

Co-op Program

# BIOCHEMISTRY AND HEALTH SCIENCES



This undergraduate program provides scientific training specifically adapted to the needs of the research community. By seamlessly combining studies in essential chemistry, modern molecular biology and biomedical applications of biochemistry, it grooms truly multidisciplinary biochemists. With close to 25% of the program's credits devoted to the practical work and to building relevant hands-on skills, it cultivates the talent and develops the expertise of our students.

In addition, the biomedical orientation of this program and its specialization paths in medical genetics, genomics-proteomics (molecular biology) and organic synthesis (chemistry) further enhance the skills and build the value of our future health biochemists. This program fully meets the requirements of the Ordre des chimistes du Québec.

## WHAT OUR STUDENTS CAN DO FOR YOU

### Project management

- Experiment design
- Experiment protocol update and optimization
- Statistical analysis and interpretation of biological data
- Follow-up with clients and suppliers
- Write reports
- Scientific communications

### Complimentary techniques

- Cellular culture
- Culture and identification of bacteria and yeasts
- Laboratory animal handling
- Virus detection, culture and molecular characterization
- Prepare solutions
- Quality control
- Logging data in common and specialized software
- Biosynthesis of organic molecules
- Computer analysis of DNA and protein sequences
- Disease screening, diagnosis and monitoring

### Specific techniques

- DNA / RNA extraction
- HPLC analysis
- PCR and real-time PCR
- Identification and characterization of a biochemical target
- Design of enzymatic and binding assays
- Thin layer chromatography and electrophoresis
- Fluorescent and confocal microscopy
- Colorimetric assays (MTT)
- Purification of antibodies
- Immunohistochemistry analysis



## KNOWLEDGE AND SKILLS

Term	Description
S-1	Structure and functions of the cell and of biological molecules; properties of microorganisms; fundamental concepts in organic chemistry (links, classes of compounds, isomerism, conformation and stereochemistry); chemical equilibrium; acidity and basicity; complexometry; redox and precipitation reactions; laboratory precision.
S-2	Basic techniques for biochemical and chemical manipulations; bacterial culture and identification; biosynthesis of organic molecules; intermediary metabolism; statistical analysis of biological data; molecular cloning; DNA analysis; restriction enzymes, cloning vectors; selection methods.
S-3	Physical chemistry for biochemists; chromatography; thermodynamics of macromolecules; simplified kinetic theory of gases; saturated carbon; carbonyl compounds; isolation and purification of enzymes; enzymatic assays; plasmid DNA preparation; synthetic organic chemistry; genetic expression; applications of molecular genetics.
S-4	Oral presentation of a scientific article; in-depth concepts of molecular biology (DNA, RNA, proteins and enzymes); basic equations for enzymatic reactions; principles of animal physiology.
S-5	Classical methods in biochemistry; biotechnology and human health; ethics and professional practice; separation of molecules; interaction with electromagnetic radiation; medical genetics; genomics-proteomics.
S-6	Molecular genetics; yeast two-hybrid system; plasmid DNA-PCR; recombinant proteins; computer analysis of DNA sequences and proteins; applied human virology; cell differentiation and metabolism; screening, diagnosis and monitoring of diseases; scientific communications.

## ORGANIZATION OF STUDY (S) AND WORK TERM (W)

1st year			2nd year			3rd year			4th year			5th year
FALL	WIN	SUM	FALL	WIN	SUM	FALL	WIN	SUM	FALL	WIN	SUM	FALL
S-1	S-2		S-3	W-1	S-4	W-2	S-5	W-3	S-6			
	S-1		S-2	S-3		S-4	W-1	S-5	W-2	S-6	W-3	S-7