Biochemistry (BIOC)

Biochemistry (BIOC) Courses

BIOC 1500 [0.5 credit]
Biochemistry in a Modern Society
Explore biochemistry's real-world applications, cutting-edge research, and transformative technologies. Learn through case studies and collaborative group work about how biochemistry revolutionizes industries, medicine, and environmental stewardship in this dynamic course.
Includes: Experiential Learning Activity
Prerequisite(s): Enrolled in a Biochemistry program.
Workshop, three hours per week

BIOC 1900 [0.5 credit]
Demystifying Social Media Diets
The biochemistry and metabolic implications of popular diets and nutrition trends. May include Mediterranean, flexitarian, ketogenic, paleo, intermittent fasting, detox plans and more. Comparing claims to basic biochemical concepts in a social media age. Available only as a free elective for Science students.
Lecture three hours a week.

BIOC 2200 [0.5 credit]
Cellular Biochemistry
Cellular functions and their interrelationships. Introduction to thermodynamics, membrane structure and function, transport mechanisms, basic metabolic pathways, energy production and utilization, communications between cells. It is strongly recommended that Biology Majors and Honours students take this course in their second year of study.
Includes: Experiential Learning Activity
Also listed as BIOL 2200.
Precludes additional credit for BIOL 2201, CHEM 4401.
Prerequisite(s): (BIOL 1003 and BIOL 1004) or (BIOL 1103 and BIOL 1104), (CHEM 1006 or CHEM 1002).
Lectures three hours a week, laboratory or tutorial four hours a week.

BIOC 2300 [0.5 credit]
Physical Biochemistry
Energy of biological systems, molecular interactions, diffusion principles, introduction to protein folding, structure and thermodynamics, ligand binding and nucleic acid structures; experimental design and data management.
Precludes additional credit for CHEM 2103.
Prerequisite(s): BIOC 2200 (can be taken concurrently with BIOC 2300) and MATH 1007 and MATH 1107, and PHYS 1007 or PHYS 1003.
Lectures three hours a week, tutorials one and a half hours a week.

BIOC 2400 [0.5 credit]
Independent Research I
Students carry out a laboratory research project under the supervision of a faculty member from the Institute of Biochemistry. A research report must be submitted by the last day of classes for evaluation by the Director and Faculty supervisor.
Includes: Experiential Learning Activity
Prerequisite(s): restricted to Honours students of second-year standing in a Biochemistry program with a GPA of 10.0 or higher in first year, and approval of the Director and a Faculty supervisor.
Laboratory research for at least three hours a week over two terms.

BIOC 2500 [0.5 credit]
Research Methods and Skills in Biochemistry
An introduction to research methods in biochemistry. Includes modern information literacy, study designs, descriptive and inferential statistics, and effective communication of research. Examples drawn from current issues in biochemistry.
Includes: Experiential Learning Activity
Prerequisite(s): 2nd year standing in a Biochemistry program.
Workshop, three hours per week.

BIOC 3101 [0.5 credit]
Unlocking Metabolism: Pathways, Enzymes, and Control
This course examines biological macromolecules as well as their chemistry, structure and function. Enzymatic reactions and their regulation, as well as carbohydrate, lipid and protein metabolism, is emphasized. Students apply knowledge of course concepts to relevant scientific problems (disease, development).
Precludes additional credit for CHEM 3401 (no longer offered), CHEM 4401.
Prerequisite(s): (BIOC 2200 or BIOL 2200), and (CHEM 2203 and CHEM 2204) or (CHEM 2207 and CHEM 2208).
Lectures three hours a week.

BIOC 3102 [0.5 credit]
Biochemical Signals and Structures: The Molecular Language of Cells
This course examines secondary metabolism, membrane composition/synthesis, cell communication, and flow of genetic information within a biological system. Emphasis is on understanding molecular structures, the reactions/processes they facilitate, and their regulation. Students apply knowledge of course concepts to relevant scientific problems.
Prerequisite(s): BIOC 3101 and BIOL 2104.
Lectures three hours a week.

BIOC 3103 [0.5 credit]
Experimental Biochemistry I: Principles and Practices

Introduction to experimental biochemistry and the theory and concepts dealt with in BIOC 3101, and BIOC 3202.
Includes: Experiential Learning Activity
Precludes additional credit for BIOC 3006 (no longer offered).
Prerequisite(s): BIOC 2200/BIOL 2200 and CHEM 2203. CHEM 2204 and (BIOC 2300 or CHEM 2103) are also recommended. It is highly recommended that BIOC 3101 and BIOC 3202 be taken concurrently.
Laboratory four hours a week, tutorial one hour per week.

