

BIOTECHNOLOGY - HEALTH

Program Outline

Major:	BIOT
Length:	2 Year
Delivery:	4 Semesters
Credential:	Ontario College Diploma
Effective:	2017-2018
Location:	Barrie
Start:	Fall (Barrie), Summer (Barrie)

Description

Students are prepared for a career as a lab technician in a biomedical field. Experimental techniques and use of scientific equipment across a variety of disciplines including biology, chemistry and physics will form the basis of the program. Both the theoretical and practical aspects of this discipline are equally emphasized. Upon graduation, students will be able to perform a wide array of experiments and assays to answer clinically-related and scientific problems.

Career Opportunities

Students graduating from this program will possess a wide array of skills related to the analysis of chemical and biological samples. Graduates will also be able to work at academic and clinical institutions in the context of supporting research labs and education of post-secondary students while performing analysis of biological samples in both public and private settings.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- complete all tasks in compliance with pertinent legislation and regulations, as well as biotechnology standards and guidelines;

- apply quality control and quality assurance procedures to meet organizational standards and guidelines;
- apply best practices for sustainability;
- complete biotechnological applications using principles of chemistry, biology and biostatistics as well as basic principles of physics;
- use appropriate laboratory procedures to carry out quantitative and qualitative tests and analyses;
- carry out standard cell culture procedures under aseptic conditions;
- carry out molecular biology procedures;
- assist with the management of biological data to support biological scientists and researchers in capturing, organizing/summarizing and storing their data;
- prepare, maintain and communicate scientific data effectively;
- develop and present a strategic plan for ongoing personal and professional development to enhance work performance;
- find solutions to problems related to health and medicine using biotechnology procedures and data analysis.
- apply basic entrepreneurial strategies to identify and respond to new opportunities in biotechnology.

The Program Progression:

Fall Intake - Barrie

Sem 1	Sem 2	Sem 3	Sem 4

Fall 2017	Winter 2018	Fall 2018	Winter 2019

Summer Intake - Barrie

Sem 1	Sem 2	Sem 3	Sem 4

Summer 2018	Fall 2018	Summer 2019	Fall 2019

Articulation:

A number of articulation agreements have been negotiated with universities and other institutions across Canada, North America and internationally. These agreements are assessed, revised and updated on a regular basis. Please contact the program co-ordinator for specific details if you are interested in pursuing such an option. Additional information can be found on our website at <http://www.georgiancollege.ca/admissions/credit-transfer/>

Admission Requirements:

OSSD or equivalent, with

- Grade 12 English (C or U)
- Grade 12 Mathematics (C or U)
- Grade 11 or 12 Biology (C or U)
- Grade 12 Chemistry (C or U)

Mature students, non-secondary school applicants (19 years or older), and home school applicants may also be considered for admission. Eligibility may be met by applicants who have taken equivalent courses, upgrading, completed their GED, and equivalency testing. For complete details refer to: www.georgiancollege.ca/admissions/policies-procedures/

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may also be considered for admission; refer to the Credit Transfer Centre website for details: www.georgiancollege.ca/admissions/credit-transfer/

Graduation Requirements:

- 17 Mandatory Courses
- 2 Communications Courses
- 3 General Education Courses

Graduation Eligibility:

To graduate from this program, the passing weighted average for promotion through each semester, from year to year, and to graduate is 60%. Additionally, a student must attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester unless otherwise stated on the course outline.

Mandatory Courses

- BIOL1030 Cell Biology
- BIOL1031 Human Physiology 1
- BIOL1032 Human Physiology 2
- BIOL1033 Biomedical Laboratory 1
- BIOL1034 Biochemistry

BIOL2012 Microbiology
BIOL2013 Biomedical Laboratory 2
BIOL2014 Pharmacology and Pharmaceutical Analysis
BIOL2015 Tissue Culture and Histology
BIOL2016 Immunology and Genetics
CHEM1011 Chemistry for Biotechnology
CHEM1012 Organic Chemistry 1
CHEM2004 Organic Chemistry 2
CHEM2005 Analytical Chemistry
CHEM2006 Quality Assurance
PHYS1008 Physical Measurements
STAT1000 Statistics

Communications Courses

To be selected at time of registration from the College list, as determined by testing.

General Education Courses

To be selected from College list

Course Descriptions:

BIOL1030 Cell Biology 56.0 Hours

Students are introduced to the anatomy, physiology and related biochemistry of the cell. Students explore cellular structures including membranes, nucleus and organelles and their associated biochemical processes with an emphasis on the relevance to human health.

BIOL1031 Human Physiology 1 56.0 Hours

Students are exposed to both theoretical and practical elements of human physiology through a blend of classroom and laboratory activities. The physiology of the integumentary, skeletal, muscular, nervous, and endocrine systems are explored and related to human health in this course.

BIOL1032 Human Physiology 2 56.0 Hours

Students continue their practical and theoretical exploration of Human Physiology in this continuation of BIOL 1031. Students investigate the cardiovascular, respiratory, immune, digestive and reproductive systems as well as fluid, electrolyte, and acid-base balance through a balance of classroom and laboratory activities.

