BEng in Computer Science

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.

Students may use no more than 6 credits earned from courses offered in self-paced online delivery mode to satisfy the graduation requirements of a degree program. This 6-credit limit does not apply to credits obtained through the credit transfer procedures of the University.

For students graduating with an additional major, they must take all the requirements specified for that major, within which they must complete at least 20 single-counted credits. These 20 credits cannot be used to fulfill any other requirements for graduation except for the 120-credit degree requirement.

Under the new 30-credit Common Core Program which is applicable to students admitted to the University in 2022-23 and thereafter, courses that have been counted towards Major Requirements are not allowed to be reused for fulfillment of the University Common Core Requirements. Students should look up the details of the Common Core Program including the general and School-/program-specific distributional requirements posted on the Common Core website where the link to it is available on this website.

Major Requirements

Engineering Fundamental Course(s)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit(s)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 1021 OR COMP 1022P</td>
<td>3</td>
<td>Introduction to Computer Science</td>
</tr>
<tr>
<td>COMP 1022P</td>
<td>3</td>
<td>Introduction to Computing with Java</td>
</tr>
<tr>
<td>CHEM 1008 OR CHEM 1020 OR LIFS 1901 OR PHYS 1101 OR PHYS 1112 OR PHYS 1312</td>
<td>3-4</td>
<td>Introductory Chemistry, General Chemistry I, General Biology I, Introductory Physics, General Physics I with Calculus, Honors General Physics I</td>
</tr>
<tr>
<td>MATH 1012</td>
<td>4</td>
<td>Calculus IA</td>
</tr>
<tr>
<td>MATH 1013</td>
<td>3</td>
<td>Calculus IB</td>
</tr>
<tr>
<td>MATH 1014</td>
<td>3</td>
<td>Calculus II</td>
</tr>
<tr>
<td>MATH 1020</td>
<td>4</td>
<td>Accelerated Calculus</td>
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<tr>
<td>MATH 1023</td>
<td>3</td>
<td>Honors Calculus I</td>
</tr>
<tr>
<td>MATH 1024</td>
<td>3</td>
<td>Honors Calculus II</td>
</tr>
<tr>
<td>MATH 2111 OR MATH 2121 OR MATH 2131</td>
<td>3-4</td>
<td>Matrix Algebra and Applications, Linear Algebra, Honors in Linear and Abstract Algebra I</td>
</tr>
<tr>
<td>MATH 2111</td>
<td>3</td>
<td>Matrix Algebra and Applications</td>
</tr>
<tr>
<td>MATH 2121</td>
<td>4</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 2131</td>
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<td>Honors in Linear and Abstract Algebra I</td>
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## Required Course(s)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 1021</td>
<td>Introduction to Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>BIEN 1010</td>
<td>Introduction to Biomedical Engineering</td>
<td>3</td>
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<tr>
<td>CENG 1000</td>
<td>Introduction to Chemical and Biological Engineering</td>
<td>3</td>
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<tr>
<td>CENG 1500</td>
<td>A First Course on Materials Science and Applications</td>
<td>3</td>
</tr>
<tr>
<td>CENG 1700</td>
<td>Introduction to Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CIVL 1100</td>
<td>Discovering Civil and Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 1100</td>
<td>Introduction to Electro-Robot Design</td>
<td>4</td>
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<tr>
<td>ELEC 1200</td>
<td>A System View of Communications: from Signals to Packets</td>
<td>4</td>
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<tr>
<td>ENGG 1100</td>
<td>First Year Cornerstone Engineering Design Project Course</td>
<td>3</td>
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<tr>
<td>IEDA 2010</td>
<td>Introduction to Industrial Engineering and Decision Analytics</td>
<td>3</td>
</tr>
<tr>
<td>ISDN 1001</td>
<td>Introduction to Integrative Systems and Design</td>
<td>3</td>
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<tr>
<td>ISDN 1002</td>
<td>Redefining Problems for the Real Needs</td>
<td>3</td>
</tr>
<tr>
<td>ISDN 1006</td>
<td>Human-centered Innovation</td>
<td>3</td>
</tr>
<tr>
<td>MECH 1902</td>
<td>Energy Systems in a Sustainable World</td>
<td>3</td>
</tr>
<tr>
<td>MECH 1906</td>
<td>Mechanical Engineering for Modern Life</td>
<td>3</td>
</tr>
<tr>
<td>MECH 1907</td>
<td>Introduction to Aerospace Engineering</td>
<td>3</td>
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</table>

### COMP

Note: [COMP 1991 AND (COMP 4981 OR COMP 4981H)] OR [COMP 4910] 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
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</thead>
<tbody>
<tr>
<td>COMP 1991</td>
<td>Industrial Experience</td>
<td>0</td>
</tr>
<tr>
<td>COMP 4910</td>
<td>Co-op Program</td>
<td>6</td>
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<tr>
<td>COMP 4981</td>
<td>Final Year Project</td>
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<tr>
<td>COMP 4981H</td>
<td>Final Year Thesis</td>
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### COMP

Note: (COMP 2011 AND COMP 2012) OR COMP 2012H 5-8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
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</thead>
<tbody>
<tr>
<td>COMP 2011</td>
<td>Programming with C++</td>
<td>4</td>
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<tr>
<td>COMP 2012</td>
<td>Object-Oriented Programming and Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>COMP 2012H</td>
<td>Honors Object-Oriented Programming and Data Structures</td>
<td>5</td>
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<tr>
<td>COMP 2611</td>
<td>Computer Organization</td>
<td>4</td>
</tr>
</tbody>
</table>

### COMP

Note: COMP 2711 OR COMP 2711H 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 2711</td>
<td>Discrete Mathematical Tools for Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>COMP 2711H</td>
<td>Honors Discrete Mathematical Tools for Computer Science</td>
<td>4</td>
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</table>

