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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>ENG 1112</td>
<td>Technical Report Writing</td>
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Compulsory First-Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIO 1130</td>
<td>Introduction to Organismal Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 1140</td>
<td>Introduction to Cell and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHG 1125</td>
<td>Chemical Engineering Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>CHG 1371</td>
<td>Numerical Methods and Engineering</td>
<td>3</td>
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<tr>
<td>CHM 1311</td>
<td>Principles of Chemistry</td>
<td>3</td>
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<tr>
<td>CHM 1321</td>
<td>Organic Chemistry I</td>
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<tr>
<td>GNG 1103</td>
<td>Introduction to Engineering Design</td>
<td>3</td>
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<tr>
<td>GNG 1105</td>
<td>Engineering Mechanics</td>
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<tr>
<td>ITI 1120</td>
<td>Introduction to Computing I</td>
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<tr>
<td>MAT 1320</td>
<td>Calculus I</td>
<td>3</td>
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<tr>
<td>MAT 1322</td>
<td>Calculus II</td>
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<tr>
<td>MAT 1341</td>
<td>Introduction to Linear Algebra</td>
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<tr>
<td>PHY 1122</td>
<td>Fundamentals of Physics II</td>
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<tr>
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<tbody>
<tr>
<td>BCH 2333</td>
<td>Introduction to Biochemistry</td>
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<tr>
<td>BIO 2133</td>
<td>Genetics</td>
<td>3</td>
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<tr>
<td>CHM 2120</td>
<td>Organic Chemistry II</td>
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<tr>
<td>CHM 2123</td>
<td>Laboratory of Organic Chemistry II</td>
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<tr>
<td>CHM 2330</td>
<td>Physical Chemistry: Introduction to the</td>
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<td>Molecular Properties of Matter</td>
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<td>CHM 2354</td>
<td>Analytical Chemistry</td>
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<td>MAT 2384</td>
<td>Ordinary Differential Equations and</td>
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<tr>
<td>ECO 1192</td>
<td>Engineering Economics</td>
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<tr>
<td>GNG 2101</td>
<td>Introduction to Product Development for</td>
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<td>Engineers and Computer Scientists</td>
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Compulsory Third-Year Courses:

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<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BCH 3120</td>
<td>General Intermediary Metabolism</td>
<td>3</td>
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<tr>
<td>BCH 3125</td>
<td>Protein Structure and Function</td>
<td>3</td>
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<tr>
<td>BCH 3170</td>
<td>Molecular Biology</td>
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<td>BCH 3346</td>
<td>Biochemistry Laboratory II</td>
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<td>BCH 3356</td>
<td>Molecular Biology Laboratory</td>
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<td>BIO 3124</td>
<td>General Microbiology</td>
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<td>BIO 3153</td>
<td>Cell Biology</td>
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<tr>
<td>CHG 2312</td>
<td>Fluid Flow</td>
<td>3</td>
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<td>CHG 2314</td>
<td>Heat Transfer Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHG 2317</td>
<td>Introduction to Chemical Process Analysis</td>
<td>3</td>
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<tr>
<td></td>
<td>and Design</td>
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</tbody>
</table>
CHG 2324  
Fundamentals and Applications of Chemical Engineering Thermodynamics  
3 Units

MAT 2322  
Calculus III for Engineers  
3 Units

3 course unit from:  

HIS 2129  
Technology, Society and Environment Since 1850  
3 Units

PHI 2394  
Scientific Thought and Social Values  
3 Units

**Compulsory Fourth-Year Courses:**

BCH 4172  
Topics in Biotechnology  
3 Units

BCH 4932  
Biochemistry Seminar  
3 Units

CHG 3111  
Unit Operations  
3 Units

CHG 3112  
Process Synthesis, Design and Economics  
3 Units

CHG 3122  
Chemical Engineering Practice  
3 Units

CHG 3127  
Chemical Reaction Engineering  
3 Units

CHG 3305  
Advanced Materials in Chemical Engineering  
3 Units

CHG 3316  
Transport Phenomena  
3 Units

CHG 3326  
Principles of Phase Equilibria and Chemical Reaction Equilibria  
3 Units

CHG 3335  
Process Control  
3 Units

One option from the following:  

**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)

6 course units from:  

BCH 4101  
Human Genome Structure and Function  
6 Units

BCH 4116  
Analytical Biochemistry  
6 Units

BCH 4122  
Structural Biology of Proteins  
6 Units

BCH 4123  
Pathological Biochemistry  
6 Units

BCH 4124  
Carbohydrates and Glycobiology  
6 Units

BCH 4125  
Cellular Regulation and Control  
6 Units

BCH 4126  
Structural Biology of Membranes  
6 Units

BCH 4188  
Synthetic Biology  
6 Units

BCH 4300  
Selected Topics in Biochemistry  
6 Units

BPS 3101  
Genomics  
6 Units

BPS 4121  
Biosynthesis and Natural Product Derived Medicines  
6 Units

BPS 4129  
Advanced Chemical Biology  
6 Units

CHM 4139  
Enzyme Chemistry and Biocatalysis  
6 Units

**Compulsory Fifth-Year Courses:**

CHG 3337  
Data Collection and Interpretation  
3 Units

CHG 4116  
Chemical Engineering Laboratory  
3 Units

CHG 4250  
Plant Design Project  
9 Units

CHG 4307  
Process Risk Management and Sustainability  
3 Units

CHG 4343  
Computer-Aided Design in Chemical Engineering  
3 Units

CHG 4381  
Biochemical Engineering  
3 Units

GNG 4170  
Engineering Law  
3 Units

One option from the following:  

**Option 1:**

CHG 4901  
Thesis and seminars I

CHG 4902  
Thesis and seminars II

**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 (https://www2.uottawa.ca/faculty-engineering/undergraduate-studies/courses-and-course-sequences/complementary-electives/) on the Faculty of Engineering website.