Department of Electrical and Computer Engineering

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Oscar González, Associate Chair
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Degree Programs
The department offers the following graduate degrees:
- Master of Science in Electrical and Computer Engineering
- Master of Engineering in Electrical and Computer Engineering
- Ph.D. in Electrical and Computer Engineering

Degrees Description
The Department of Electrical and Computer Engineering strives to provide the highest quality engineering education at the undergraduate and graduate levels, to engage in scholarly research at the forefront of electrical and computer engineering, and to serve the profession of electrical and computer engineering. The department has strong graduate and research programs providing a high quality and broad-based education that prepares graduates for successful professional careers and a lifetime of learning.

Electrical and computer engineering graduate studies encompass four broad areas:
1. systems
2. signal and image processing
3. physical electronics
4. and computer engineering

The research laboratories and institutes directly associated with the department include the Advanced Signal Processing in Engineering and Neuroscience Lab, the Plasma Engineering and Medicine Institute, the Medical Imaging Diagnostics and Analysis Laboratory, the Virginia Institute for Photovoltaics, the Systems Research Laboratory, the Virginia Institute for Vision Analysis, and the Wireless Communication and Networking Laboratory. In addition, the department has strong ties to several off-campus laboratories including the Applied Research Center at the Jefferson National Laboratory, the Frank Reidy Center for Bioelectronics, and the Virginia Modeling Analysis and Simulation Center. These research facilities position the department for national leadership in several areas and as a leading institution of research and higher education in the southeastern United States. For additional information, please visit our website at eng.odu.edu/ece.

Master of Science and Master of Engineering in Electrical and Computer Engineering

Master’s Admission Information
Applicants are expected to hold a B.S. degree in electrical engineering (EE) or computer engineering (CpE) from an accredited institution. Applicants are also expected to have a minimum grade point average of 3.0 (on a 4.0 scale) in both the baccalaureate major area (EE or CpE) and overall. Applicants with a GPA below a 3.0 may be considered for provisional admission, which may require additional prerequisite courses in addition to the graduate degree requirements. The applications are submitted through the Office of Admissions of Old Dominion University. Together with the completed application form, two letters of recommendation from former undergraduate instructors, transcripts from all colleges and universities attended, GRE scores, a resume, and a personal statement of objectives are required. TOEFL scores are also required for international applicants. Applicants with academic degrees in areas other than electrical and computer engineering will be considered. Those with degrees in math, physics, computer science, or other engineering fields are encouraged to apply. The accelerated Bachelor’s/Master’s degree program in the Frank Batten College of Engineering and Technology at Old Dominion University is designed to provide an opportunity for exceptionally qualified engineering undergraduate students to obtain both a bachelor’s and a master’s degree in Electrical and Computer Engineering. Typically undergraduate students apply at the end of their junior year for admission to the accelerated programs.

Accepted students from disciplines other than EE or CpE are required to complete a number of leveling courses to meet prerequisites for graduate studies. All students are required to have one year of college chemistry and one year of calculus-based college physics in addition to Calculus III and Differential Equations courses. Students at Old Dominion University may complete the leveling requirement by earning a minor in electrical or computer engineering with a GPA of 3.0 or greater. Students that have not earned a minor need to meet with the graduate program director to prepare a course plan and determine which pre-requisite courses are needed. In general, three to four leveling courses are needed and they are chosen from the following lists.

List of Possible Courses to Meet the Leveling Requirement

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ECE 202</td>
<td>Circuit Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 241</td>
<td>Fundamentals of Computer Engineering</td>
<td>4</td>
</tr>
<tr>
<td>ECE 302</td>
<td>Linear System Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECE 303</td>
<td>Introduction to Electrical Power</td>
<td>3</td>
</tr>
<tr>
<td>ECE 304</td>
<td>Probability, Statistics, and Reliability</td>
<td>3</td>
</tr>
<tr>
<td>ECE 313</td>
<td>Electronic Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 323</td>
<td>Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>ECE 332</td>
<td>Microelectronic Materials and Processes</td>
<td>3</td>
</tr>
<tr>
<td>ECE 340</td>
<td>Digital Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 341</td>
<td>Digital System Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 346</td>
<td>Microcontrollers</td>
<td>3</td>
</tr>
<tr>
<td>ECE 381</td>
<td>Introduction to Discrete-time Signal</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Processing</td>
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</tbody>
</table>

Students interested in taking computer engineering graduate courses may need to take additional leveling computer science courses as indicated below.

