HONOURS BSC BIOCHEMISTRY AND BASC CHEMICAL ENGINEERING (BIOTECHNOLOGY)

Biochemistry
Biochemistry is the chemistry of life. It provides the foundation for understanding all biological processes as well as the molecular basis and treatment of human disease.

The biochemistry bachelor’s provides you with the education you need to play a leading role in new and exciting areas of medical research. You will be exposed to cutting-edge research and knowledge. Our program prepares you for graduate studies and for an academic or research career in the medical sciences. What’s more, biochemistry provides an excellent foundation for further studies in medicine and other areas of health care.

You can choose an Honours BSc in Biochemistry, a major or a minor.

If you want to pursue a career in experimental biochemistry, choose the Honours program. If you prefer a basic biochemistry education, choose a major. And if you want to focus on another discipline but are interested in biochemistry, choose a minor.

If you have a particular interest in microorganisms and the role that the immune system plays in health and disease, you can also choose an Honours BSc in biochemistry with an option in microbiology and immunology. We also offer an integrated biotechnology program that lets you combine studies in biochemistry and chemical engineering and receive both a BSc in biochemistry and a BASc in chemical engineering in five years.

As for the language of instruction, compulsory courses and many optional course units are available in either English or French.

If you choose the Honours in Biochemistry, you have the opportunity to complete a full-year research project under the supervision of a professor from the departments of Chemistry and Biomolecular Sciences, Biology, Physics, or Biochemistry, Microbiology and Immunology, or under the supervision of an affiliated principle investigator from one of the many research institutes in the National Capital Region. Given the breadth of research expertise within our program, you can conduct research in many areas of modern biomedicine, including biochemistry, microbiology, immunology, chemical biology, molecular biology, cell biology, proteomics, genomics, systems biology and bioinformatics.

Chemical Engineering
Chemical engineering is at the intersection of many disciplines, linking knowledge of basic and applied sciences, economics, and health and safety. Chemical engineering graduates use a series of operations to sustainably process raw natural materials into finished products. They work in any number of industries, and during their careers, they may face a variety of challenges, including optimizing processes, monitoring pollution, converting renewable energy, processing foods and drugs, and manufacturing new materials.

This program is offered in English and in French.

Program Requirements
The minimum CGPA required to be on good academic standing is 6.0.

Co-operative education is available with this program.

The French immersion stream is available with this program.

Requirements for this program have been modified. Please consult the 2023-2024 calendars (https://catalogue.uottawa.ca/en/archives/) for the previous requirements.

Basic Skills
ENG 1112 Technical Report Writing 3 Units

Compulsory First-Year Courses:
BIO 1130 Introduction to Organismal Biology 3 Units
BIO 1140 Introduction to Cell and Molecular Biology 3 Units
CHG 1125 Chemical Engineering Fundamentals 3 Units
CHG 1371 Numerical Methods and Engineering Computation in Chemical Engineering 3 Units
CHM 1311 Principles of Chemistry 3 Units
CHM 1321 Organic Chemistry I 3 Units
GNG 1103 Introduction to Engineering Design 3 Units
GNG 1105 Engineering Mechanics 3 Units
ITI 1120 Introduction to Computing I 3 Units
MAT 1320 Calculus I 3 Units
MAT 1322 Calculus II 3 Units
MAT 1341 Introduction to Linear Algebra 3 Units
PHY 1122 Fundamentals of Physics II 3 Units

Compulsory Second-Year Courses:
BCH 2333 Introduction to Biochemistry 3 Units
BIO 2133 Genetics 3 Units
CHM 2120 Organic Chemistry II 3 Units
CHM 2123 Laboratory of Organic Chemistry II 3 Units
CHM 2330 Physical Chemistry: Introduction to the Molecular Properties of Matter 3 Units
CHM 2354 Analytical Chemistry 3 Units
MAT 2384 Ordinary Differential Equations and Numerical Methods 3 Units
3 course units from:
ECO 1192 Engineering Economics 3 Units
GNG 2101 Introduction to Product Development for Engineers and Computer Scientists 3 Units

