

PHL 385	Intermediate Physics Lab I	2-0-6
Introduction to data acquisition and analysis of experiments which serve to measure the fundamental constants or properties of nature (e.g., Planck's constant, Boltzmann's constant, speed of light, charge of the electron, Landé g-factor). Data will be collected by using a variety of instruments including oscilloscopes, computer interfaces using A/D converters, and other data sensors. <i>Offered alternate years.</i>		
PHL 386	Intermediate Physics Lab II	2-0-6
Experiments in quantum physics, non-linear dynamics (chaos), thermodynamics, and low-temperature physics will be carried out. Computer interfaces and nuclear counters will be used to collect and analyze data. <i>Offered alternate years.</i>		
PHL 387	Intermediate Physics Lab III	2-0-6
Introduction to data acquisition and the analysis of data related to experiments in electricity and magnetism, electronics, and physical optics. Experiments include the magnetization of various materials, the Hall effect, and advanced spectroscopy. Computer interfaces will be used to collect and analyze data. <i>Offered alternate years.</i>		
PHL 388	Intermediate Physics Lab IV	2-0-6
Experiments in electricity and magnetism, electronics, holography, and optical astronomy will be carried out. Students will also be allowed to carry out numerical simulations in any area pertaining to computational physics. <i>Offered alternate years.</i>		
PHY 462	Quantum Mechanics II	3-3-0
Theory of angular momentum, matrix mechanics and applications of quantum mechanics to various branches of physics. Perturbation theory, scattering, molecular applications, and Hartree-Fock theory. <i>Prerequisite: PHY 361.</i>		
PHY 463	Nuclear Physics	3-3-0
Nuclear structure and systematics; alpha emission, beta decay, gamma emission, two-body systems and nuclear reactions; neutron physics; sub-nuclear particles. <i>Prerequisite: PHY 361.</i>		
PHY 464	Condensed Matter Physics	3-3-0
Topics to be studied include the one-electron theory of solids, energy bands, lattice vibrations, transport theory, and thermodynamic properties. <i>Prerequisite: PHY 317, or permission of the department.</i>		
PHY 465	Electromagnetic Theory	3-3-0
Static and dynamic electric and magnetic fields; Maxwell's equations and solutions involving plane waves. Covariant formulation of electromagnetic field theory. <i>Prerequisite: PHY 321.</i>		
PHY 466	Theoretical Topics	3-3-0
Topics to be studied will be selected from the areas of special and general relativity, classical and quantum mechanics, particle physics, astrophysics, and cosmology. In particular, the covariant nature of physics and various physical symmetries will be investigated. <i>Prerequisites: PHY 317, PHY 318; or permission of the instructor.</i>		
PHY 467	Advanced Statistical Mechanics	3-3-0
Derivation of the laws of thermodynamics from statistical principles. Quantum statistics, arbitrarily degenerate and relativistic perfect gases, transport theory, thermodynamic fluctuations, and low-temperature physics will also be studied. <i>Prerequisite: PHY 317.</i>		
PHY 469	Independent Studies I	3-0-0
Topics to be determined by the instructor based on student's needs.		
PHY 470	Independent Studies II	3-0-0
Topics to be determined by the instructor based on student's needs.		
PHY 471	Independent Studies III	3-0-0
Topics to be determined by the instructor based on student's needs.		
PHY 474	Cosmology	3-0-0
Topics to be studied include: cosmology, inflation, dark energy, compact objects, relativistic fluid dynamics, gravitational lensing, and gravitational waves. <i>See PHY 574.</i> <i>Students who take this course for credit may not receive credit for PHY 574.</i>		

PHY 475	Numerical Methods and Simulations	3-3-0
This course will cover selected topics in High Performance Computing including cellular automata, finite element methods, molecular dynamics, Monte Carlo methods, and multigrid methods. Applications of the algorithms to the study of classical fields, fluid dynamics, materials properties, nanostructures, and biomolecules will be addressed depending on the interests of the students. <i>See PHY 575. Students may not take this course for credit if they have received credit for PHY 575.</i>		

PHY 476	Stellar Astrophysics	3-3-0
An introduction to the properties of stellar atmospheres and interiors. The equations of stellar evolution, nuclear energy generation, radiative transport and stellar model building will be studied. Further topics include the formation of stars, and the physics associated with supernovae, white dwarfs, neutron stars, pulsars and black holes.		

