechatronics (embedded systems, sensors and actuators).

 Concentration in Computer Engineering
The computer engineering specialization is a program focused on the design and development of embedded computer/ control and wireless smart sensor systems. This focus uniquely addresses the needs of the BioElectric, Wireless Communications, Multimedia, Aerospace and Automotive communities. The program seeks to provide students with the ability to design real-time distributed microcontroller-based systems. Career opportunities in this area are excellent.

 Concentration in Signals and Systems
The signals and systems specialization provides a background in digital signal and image processing, and control systems. The advent of high-speed specialized digital signal processor and FPGA integrated circuits has spurred rapid development in this area (witness cellular phones, software radios, MP3, CD and DVD players, and HDTV systems). The subsequent demand for specialists in this field has created excellent career opportunities. Students completing this program will have both the theoretical background and practical experience to design and develop quality products in this market.

 Concentration in Mechatronics
Mechatronics Engineering is a modern discipline that transcends the boundaries between Embedded Systems, Mechanical, Electrical, and Computer Engineering. Mechatronics Engineering is commonly defined as "The discipline that focuses on the design and control of electromechanical devices" or "the integration of electronics, control engineering and mechanical engineering."
The Faculty of the ECE department, in close cooperation with the Mechanical Engineering department has designed an innovative world class Mechatronics program that offers a balance of Electrical, Software, and Mechanical content with a focus on Embedded Systems Design. Career opportunities can be found in the Aerospace, BioMedical, and Automotive fields among many others.

Required courses for each concentration are as follows:

 Concentration in Computer Engineering*
ELEE4860/4870 Microcontrollers and lab
ELEE 5770/5790 Embedded Systems and lab
ELEE 5800 Computer Architecture

 ENT 5500** Innovation and Creativity

 Concentration in Signals and Systems*
ELEE 5880 Digital Signal Processing I
ELEE 5580 Advanced Electronics
ELEE 5760 Digital Control
ENT 5500** Innovation and Creativity

 Concentration in Robotics*
ENGR 5520 Sensors and Actuators
ELEE 5200 Autonomous Mobility Robotics
ENGR 5790 Mechatronics Modeling and Simulation
ENT 5500** Innovation and Creativity

 Concentration in Mechatronics*
ELEE 4860/4870 Microcontrollers and lab
ENGR 5520 Sensors and Actuators
ENGR 5790 Mechatronics Modeling
ENT 5500** Innovation and Creativity

*Other courses may be substituted with permission of the advisor and Department Chairperson depending on prior preparation and offerings available.

**Not a required core course for thesis-option students.

Remaining Courses selected (with advisors approval based on concentration selected) from ELEE, MENG/ ENGR, MTH, AEV, and CSC Courses

A partial list of commonly accepted Courses:
ELEE 5740 Pattern Recognition and Neural Networks
ELEE 5540 Fuzzy Systems Theory & Applications
ELEE 5400 Computational Intelligence Techniques
ELEE 5920 Image Processing and Computer Vision
ELEE 5620 Rand. Vars. and Rand. Processes
ELEE 5520 Real Time Control Systems
ELEE 5940 Wireless Sensor Networking
ELEE 5760 Digital Control
ELEE 5086/5087 Microcontrollers and lab (for students without prior microcontroller instruction)
ELEE 5770/5790 Embedded Systems and lab
ELEE 5490 Graduate Seminar in Robotics
ELEE 5640/5650 Hardware Description Languages – VHDL
ELEE 5680/5690 Computer Networks and Lab
ELEE 5860 Advanced Microprocessors
ELEE 5800 Computer Architecture
ELEE 5880 Digital Signal Processing I
ELEE 5900 Digital Signal Processing II
ELEE 5940 Advanced Topics in Electrical Engineering
ELEE 5580 Advanced Electronics
ELEE 5070 Controls II
ELEE 5074 Communications II
ELEE 5840 Electromagnetic Compatibility
ELEE 5570 Vehicular Electrical Power Systems
Electrical and Computer Engineering
Courses for Graduate Students may be reviewed in the University Online Catalog:
http://www.udmercy.edu/catalog/

If you have any questions regarding the application process for any of the Electrical Engineering Graduate programs at UDM, please contact:

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or

Theresa Carson,
graduate admissions counselor, (313) 993-3309
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Career Opportunities
With a graduate degree in electrical and computer engineering, you can choose from a variety of career opportunities in such fields as aerospace, biomedical, robotics, telecommunications, automotive, computer design and applications, national security, and business to name a few. Many of our graduates enter the profession, or go on to doctoral programs (at schools such as MIT, Duke, UofM, and Notre Dame) or pursue advanced degrees in law, dentistry, medicine, or business, for careers as patent lawyers, biomedical engineers, university professors, and corporate entrepreneurs.

Alumni Network
Our alumni provide a powerful network of individuals who support and help our program graduates upon degree completion. Our alumni enjoy tremendous success in Fortune 500 companies, government agencies, and entrepreneurial endeavors. Alumni serve in leadership positions in such companies as
• Sirius Satellite Radio
• Raytheon
• Boeing Satellite Systems
• Nvidia Corporation
• Kodak
• Erim International
• Rockwell Automation
• Lockheed Martin Corporation
• Medtronic
• TARDEC / Army Tank Automotive Command
• Detroit Edison
• Magnavox
• Ford Motor Company
• General Dynamics Land Systems
• General Motors Corporation
• Chrysler
among many others.

For More Information please visit our program’s web site at http://eng-sci.udmercy.edu/eengr/graduate_program.html