BEng in Computer Engineering

In addition to the requirements of their major programs, students are required to complete the University requirements for graduation. For details please refer to the respective section on this website.

Some courses can be used to fulfill both Major and University Common Core Requirements. Students may reuse a maximum of 9 credits of these courses to count towards both Requirements.

**Major Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMP</td>
<td>Introduction to Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>COMP</td>
<td>Introduction to Computing with Java</td>
<td>3</td>
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<tr>
<td>COMP</td>
<td>Introduction to Computing with Excel VBA</td>
<td>3</td>
</tr>
<tr>
<td>ENGG</td>
<td>Academic Orientation</td>
<td>0</td>
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<tr>
<td>LANG</td>
<td>Technical Communication I</td>
<td>3</td>
</tr>
<tr>
<td>MATH</td>
<td>Calculus IB</td>
<td>3</td>
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<tr>
<td>MATH</td>
<td>Calculus II</td>
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<tr>
<td>MATH</td>
<td>Accelerated Calculus</td>
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<tr>
<td>MATH</td>
<td>Honors Calculus I</td>
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<tr>
<td>MATH</td>
<td>Honors Calculus II</td>
<td>3</td>
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<tr>
<td>MATH</td>
<td>Introduction to Multivariable Calculus</td>
<td>3</td>
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<tr>
<td>MATH</td>
<td>Matrix Algebra and Applications</td>
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<tr>
<td>PHYS</td>
<td>General Physics I with Calculus</td>
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<tr>
<td>PHYS</td>
<td>Honors General Physics I</td>
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<tr>
<td>PHYS</td>
<td>General Physics II</td>
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<td>PHYS</td>
<td>Honors General Physics II</td>
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<tr>
<td>SENG</td>
<td>Engineering Introduction course</td>
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<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMP</td>
<td>Introduction to Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>ELEC</td>
<td>Introduction to Electro-Robot Design</td>
<td>4</td>
</tr>
<tr>
<td>ELEC</td>
<td>A System View of Communications: from Signals to Packets</td>
<td>4</td>
</tr>
<tr>
<td>CENG</td>
<td>Introduction to Chemical and Biomolecular Engineering</td>
<td>3</td>
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<tr>
<td>CIVL</td>
<td>Discovering Civil and Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>IELM</td>
<td>Industrial Engineering and Modern Logistics</td>
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## Required Course(s)