PHY 480	Honours Research Dissertation	6-1-6
Each student is required to carry out either an experimental or theoretical project under the supervision of a faculty member. A plan outlining the proposed research must be submitted for approval during the first four weeks of the course. Each student will present his/her results in the form of a seminar, an oral thesis defense, and a written dissertation. <i>Prerequisite: U3 Honours Physics registration or permission of the department.</i>		

Pre-Medicine Double Major (B.Sc)

<p>Faculty Administered by the Chair of Biology</p>
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Program Overview (75 credits)

MAJMED

The pre-medicine double major allows students to complete all the necessary pre-requisites to apply to medical schools while at the same time pursuing a liberal arts education. The required and optional courses listed below correspond to the entrance requirements of most Canadian and American medical schools, but also address the requirements of most related professional schools (such as dentistry or physiotherapy). Students must register in a separate, primary major as well as the pre-medicine major and complete all of the requirements of both majors in order to graduate. Students can select their primary major from any discipline offered at Bishop's, including Biology, Biochemistry, Chemistry, Business, Liberal Arts, or Psychology. Courses can be double-counted towards both the primary major and the Pre-Medicine major.

Entrance Requirements

Students must already be admitted to their primary major at Bishop's. Students must meet two criteria to be considered for entry into the B.Sc. Pre-medicine double major:

- 60 completed course credits (not including lab credits), including advanced credits
- An overall average of 75%. Students must maintain this average to graduate from the program.

Quebec students with a completed D.E.C. will be granted credit for Year 1 courses (30 credits) if they successfully completed collegial courses in Chemistry (General Chemistry, Solutions Chemistry), Physics (Mechanics, Electricity and Magnetism), Mathematics (Differential Calculus, Integral Calculus) and Biology (General Biology, Cell and Molecular Biology). Students lacking any of these courses can take their equivalents at Bishop's, and their advanced credits will be reduced accordingly.

Program Requirements

1. B.Sc. Y1 Year (27 credits; non-Quebec students)

BIO 196	Introductory Biology I: Introduction to Cellular and Molecular Biology
CHM 191	General Chemistry I
CHM 192	General Chemistry II
PHY 193	Physics for the Life Sciences I
PHY 194	Physics for the Life Sciences II
MAT 198	Calculus I for Life Sciences
MAT 199	Calculus II for Life Sciences
ENG 116	Effective Writing (or other ENG)
HUM (CLA, ENG, HIS, REL, PHI or Lib. Arts)	

Note: Some Quebec medical schools require PHY 206 Waves and Optics in addition to PHY 193 and PHY 194. Students should research their preferred medical school to confirm whether or not they should take PHY 206.

2. Pre-Medicine Required Courses: (36 Credits)

The following courses must be taken in order to meet the requirements of the major.

BCH 210	General Biochemistry
BCH 313	Metabolism
BIO 201	Cell and Molecular Biology
BIO 233	Human Anatomy
BIO 336	Animal Physiology I
BIO 337	Animal Physiology II
CHM 111	Organic Chemistry I
CHM 211	Organic Chemistry II
PHY 101	Statistical Methods in Experimental Science
PSY 101	Introduction to Psychology
PSY 102	Introduction to Psychology II
SOC 101	Introduction to Sociology

3. Pre-Medicine Required Options: (12 Credits)

Note: These courses must be taken in addition to the Y1 Humanities and English requirements.

At least 2 Second Language Courses.

At least 2 Courses in English Literature. This includes courses in literature and comprehension, not writing or composition.

4. Free Electives: (48 Credits)

These credits can be used to fulfill the requirements of the primary major.

Useful Electives

These courses are not required for the Pre-Medicine Major, but will deepen your background in biomedical topics and may enhance your success in writing the MCAT, preparing your application essay, and/or performing well in the interview.

BIO 208	Genetics
BIO 311	Quantitative Methods in Health Sciences
BIO 320	Programmed Cell Death
BIO 428	Advanced Physiology
CHM 121	Structure and Bonding
CHM 131	Physical Chemistry I
CHM 141	Analytical Chemistry
CHM 311	Organic Chemistry III
CLA 170	Greek and Latin Terminology for Medicine and the Life Sciences
PBI 275	Health Psychology 1
PBI 276	Health Psychology 2