Compulsory Third-Year Courses:
BCH 3120 General Intermediary Metabolism 3 Units
BCH 3125 Protein Structure and Function 3 Units
BCH 3170 Molecular Biology 3 Units
BCH 3346 Biochemistry Laboratory II 3 Units
BCH 3356 Molecular Biology Laboratory 3 Units
BIO 3124 General Microbiology 3 Units
BIO 3153 Cell Biology 3 Units
CHG 2312 Fluid Flow 3 Units
CHG 2314 Heat Transfer Operations 3 Units
CHG 2317 Introduction to Chemical Process Analysis and Design 3 Units

### Compulsory Fourth-Year Courses:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BCH 4172</td>
<td>Topics in Biotechnology</td>
<td>3</td>
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<tr>
<td>BCH 4932</td>
<td>Biochemistry Seminar</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3111</td>
<td>Unit Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3112</td>
<td>Process Synthesis, Design and Economics</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3122</td>
<td>Chemical Engineering Practice</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3127</td>
<td>Chemical Reaction Engineering</td>
<td>3</td>
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<tr>
<td>CHG 3305</td>
<td>Advanced Materials in Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3316</td>
<td>Transport Phenomena</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3326</td>
<td>Principles of Phase Equilibria and Chemical Reaction Equilibria</td>
<td>3</td>
</tr>
<tr>
<td>CHG 3335</td>
<td>Process Control</td>
<td>3</td>
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<td></td>
<td>One option from the following:</td>
<td>9</td>
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#### Option 1: Honours Project

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BCH 4040</td>
<td>Honours Research - Biochemistry</td>
<td>3</td>
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#### Option 2: Honours Project Substitution

- 9 course units among the 3000 or 4000 level courses in biochemistry (BCH), biology (BIO), biopharmaceutical sciences (BPS), cellular and molecular medicine (CMM), chemistry (CHM), pharmacology (PHA), physiology (PHS), microbiology and immunology (MIC)

- 6 course units from:
  - BCH 4101 Human Genome Structure and Function
  - BCH 4116 Analytical Biochemistry
  - BCH 4122 Structural Biology of Proteins
  - BCH 4123 Pathological Biochemistry
  - BCH 4124 Carbohydrates and Glycobiology
  - BCH 4125 Cellular Regulation and Control
  - BCH 4126 Structural Biology of Membranes
  - BCH 4188 Synthetic Biology
  - BCH 4300 Selected Topics in Biochemistry
  - BPS 3101 Genomics
  - BPS 4121 Biosynthesis and Natural Product Derived Medicines
  - BPS 4129 Advanced Chemical Biology
  - CHM 4139 Enzyme Chemistry and Biocatalysis

### Compulsory Fifth-Year Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHG 3337</td>
<td>Data Collection and Interpretation</td>
<td>3</td>
</tr>
<tr>
<td>CHG 4116</td>
<td>Chemical Engineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>CHG 4250</td>
<td>Plant Design Project</td>
<td>9</td>
</tr>
<tr>
<td>CHG 4307</td>
<td>Process Risk Management and Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>CHG 4343</td>
<td>Computer-Aided Design in Chemical Engineering</td>
<td>3</td>
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<tr>
<td>CHG 4381</td>
<td>Biochemical Engineering</td>
<td>3</td>
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<tr>
<td>GNG 4170</td>
<td>Engineering Law</td>
<td>3</td>
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- One option from the following: 6 Units

#### Option 1:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHG 4901</td>
<td>Thesis and seminars I</td>
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<tr>
<td>CHG 4902</td>
<td>Thesis and seminars II</td>
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#### Option 2:

- CHG 4901 Thesis and seminars I
- 3 course units of technical electives

#### Option 3:

- 6 course units of technical electives

### Electives

- 6 complementary electives course units at the undergraduate level

### Total: 189 Units

#### Note(s)

1. CHG 1125 must be taken during the first two years; it is recommended that this course be taken the first year.
2. This course runs from September to April.
3. The research project is highly recommended for students who intend to pursue a career in research, but a CGPA of 6.5 or greater or with a GPA of 6.5 or greater calculated from the two most recent years of full-time study in the Honours in Biochemistry program (minimum of 54 units including all compulsory 3000 level courses). This course runs from September to April.
4. This course may not be available every year.
5. Consult the list of technical electives in the regular Chemical Engineering program.
6. Complementary elective courses at the undergraduate level includes GNG 2101, GNG 4170, and GNG 4120, but excludes all courses offered by the Faculty of Science and the Faculty of Engineering as well as all courses that have a science, mathematics or engineering content. For a complete list of courses please refer to the list of complementary elective courses on the Faculty of Engineering website.