List of Possible Computer Science Courses to Meet the Leveling Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CS 333</td>
<td>Programming and Problem Solving in C++</td>
<td>4</td>
</tr>
<tr>
<td>CS 350</td>
<td>Introduction to Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CS 361</td>
<td>Advanced Data Structures and Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 381</td>
<td>Introduction to Discrete Structures</td>
<td>3</td>
</tr>
</tbody>
</table>

Master’s Degree Requirements
Both M.S. and M.E. degrees require a minimum of 30 credit hours of graduate study. Full-time and part-time students may pursue these degrees through a combination of on-campus and distance learning courses. The distance learning courses are available synchronously at the higher education centers and can be broadcast to any computer with a high speed Internet connection. These distance learning courses can also accommodate asynchronous students.

The M.S. degree requires a minimum of 24 credit hours of courses (not including the Graduate Seminar), at least 1 credit hour of Graduate Seminar, and 6 credit hours of thesis along with the oral thesis defense examination.
The M.E. degree project option requires a minimum of 27 credit hours of courses (not including the Graduate Seminar) and 3 credit hours in a project that includes an oral defense examination.

The M.E. degree course option requires a minimum of 30 credit hours of courses (not including the Graduate Seminar) and a written comprehensive examination at the end of the course work. The examination is offered every fall and spring semesters, and the student needs to pass the examination in no more than two attempts. The second attempt, if necessary, should be taken at the next offered examination.

These degree programs are available to full-time and part-time students seeking to improve their professional skills in electrical and computer engineering. Students are required to complete at least one course that meets the department’s mathematics requirement. The current list of courses that meet this requirement is given next.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ECE 601</td>
<td>Linear Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 611</td>
<td>Numerical Methods in Engineering Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECE 623</td>
<td>Electromagnetism</td>
<td>3</td>
</tr>
<tr>
<td>ECE 651</td>
<td>Statistical Analysis and Simulation</td>
<td>3</td>
</tr>
</tbody>
</table>

The remaining courses are chosen to meet the student’s career objectives. The graduate course descriptions are included in the graduate catalog and in the department’s website. Additional graduate courses are offered through the Commonwealth Graduate Engineering Program and the Virginia Consortium for Engineering and Science. The selection of courses is made in coordination with the students’ research advisor and/or the graduate program director. To earn a master’s degree, a student needs to take at least five courses at the 600 or higher level, and no more than three courses at the 500 level. Also, no more than three graduate courses can be taken in other departments. All funded students are required to enroll in ECE 731.

**Doctor of Philosophy in Electrical and Computer Engineering**

**Doctor of Philosophy Admission Requirements**

Applicants to a doctoral degree in electrical and computer engineering are expected to have completed a master’s degree in electrical engineering and/or computer engineering or a closely related technical field with a minimum grade point average of 3.5 (on a 4.0 scale) in graduate course work. The applications are submitted through the Office of Admissions of Old Dominion University. Together with the completed application form, three letters of recommendation, transcripts from all colleges and universities attended, GRE scores, a resume, and a personal statement of objectives are required. TOEFL scores are required for international applicants. At least two of the recommendation letters should be submitted by faculty or work supervisor familiar with the applicant’s graduate work. The Frank Batten College of Engineering and Technology at Old Dominion University has the Direct Bachelor-to-Ph.D. and Integrated Bachelor/Ph.D. programs that allow exceptionally well-qualified undergraduate students to apply for admission directly to a Ph.D. program. The programs are described in the college section of the catalog.

**Description of the Doctoral Degree**

The Department offers a strong doctoral program leading to a Ph.D. in Electrical and Computer Engineering. A very important component of the doctoral degree is the original research pursued by the student which culminates in a written dissertation, as well as an oral defense of this work. Doctoral students usually publish the result of their research in highly reputable nationally and internationally refereed journals. In addition, the students are expected to present their work at national and international conferences.

**Doctor of Philosophy Degree Requirements**

The Ph.D. degree in Electrical and Computer Engineering requires

- 24 credit hours of graduate-level courses beyond the master’s degree (not including Graduate Seminar),
- 24 research credit hours,