HONOURS BSC IN BIOCHEMISTRY / BASC IN 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 2018-2019 calendars (https://catalogue.uottawa.ca/en/archives/) for the previous requirements.

Compulsory First-Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<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 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 Computation in Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHM 1311</td>
<td>Principles of Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHM 1321</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>GNG 1103</td>
<td>Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td>MAT 1320</td>
<td>Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MAT 1322</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MAT 1341</td>
<td>Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>PHY 1121</td>
<td>Fundamentals of Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHY 1122</td>
<td>Fundamentals of Physics II</td>
<td>3</td>
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Compulsory Second-Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BCH 2333</td>
<td>Introduction to Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIO 2133</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2120</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2123</td>
<td>Laboratory of Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2330</td>
<td>Physical Chemistry: Introduction to the Molecular Properties of Matter</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2354</td>
<td>Analytical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>ENG 1112</td>
<td>Technical Report Writing</td>
<td>3</td>
</tr>
<tr>
<td>MAT 2384</td>
<td>Ordinary Differential Equations and Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>3 course units from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECO 1192</td>
<td>Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>GNG 2101</td>
<td>Introduction to Product Development and Management for Engineers and Computer Scientists</td>
<td>3</td>
</tr>
<tr>
<td>3 complementary electives course units at the undergraduate level</td>
<td>3</td>
<td></td>
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Compulsory Third-Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 3120</td>
<td>General Intermediary Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>BCH 3125</td>
<td>Protein Structure and Function</td>
<td>3</td>
</tr>
<tr>
<td>BCH 3170</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BCH 3346</td>
<td>Biochemistry Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>BCH 3356</td>
<td>Molecular Biology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BIO 3124</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 3153</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHG 2312</td>
<td>Fluid Flow</td>
<td>3</td>
</tr>
<tr>
<td>CHG 2314</td>
<td>Heat Transfer Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHG 2317</td>
<td>Introduction to Chemical Process Analysis and Design</td>
<td>3</td>
</tr>
</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 1800  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:  9 Units

Option 1: Honours Project
BCH 4040  Honours Research - Biochemistry  4

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 Units
3 complementary electives course units at the undergraduate level  3 Units
6 course units from:
BCH 4101  Human Genome Structure and Function  5
BCH 4125  Cellular Regulation and Control  5
BCH 4116  Analytical Biochemistry  5
BCH 4122  Structural Biology of Proteins  6
BCH 4123  Pathological Biochemistry  6
BCH 4124  Carbohydrates and Glycobiology  6
BCH 4188  Nucleic Acids - Structure and Functions  6
BCH 4300  Selected Topics in Biochemistry  6
BPS 3101  Genomics  5
BPS 4121  Biosynthesis and Natural Product Derived Medicines  5
BPS 4129  Advanced Chemical Biology  5
CHM 4139  Enzyme Chemistry and Biocatalysis  5

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
6 course units from:  6 Units

CHG 4900  Thesis and seminars  or 6 course units of technical electives  7
3 course units of technical electives  7  3 Units

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 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.
3 This course runs from September to April.
4 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.
5 A maximum of 3 course units may be selected amongst these courses.
6 This course may not be available every year.
7 Consult the list of technical electives in the regular Chemical Engineering program.