HONOURS BSC IN BIOCHEMISTRY / BASC IN CHEMICAL ENGINEERING (BIOTECHNOLOGY) - BIOMEDICAL ENGINEERING OPTION

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.

This program is offered in English and in French.

Program Requirements

Co-operative education is available with this program.

The extended French stream is available with this program.

Requirements for this program have been modified. Please consult the 2018-2019 calendars (http://catalogue.uottawa.ca/en/archives) for the previous requirements.

This program is currently under revision. At this time, we are not accepting applications.

Compulsory First-Year Courses:

- BIO 1130 Introduction to Organismal Biology (3 Units)
- BIO 1140 Introduction to Cell Biology (3 Units)
- CHG 1125 Chemical Engineering Fundamentals ¹ (3 Units)
- CHM 1311 Principles of Chemistry (3 Units)
- CHM 1321 Organic Chemistry I (3 Units)
- MAT 1320 Calculus I (3 Units)
- MAT 1322 Calculus II (3 Units)
- MAT 1341 Introduction to Linear Algebra (3 Units)
- PHY 1121 Fundamentals of Physics I (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)
- CHG 1371 Numerical Methods and Engineering Computation in Chemical Engineering (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)
- ECO 1192 Engineering Economics (3 Units)
- ENG 1112 Technical Report Writing (3 Units)
- GNG 1103 Engineering Design (3 Units)
- MAT 2384 Ordinary Differential Equations and Numerical Methods (3 Units)
- PHI 2394 Scientific Thought and Social Values (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)
- CHG 2312 Fluid Flow (3 Units)
- CHG 2314 Heat Transfer Operations (3 Units)
- CHG 2317 Introduction to Chemical Process Analysis and Design (3 Units)
- CHG 2324 Fundamentals and Applications of Chemical Engineering Thermodynamics (3 Units)

3 course units from:

- HIS 2129 Technology, Society and Environment Since 1800 (3 Units)
- PHI 2394 Scientific Thought and Social Values (3 Units)
- MAT 2322 Calculus III for Engineers (3 Units)
- 3 complementary electives course units at the undergraduate level (3 Units)

Compulsory Fourth-Year Courses:

- BCH 4172 Topics in Biotechnology (3 Units)
- BCH 4932 Biochemistry Seminar ⁴ (3 Units)
- One option from the following: (9 Units)

### Option 1: Honours Project

- **BCH 4040** Honours Research - Biochemistry

### 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)

#### 3 course units from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BPS 3101</td>
<td>Genomics</td>
</tr>
<tr>
<td>BCH 4101</td>
<td>Human Genome Structure and Function</td>
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#### 6 course units from:

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BCH 4122</td>
<td>Structural Biology of Proteins</td>
</tr>
<tr>
<td>BCH 4125</td>
<td>Cellular Regulation and Control</td>
</tr>
<tr>
<td>BCH 4188</td>
<td>Nucleic Acids - Structure and Functions</td>
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<tr>
<td>BCH 4300</td>
<td>Selected Topics in Biochemistry</td>
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#### Compulsory Fifth-Year Courses:

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHG 3111</td>
<td>Unit Operations</td>
</tr>
<tr>
<td>CHG 3112</td>
<td>Process Synthesis, Design and Economics</td>
</tr>
<tr>
<td>CHG 3122</td>
<td>Chemical Engineering Practice</td>
</tr>
<tr>
<td>CHG 3127</td>
<td>Chemical Reaction Engineering</td>
</tr>
<tr>
<td>CHG 3305</td>
<td>Advanced Materials in Chemical Engineering</td>
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<tr>
<td>CHG 3316</td>
<td>Transport Phenomena</td>
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<tr>
<td>CHG 3326</td>
<td>Principles of Phase Equilibria and Chemical Reaction Equilibria</td>
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<tr>
<td>CHG 3337</td>
<td>Data Collection and Interpretation</td>
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<tr>
<td>CHG 3355</td>
<td>Process Control</td>
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<tr>
<td>CHG 4116</td>
<td>Chemical Engineering Laboratory</td>
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<td>CHG 4250</td>
<td>Plant Design Project</td>
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#### 6 course units from:

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<tr>
<th>Course Code</th>
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<tr>
<td>CHG 4900</td>
<td>Thesis and seminars</td>
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or 6 course units of technical electives

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>CHG 4307</td>
<td>Process Risk Management and Sustainability</td>
</tr>
<tr>
<td>CHG 4343</td>
<td>Computer-Aided Design in Chemical Engineering</td>
</tr>
<tr>
<td>CHG 4381</td>
<td>Biochemical Engineering</td>
</tr>
<tr>
<td>GNG 4170</td>
<td>Engineering Law</td>
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#### 3 course units of technical electives

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Total: 189 Units

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**Note(s):**

1. CHG 1125 must be taken in first or second year; first year is recommended.
2. It is recommended that GNG 1106 be taken in first or second year.
3. 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 (https://engineering.uottawa.ca/undergraduate-programs/courses/complementary-electives) on the Faculty of Engineering website.

4. This course runs from September to April.
5. The research project is highly recommended for students who intend to pursue a career in research, but a CGPA of 7.0 is required to be eligible for the project. This course runs from September to April.
6. This course may not be available every year.
7. Consult the list of technical electives for the Biomedical Engineering option in the regular Chemical Engineering program.