### COMP

Note: COMP 3111 OR COMP 3111H 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
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</thead>
<tbody>
<tr>
<td>COMP 3111</td>
<td>Software Engineering</td>
<td>4</td>
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<tr>
<td>COMP 3111H</td>
<td>Honors Software Engineering</td>
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</tr>
</tbody>
</table>

### COMP

Note: COMP 3511 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
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</thead>
<tbody>
<tr>
<td>COMP 3511</td>
<td>Operating Systems</td>
<td>3</td>
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</table>

### COMP

Note: COMP 3711 OR COMP 3711H 3-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s) attained</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 3711</td>
<td>Design and Analysis of Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>COMP 3711H</td>
<td>Honors Design and Analysis of Algorithms</td>
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</tbody>
</table>
### School of Engineering - BEng in Computer Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Minimum credit(s) required</th>
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</thead>
<tbody>
<tr>
<td>COMP 4900</td>
<td>Academic and Professional Development</td>
<td>0</td>
</tr>
<tr>
<td>ELEC 2600</td>
<td>Probability and Random Processes in Engineering</td>
<td>4</td>
</tr>
<tr>
<td>IEDA 2520</td>
<td>Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2411</td>
<td>Applied Statistics</td>
<td>4</td>
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<tr>
<td>MATH 2431</td>
<td>Honors Probability</td>
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<tr>
<td>ENGG 2010</td>
<td>Engineering Seminar Series</td>
<td>0</td>
</tr>
<tr>
<td>LANG 4030</td>
<td>Technical Communication II for CSE, CPEG &amp; DSCT</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Elective(s)

**COMP 2000-level or above Elective (Any course(s) of the subject and level as specified)**

- COMP 3211: Fundamentals of Artificial Intelligence
- COMP 3721: Theory of Computation
- COMP 4211: Machine Learning
- COMP 4221: Introduction to Natural Language Processing
- COMP 4222: Machine Learning with Structured Data
- COMP 4331: Data Mining
- COMP 4332: Big Data Mining and Management
- COMP 4421: Image Processing
- COMP 4471: Deep Learning in Computer Vision
- COMP 5211: Advanced Artificial Intelligence
- COMP 5212: Machine Learning
- COMP 5213: Introduction to Bayesian Networks
- COMP 5221: Natural Language Processing
- COMP 5223: Perception and Information Processing for Robotics
- COMP 5331: Knowledge Discovery in Databases
- COMP 5421: Computer Vision
- COMP 5711: Introduction to Advanced Algorithmic Techniques
- COMP 5712: Introduction to Combinatorial Optimization
- COMP 5713: Computational Geometry

### Artificial Intelligence / Theory Area

- COMP 3211: Fundamentals of Artificial Intelligence
- COMP 3721: Theory of Computation
- COMP 4211: Machine Learning
- COMP 4221: Introduction to Natural Language Processing
- COMP 4222: Machine Learning with Structured Data
- COMP 4331: Data Mining
- COMP 4332: Big Data Mining and Management
- COMP 4421: Image Processing
- COMP 4471: Deep Learning in Computer Vision
- COMP 5211: Advanced Artificial Intelligence
- COMP 5212: Machine Learning
- COMP 5213: Introduction to Bayesian Networks
- COMP 5221: Natural Language Processing
- COMP 5223: Perception and Information Processing for Robotics
- COMP 5331: Knowledge Discovery in Databases
- COMP 5421: Computer Vision
- COMP 5711: Introduction to Advanced Algorithmic Techniques
- COMP 5712: Introduction to Combinatorial Optimization
- COMP 5713: Computational Geometry
### Vision & Graphics / Multimedia Area

- **COMP 4411**  
  Computer Graphics  
  3
- **COMP 4421**  
  Image Processing  
  3
- **COMP 4431**  
  Multimedia Computing  
  3
- **COMP 4441**  
  Computer Music  
  3
- **COMP 4451**  
  Game Programming  
  3
- **COMP 4461**  
  Human-Computer Interaction  
  3
- **COMP 4462**  
  Data Visualization  
  3
- **COMP 4471**  
  Deep Learning in Computer Vision  
  3
- **COMP 5411**  
  Advanced Computer Graphics  
  3
- **COMP 5421**  
  Computer Vision  
  3

### Software / Database Area

- **COMP 3021**  
  Java Programming  
  3
- **COMP 3031**  
  Principles of Programming Languages  
  3
- **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
- **COMP 4651**  
  Cloud Computing and Big Data Systems  
  3
- **COMP 5111**  
  Fundamentals of Software Analysis  
  3
- **COMP 5112**  
  Parallel Programming  
  3
- **COMP 5311**  
  Database Architecture and Implementation  
  3
- **COMP 5331**  
  Knowledge Discovery in Databases  
  3

### Computer Systems / Networking Area

- **COMP 3632**  
  Principles of Cybersecurity  
  3
- **COMP 4511**  
  System and Kernel Programming in Linux  
  3
- **COMP 4521**  
  Mobile Application Development  
  3
- **COMP 4531**  
  IoT and Smart Sensing  
  3
- **COMP 4611**  
  Design and Analysis of Computer Architectures  
  3
- **COMP 4621**  
  Computer and Communication Networks  
  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
- **COMP 4651**  
  Cloud Computing and Big Data Systems  
  3
- **COMP 5621**  
  Computer Networks  
  3
- **COMP 5622**  
  Advanced Computer Communications and Networking  
  3
- **COMP 5631**  
  Cryptography and Security  
  3

### Courses Without Associated Area

- **COMP 4911**  
  IT Entrepreneurship  
  3
**Remarks on course(s):**

- COMP 4311: The course was last offered in 2017-18 and was deleted subsequently.