BIOC 3104 [0.5 credit]
Experimental Biochemistry II: Research Experience
Introduction to experimental biochemistry and the theory and concepts dealt with in BIOC 3101, BIOC 3102, and BIOC 3202.
Includes: Experiential Learning Activity
Precludes additional credit for BIOC 3006 (no longer offered).
Prerequisite(s): BIOC 3103. It is highly recommended that BIOC 3102 be taken concurrently.
Laboratory four hours a week, tutorial one hour a week.

BIOC 3202 [0.5 credit]
Biophysical Techniques and Applications
Theory and applications of current biochemical/ biophysical instrumentation and techniques including biophysical spectroscopy, molecular structure determination, calorimetry, and mass spectrometry.
Precludes additional credit for BIOC 4002.
Prerequisite(s): BIOC 2200 or permission of the Institute.
Lectures three hours a week.

BIOC 3203 [0.5 credit]
Biochemical Pharmacology
Biochemical principles of pharmacology, including receptor mechanisms, signal transduction, pharmacokinetics, and pharmacodynamics. Genome-wide association studies, pharmacogenomics, and personalized medicine will also be included.
Prerequisite(s): BIOC 2200 or BIOL 2200 or BIOL 2201, or permission of the Institute.
Lectures three hours a week.

BIOC 3400 [0.5 credit]
Independent Research II
Students carry out a laboratory research project under the supervision of faculty member from the Institute of Biochemistry. A research report must be submitted by the last day of classes for evaluation by the Director and Faculty supervisor.
Includes: Experiential Learning Activity
Prerequisite(s): restricted to Honours students of third-year standing in a Biochemistry program with a GPA of 10.0 or higher in second year, and approval of the Director and Faculty supervisor.
Laboratory research for at least three hours a week over two terms.

BIOC 3999 [0.0 credit]
Co-operative Work Term
Practical experience for students enrolled in the co-operative option. Students must receive a satisfactory evaluation from their work term employer; and present a written report describing their work term project. Graded SAT or UNS.
Includes: Experiential Learning Activity
Prerequisite(s): registration in the Biochemistry co-operative option and permission of the Institute.

BIOC 4001 [0.5 credit]
Methods in Biochemistry
Principles and applications of modern biochemical methodology, including ultracentrifugation, electrophoresis, ELISA, EMSA, experimental planning, ligand binding kinetics, fluorescence spectroscopy, affinity purification, and in vitro translation.
Includes: Experiential Learning Activity
Prerequisite(s): BIOC 3103 and BIOC 3104 or permission of the Institute.
Lectures and discussion two hours, laboratory four hours a week.

BIOC 4004 [0.5 credit]
Industrial Biochemistry
The application of biochemistry to the production of biological compounds useful in nutrition, medicine, and the food and chemical industries. General strategies for efficient production of these compounds by controlling the activities of living cells or enzymes.
Prerequisite(s): BIOC 3101 and BIOC 3102 (BIOC 3102 may be taken concurrently), or permission of the Institute.
Lecture three hours a week.

BIOC 4005 [0.5 credit]
Biochemical Regulation
Regulation at the transcriptional, translational and metabolic level; regulation of cell and subcellular organelle function and other timely topics may be included.
Prerequisite(s): BIOC 3101 and BIOC 3102.
Lectures three hours a week.

BIOC 4007 [0.5 credit]
Membrane Biochemistry
Biochemical and biophysical aspects of biomembrane structure and function. Topics may include: membrane lipids and proteins, lipid polymorphism, model membranes, liposomes, membrane biogenesis, the membrane cytoskeleton, membrane trafficking, membrane fusion, exocytosis and signal transduction across membranes.
Prerequisite(s): BIOC 2200 or BIOL 2201, and third-year standing.
Lectures two hours a week and workshop two hours a week.

BIOC 4009 [0.5 credit]
Biochemistry of Disease
The biochemical basis of disease including genetic and metabolic disorders such as cancer, neurological degenerative conditions, diabetes, stroke and microbial infections.
Prerequisite(s): BIOC 2200 or BIOL 2201, and third-year standing.
Lectures three hours a week.