P- BIOL1031 Human Physiology 1

BIOL1033 Biomedical Laboratory 1 56.0 Hours

Students learn the skills and techniques required to successfully perform tests in a biomedical laboratory and builds upon measurements skills developed in PHYS 1030. Topics include pH and buffers, chromatography, spectrophotometry, protein electrophoresis and enzyme kinetics. A theoretical introduction to NMR spectroscopy is also presented.

P- CHEM1011 Chemistry for Biotechnology and P- PHYS1008 Physical Measurements

BIOL1034 Biochemistry 56.0 Hours

Students are exposed to introductory topics in human biochemistry with emphasis on biological macromolecules including proteins, carbohydrates and lipids. The metabolism and bioenergetics of each molecule forms the basis of the course with emphasis on the relationship between structure and function in biological systems.

P- CHEM1011 Chemistry for Biotechnology

BIOL2012 Microbiology 56.0 Hours

Students continue their study of cellular organisms while investigating bacterial, viral and fungal organisms with emphasis on applications to the biomedical field. Students, through a series of theoretical and practical investigations, identify and characterize these organisms along with their associated morphology and physiology.

P- BIOL1030 Cell Biology

BIOL2013 Biomedical Laboratory 2 56.0 Hours

Students continue to practice and apply technical skills developed in BIOL XXX4 (Biomedical Laboratory 1) with emphasis on performing skills reliably, efficiently and reproducibly. Students are also exposed to the crucial health and safety policies and protocols in a biomedical laboratory.

P- BIOL1033 Biomedical Laboratory 1

BIOL2014 Pharmacology and Pharmaceutical Analysis 56.0 Hours

Students are introduced to the development, use and analysis of pharmaceutical products. The molecular interactions of drug molecules at their target from a structural and mechanistic viewpoint are studied. The laboratory component focuses on the analysis of individual batches of pharmaceuticals.

P- BIOL1032 Human Physiology 2

BIOL2015 Tissue Culture and Histology 84.0 Hours

Students examine the histology of various tissue samples in the human body through classroom and laboratory activities. Students learn how to identify the morphology of tissues using light microscopy and are introduced briefly to pathohistology. The laboratory component is focused on the preparation, sectioning, staining and mounting of a variety of tissue samples.

BIOL2016 Immunology and Genetics 56.0 Hours

Students are introduced to the cells and tissues of the immune system as they explore principles of immunology. Medical genetics is the focus of the second half of the course as DNA replication, transcription and RNA processing, translation, regulation of gene expression and recombinant DNA are studies. Techniques of immunology and genetic analysis that are specifically related to human pathology are also explored.

P- BIOL1034 Biochemistry

CHEM1011 Chemistry for Biotechnology 56.0 Hours

Students study how atoms, ions, and biomolecules assemble together to form organelles and related structures that make up a cell - the basic building block of every living organism. During lecture and lab sessions students explore the origins and formation of biomolecules and examine various techniques for synthesis, identification, and analysis that will be important to future biotechnology courses.

CHEM1012 Organic Chemistry 1 56.0 Hours

Students are introduced to the principles of organic chemistry. The structure and reactivity of organic molecules is explored with special emphasis on functional groups and stereochemistry.

P- CHEM1011 Chemistry for Biotechnology

CHEM2004 Organic Chemistry 2 56.0 Hours

Students continue their investigation of organic chemistry with special attention on functional group reactivity, mechanisms, spectroscopy and molecular synthesis. The utility of these reactions in the synthesis of pharmaceuticals is a point of emphasis.

P- CHEM1012 Organic Chemistry 1

CHEM2005 Analytical Chemistry 56.0 Hours

Students engage in a vigorous examination of the principles of biochemical measurements and their application in the laboratory. Students, through a series of classroom and laboratory activities, learn about sampling, analysis and interpretation of results in terms of the content, quality and contamination of various biochemical samples such as dietary supplements, food products and liquids.

P- BIOL1033 Biomedical Laboratory 1

CHEM2006 Quality Assurance 56.0 Hours

In this capstone course in laboratory analysis, students focus on industrial biomedical processes. The concepts of good manufacturing practices and current validated processes for the manufacture and analysis of active pharmaceutical agents are examined. Various regulatory frameworks are introduced as well with special emphasis on data handling and validity.

P- BIOL2013 Biomedical Laboratory 2 and P- CHEM2004 Organic Chemistry 2 and P- CHEM2005 Analytical Chemistry

PHYS1008 Physical Measurements 56.0 Hours

Students are introduced to the principles and practice of measuring and documenting quantities for use in science. The laboratory component focuses on the use of both basic scientific equipment including glassware and centrifuges as well as more sophisticated ones such as chromatographs and spectrophotometers.

STAT1000 Statistics 42.0 Hours

Students are introduced to quantitative statistics as they develop skills related to the collection, organization and presentation of data including the use of measures of central tendency, variability and graphing. The use of inferential statistics is presented through practical problems that address the various means of hypothesis testing, probability distributions, linear regression and correlation with one and two variables. The discussion of these topics takes place in context of proper research design to ensure that students are able to think critically about the merits and limitations of statistics.

Course Description Legend

P = Prerequisite; C = Concurrent prerequisite; CO= Corequisite

Information contained in College documents respecting programs is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs. The college reserves the right to add or delete programs, options, courses, timetables or campus locations subject to sufficient enrolment, and the availability of courses.