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CPEG</td>
<td>Industrial Experience</td>
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<tr>
<td>CPEG</td>
<td>Academic and Professional Development I</td>
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<tr>
<td>CPEG</td>
<td>Academic and Professional Development II</td>
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<tr>
<td>COMP</td>
<td>Note: (COMP 2011 AND COMP 2012) OR COMP 2012H</td>
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<tr>
<td>COMP</td>
<td>2011 Introduction to Object-oriented Programming</td>
<td>4</td>
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<tr>
<td>COMP</td>
<td>2012 Object-Oriented Programming and Data Structures</td>
<td>4</td>
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<tr>
<td>COMP</td>
<td>2012H Honors Object-Oriented Programming and Data Structures</td>
<td>5</td>
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<tr>
<td>COMP/ELEC</td>
<td>Note: COMP 2611 OR ELEC 2300</td>
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<tr>
<td>COMP</td>
<td>2611 Computer Organization</td>
<td>4</td>
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<tr>
<td>ELEC</td>
<td>2300 Computer Organization</td>
<td>4</td>
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<tr>
<td>COMP/ELEC</td>
<td>Note: COMP 2711 OR COMP 2711H OR ELEC 2600</td>
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<tr>
<td>COMP</td>
<td>2711 Discrete Mathematical Tools for Computer Science</td>
<td>4</td>
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<tr>
<td>COMP</td>
<td>2711H Honors Discrete Mathematical Tools for Computer Science</td>
<td>4</td>
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<tr>
<td>ELEC</td>
<td>2600 Probability and Random Processes in Engineering</td>
<td>4</td>
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<tr>
<td>COMP</td>
<td>3511 Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMP/ELEC</td>
<td>Note: COMP 4521 OR COMP 4611 OR ELEC 4310</td>
<td>3-4</td>
</tr>
<tr>
<td>COMP</td>
<td>4521 Mobile Application Development</td>
<td>3</td>
</tr>
<tr>
<td>COMP</td>
<td>4611 Design and Analysis of Computer Architectures</td>
<td>3</td>
</tr>
<tr>
<td>ELEC</td>
<td>4310 Embedded System Design</td>
<td>4</td>
</tr>
<tr>
<td>COMP/ELEC</td>
<td>Note: COMP 4988 OR COMP 4989 OR ELEC 4918 OR ELEC 4919 (Students taking the Research Option must take either COMP 4989 or ELEC 4919)</td>
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<tr>
<td>COMP</td>
<td>4988 Computer Engineering Final Year Project</td>
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<tr>
<td>COMP</td>
<td>4989 Computer Engineering Final Year Thesis</td>
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<tr>
<td>ELEC</td>
<td>4918 Computer Engineering Final Year Project</td>
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<tr>
<td>ELEC</td>
<td>4919 Computer Engineering Final Year Thesis</td>
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<td>ELEC</td>
<td>Note: ELEC 1100 OR ELEC 1200</td>
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<tr>
<td>ELEC</td>
<td>1100 Introduction to Electro-Robot Design</td>
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<tr>
<td>ELEC</td>
<td>1200 A System View of Communications: from Signals to Packets</td>
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<tr>
<td>ELEC</td>
<td>Note: ELEC 2100 OR ELEC 2400</td>
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<tr>
<td>ELEC</td>
<td>2100 Signals and Systems</td>
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<tr>
<td>ELEC</td>
<td>2400 Electronic Circuits</td>
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<tr>
<td>ELEC</td>
<td>2200 Digital Circuits and Systems</td>
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<tr>
<td>ELEC</td>
<td>3300 Introduction to Embedded Systems</td>
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<tr>
<td>ENGG</td>
<td>2010 Engineering Seminar Series</td>
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<td>Elective(s)</td>
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**COMP/ELEC**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>LANG 4030</td>
<td>Technical Communication II for CSE &amp; CPEG</td>
</tr>
<tr>
<td>LANG 4031</td>
<td>Technical Communication II for ECE &amp; CPEG</td>
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</table>

**Artificial Intelligence / Theory Area**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>COMP 3211</td>
<td>Fundamentals of Artificial Intelligence</td>
</tr>
<tr>
<td>COMP 3711</td>
<td>Design and Analysis of Algorithms</td>
</tr>
<tr>
<td>COMP 3711H</td>
<td>Honors Design and Analysis of Algorithms</td>
</tr>
<tr>
<td>COMP 3721</td>
<td>Theory of Computation</td>
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<tr>
<td>COMP 4211</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>COMP 4221</td>
<td>Introduction to Natural Language Processing</td>
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<tr>
<td>COMP 4331</td>
<td>Data Mining</td>
</tr>
<tr>
<td>COMP 4332</td>
<td>Big Data Mining and Management</td>
</tr>
<tr>
<td>COMP 4421</td>
<td>Image Processing</td>
</tr>
<tr>
<td>COMP 5421</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>COMP 5711</td>
<td>Introduction to Advanced Algorithmic Techniques</td>
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</table>

**Communications Area**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ELEC 3100</td>
<td>Signal Processing and Communications</td>
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<tr>
<td>ELEC 3600</td>
<td>Electromagnetics: From Wireless to Photonic Applications</td>
</tr>
<tr>
<td>ELEC 4110</td>
<td>Digital Communications and Wireless Systems</td>
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<tr>
<td>ELEC 4150</td>
<td>Information Theory and Error-Correcting Codes</td>
</tr>
<tr>
<td>ELEC 4180**</td>
<td>Wireless Communication Engineering</td>
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<tr>
<td>ELEC 4610</td>
<td>Engineering Optics</td>
</tr>
<tr>
<td>ELEC 4620</td>
<td>Photonics and Optical Communications</td>
</tr>
<tr>
<td>ELEC 4630</td>
<td>Radio Frequency Engineering</td>
</tr>
<tr>
<td>ELEC 4640</td>
<td>Modern Optics</td>
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</table>