BIOC 4010 [0.5 credit]
Data Applications in Biochemistry
A project-based workshop at the intersection of data and biochemistry. Students will develop skills for autonomous learning and proficiency in database selection, computational tool integration, data management, introductory programming, statistical analysis, data visualization, and effective communication of biochemically-relevant information.
Prerequisite(s): BIOC 3101 and BIOC 3102, or permission of the Institute.
Workshop three hours a week.

BIOC 4201 [0.5 credit]
Advanced Cell Culture and Tissue Engineering
Theory and application of current techniques and developments in cell culture as applied to research questions in the field of stem cells and tissue engineering.
Includes: Experiential Learning Activity
Also listed as BIOL 4201.
Prerequisite(s): BIOL 3201 or permission of the Institute.
Laboratory four hours per week, tutorial one hour a week.

BIOC 4203 [0.5 credit]
Secondary Metabolism and Natural Products Biochemistry
Structure, biochemical derivation and function of secondary metabolites such as toxins and antibiotics. Examples from plant, fungal and animal systems.
Prerequisite(s): BIOC 3101 and BIOL 3104, or permission of the Institute.
Lectures three hours a week.

BIOC 4204 [0.5 credit]
Protein Biotechnology
An advanced lecture, discussion and seminar course covering the theory, development and current techniques of protein and enzyme engineering. Topics to be discussed may also include applications in biotechnology, nanotechnology and new frontiers in basic and applied research.
Prerequisite(s): BIOC 3101 and BIOC 3202 (may be taken concurrently), or permission of the Institute.
Lectures two hours a week, workshop two hours a week.

BIOC 4207 [0.5 credit]
Bio-Organic Chemistry
The course covers chemical and biosynthetic methods applied to the major classes of biomolecules and their derivatives, including: carbohydrates, amino acids, peptides, proteins, nucleic acids, lipids, terpenes, heterocycles and natural products. Content will focus on reactions and mechanisms that contribute to their biological activities.
Also listed as CHEM 4207.
Prerequisite(s): CHEM 3201 or permission of the Institute.

Also offered at the graduate level, with different requirements, as CHEM 5010., for which additional credit is precluded.
Lectures three hours a week.

BIOC 4708 [0.5 credit]
Principles of Toxicology
Basic theorems of toxicology with examples of current research problems. Toxic risk is defined as the product of intensive hazard and extensive exposure. Each factor is assessed in scientific and social contexts and illustrated with many types of experimental material.
Prerequisite(s): BIOC 3101 and fourth-year standing or permission of the Institute.
Also offered at the graduate level, with different requirements, as BIOL 6402, CHEM 5708, for which additional credit is precluded.
Lectures three hours a week.

BIOC 4901 [0.5 credit]
Directed Special Studies
Independent or group study, open to third- and fourth-year students to explore a particular topic, in consultation with a Faculty supervisor. May include directed reading, written assignments, tutorials, or laboratory or field work.
Prerequisite(s): permission of the Institute. Students normally may not offer more than 0.5 credit of Directed Special Studies in their program.

BIOC 4902 [0.5 credit]
Special Topics in Biochemistry
Specific topics of current interest. Topics may vary from year to year.
Prerequisite(s): third or fourth-year standing in a Biochemistry program or permission of the Institute.
Lecture, seminars, or workshops three hours per week.

BIOC 4907 [1.0 credit]
Honours Essay and Research Proposal
An independent research study using library resources. The candidate will prepare a critical review of a topic and research proposal approved by a faculty adviser. Evaluation will be based on a written report and a poster presentation of the project.
Includes: Experiential Learning Activity
Precludes additional credit for BIOC 4906 (no longer offered), BIOC 4908 [1.0].
Prerequisite(s): fourth-year standing in an Honours Biochemistry program and permission of the Institute.

BIOC 4908 [1.0 credit]
Research Project
Students carry out a research project approved by the Director, under the supervision of a faculty member of the Institute, in either the Biology or Chemistry departments. Evaluation is based on a written thesis and poster presentation.
Includes: Experiential Learning Activity
Precludes additional credit for BIOC 4906 and BIOC 4907.
Prerequisite(s): (BIOC 3103 and BIOC 3104) and (BIOC 3101 and BIOC 3102) or equivalent, and eligibility to continue in Honours Biochemistry or in Biochemistry and Biotechnology.