

Co-op Program

PHARMACEUTICAL CHEMISTRY



With a solid training foundation in chemistry to master concepts, principles and scientific methods, this Bachelor's degree program provides the opportunity for further specialization in the synthesis of products of biological interest. After completing a two-year core curriculum in chemistry, students start their pharmaceutical specialization program.

Just like the Bachelor's degree in Chemistry, the Pharmaceutical Chemistry program is endorsed by the Ordre des chimistes du Québec and provides hands-on learning experience as early as their first term. This lab immersion encourages self-directed learning and helps to build practical skills in advanced analysis and synthesis techniques. Moreover, based on their choice of elective courses and paths, these future chemists can specialize in pharmaceuticals, organic synthesis and even in medicinal chemistry.

WHAT OUR STUDENTS CAN DO FOR YOU

Complementary Skills

- Data interpretation
- Software applications (ChemStation, ChemStore, SigmaPlot, Maple, Labview, GAUSS)
- Lab reporting
- Quality control

Analytical

- Structural and conformational analysis of proteins (NMR spectroscopy)
- Analysis of end products and raw materials (GC, HPLC, AA, IR, NMR)
- Chromatographic purification and analysis methods (flash, CCM, GC)
- Physicochemical analysis of samples (conductivity, colorimetric, kinetic)
- Mass spectrometry and argon plasma emission spectrometry (MS)
- Screening test (drugs, medications and their metabolites)

Organic

- Improved pharmaceutical compounds
- Synthesis of organic compounds
- Reduction, oxidation, alkylation, hydrogenation, crystallization, distillation
- Asymmetric synthesis of natural products
- Combinatorial chemistry
- Synthesis of organic molecules with biological activity (in vitro and in vivo)
- Computer modeling of synthetic compounds



KNOWLEDGE AND SKILLS

Term	Description
S-1	Basic concepts in organic and inorganic chemistry; quantitative chemical analysis; molecular geometry and 3D representation; aromatic substitution; energy diagrams; electronic structure of atoms; chemical bonds; description of structures; coordination chemistry and organometallic chemistry; gravimetric and volumetric methods.
S-2	IR spectroscopy, NMR, gas-liquid chromatography; distillation; extraction; thin layer chromatography, column chromatography; recrystallization; inorganic chemistry; crystallography; thermodynamics; entropy; chemical and electrochemical potential; useful energy; statistical methods for quality control.
S-3	Spectroanalytical methods; electrochemical methods: UV/Vis, fluorescence, atomic absorption and emission; gas-liquid chromatography methods; multistage syntheses; carbonyl chemistry; kinetics. Electives: chemistry in the natural environment or basic concepts in pharmacology.
S-4	Basic concepts in molecular biochemistry; organometallic and bioorganic chemistry; principles of quantum chemistry; equilibrium thermodynamics; elimination reactions; electrophilic addition to unsaturated substrates.
S-5	Molecular dynamics; modeling; atomic and molecular electronic spectroscopy; mechanism of drug action; structure-activity relationship or polymer chemistry or biosynthesis of natural products or advanced organic chemistry, orbitals and frontier orbitals or statistical thermodynamics or drug-biological system interactions.
S-6	Ethics and professional conduct; chemistry of materials or strategies in organic synthesis or modern reagents in organic chemistry or central nervous system and neuropharmacology.

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	W-1	S-3	W-2	S-4	W-3	S-5	W-4	S-6			
	S-1		S-2	S-3	W-1	S-4	W-2	S-5	W-3	S-6	W-4	S-7