**Embedded System / Robotics Area**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>COMP 4521</td>
<td>Mobile Application Development</td>
</tr>
<tr>
<td>COMP 4611</td>
<td>Design and Analysis of Computer Architectures</td>
</tr>
<tr>
<td>ELEC 3200</td>
<td>System Modeling, Analysis and Control</td>
</tr>
<tr>
<td>ELEC 4210**</td>
<td>Digital Control Systems</td>
</tr>
<tr>
<td>ELEC 4310</td>
<td>Embedded System Design</td>
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<tr>
<td>ELEC 4320</td>
<td>FPGA-based Design: From Theory to Practice</td>
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<td>ENGG 4950</td>
<td>Engineering Special Project</td>
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**Graphic / Multimedia Area**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>COMP 4411</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>COMP 4421</td>
<td>Image Processing</td>
</tr>
<tr>
<td>COMP 4431</td>
<td>Multimedia Computing</td>
</tr>
<tr>
<td>COMP 4441</td>
<td>Computer Music</td>
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</tbody>
</table>
COMP 4451  Game Programming  3
COMP 5411  Advanced Computer Graphics  3
COMP 5421  Computer Vision  3
ELEC 4170  Digital Media and Multimedia Applications  4

Semiconductor / VLSI Area
ELEC 3400  Introduction to Integrated Circuits and Systems  4
ELEC 3500  Microelectronic Devices and Technology  4
ELEC 4410  CMOS VLSI Design  3
ELEC 4420  Analogue Integrated Circuits Design and Analysis  4
ELEC 4430  Integrated Power Electronics  3
ELEC 4510  Semiconductor Materials and Devices  3
ELEC 4520  Integrated Circuit Fabrication Technology  3

Signal Processing Area
ELEC 3100  Signal Processing and Communications  4
ELEC 3110**  Digital Signal Processing  4
ELEC 3210**  Signals and Systems II  4
ELEC 4130  Digital Image Processing  3
ELEC 4140  Speech and Image Compression  3
ELEC 4160  Introduction to Digital Speech Recognition  4
ELEC 4810  Introduction to Biosensors and Bioinstrumentation  4
ELEC 4820  Medical Imaging  3

Software / Database Area
COMP 2021  Unix and Script Programming  3
COMP 3021  Java Programming  3
COMP 3031  Principles of Programming Languages  3
COMP 3111  Software Engineering  4
COMP 3111H  Honors Software Engineering  4
COMP 3311  Database Management Systems  3
COMP 4021  Internet Computing  3
COMP 4111  Software Engineering Practices  3
COMP 4311  Principles of Database Design  3
COMP 4321  Search Engines for Web and Enterprise Data  3
COMP 4331  Data Mining  3
COMP 4332  Big Data Mining and Management  3
COMP 4521  Mobile Application Development  3

Systems / Networking Area
COMP 4511  System and Kernel Programming in Linux  3
COMP 4611  Design and Analysis of Computer Architectures  3
COMP 4621  Computer Communication Networks I  3
COMP 4622  Computer Communication Networks II  3
COMP 4631  Computer and Communication Security  3
COMP 4632  Practicing Cybersecurity: Attacks and Counter-measures  3
COMP 4641  Social Information Network Analysis and Engineering  3
ELEC 4120  Computer Communication Networks  3
ELEC 4310  Embedded System Design  4
Student may opt to graduate with or without an option. Students who take an option MUST complete all requirements specified in addition to the major requirements.

Option(s)

Research Option

Students in the Research Option should also take either COMP 4989 or ELEC 4919 as specified in the major requirements.

### Elective Course(s)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>COMP/ELEC/UROP</td>
<td>Research Electives [Students should take either (ELEC 5900 AND UROP 1100) or a 3-credit COMP 5000-level course to fulfill this requirement.]</td>
<td>2-3</td>
</tr>
<tr>
<td>COMP</td>
<td>Any COMP course at 5000-level</td>
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<tr>
<td>ELEC 5900</td>
<td>Modern Engineering Research Methodologies</td>
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<tr>
<td>UROP 1100</td>
<td>Undergraduate Research Opportunities Series 1</td>
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</tr>
<tr>
<td>COMP/ELEC</td>
<td>CPEG Electives (1 PG-level course as approved by advisor)</td>
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</table>

**Remarks on course(s):**
- ELEC 3110: The course was last offered in 2009-10 and was deleted subsequently.
- ELEC 3210: The course was last offered in 2009-10 and was deleted subsequently.
- ELEC 4180: The course was last offered in 2009-10 and was deleted subsequently.
- ELEC 4210: The course was last offered in 2010-11 and was deleted subsequently.
- PHYS 1154: The course was last offered in 2013-14 and was deleted subsequently.