

SECTION 15:

FACULTY OF SCIENCE

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15.1 Degrees offered

Bachelor of Science (Honours) in Applied and Industrial Mathematics - BSc (Hons)

Bachelor of Science (Honours) in Biological Science - BSc (Hons)

- Complementary Studies
- Environmental Toxicology specialization
- Life Sciences specialization
- Pharmaceutical Biotechnology specialization

Bachelor of Science (Honours) in Chemistry - BSc (Hons)

- Chemistry Comprehensive program
- Biological Chemistry specialization
- Pharmaceutical Chemistry specialization

Bachelor of Science (Honours) in Computing Science - BSc (Hons)

- Computing Science Comprehensive program
- Digital Forensics specialization
- Digital Media specialization

Bachelor of Science (Honours) in Forensic Science - BSc (Hons)

Bachelor of Science (Honours) in Physical Science - BSc (Hons)

Bachelor of Science (Honours) in Physics - BSc (Hons)

- Physics Comprehensive program
- Energy and the Environment specialization
- Forensic Physics specialization
- Medical Physics specialization

Bachelor of Science and Management (Honours) in Biological Science and Management - BSc and Mgt (Hons)

- Complementary Studies
- Environmental Toxicology specialization
- Life Sciences specialization
- Pharmaceutical Biotechnology specialization

Bachelor of Science and Management (Honours) in Physical Science and Management - BSc and Mgt (Hons)

Bachelor of Science (Honours)/Bachelor of Education (Intermediate/Senior) - BSc (Hons)/BEd (Concurrent)

The Faculty of Science offers students a variety of four-year degree programs in science. A combined program in Concurrent Education (BSc (Hons) and BEd) is offered in collaboration with the Faculty of Education. These programs are highly focused on subjects relevant to emerging areas of science knowledge and practice. The

Biological Science program provides three innovative specializations: Environmental Toxicology; Life Sciences; and Pharmaceutical Biotechnology. In the Chemistry program, students can choose to pursue a comprehensive Chemistry degree or major in Biological Chemistry or Pharmaceutical Chemistry. Specializations in Energy and the Environment, Forensic Physics, and Medical Physics are also available in addition to a Comprehensive degree in Physics. A Bachelor of Science (Honours) degree in Computing Science, with specializations in Digital Media and Digital Forensics, as well as a Bachelor of Science (Honours) in Forensic Science are offered in the Faculty of Science at UOIT. In addition, students will be able to work with an advisor to customize a program to match their interests and career plans by selecting Complementary Studies in Biological Science, or by choosing the Physical Science degree. In all programs, minors are also available in Biology, Chemistry, Computing Science, Mathematics, Physics and Computational Science.

In keeping with the university's mission to prepare students for careers, our science programs emphasize the development of leadership skills. The university offers students the opportunity to earn a Bachelor of Science and Management (Honours) degree in either the Biological Science or Physical Science programs. This five-year degree provides students with an opportunity to combine their interests in science with business management skills.

In order to further opportunities for students and research, the Faculty of Science maintains strong links with other faculties in the university, in particular Education, Health Sciences and Engineering.

Master of Science (MSc) programs in Applied Bioscience; Materials Science; and Modelling and Computational Science are planned to start in the 2007-2008 academic year. Section 17 of this calendar provides information about the graduate programs offered at UOIT.

15.2 Program information - Bachelor of Science (Honours) in Applied and Industrial Mathematics

15.2.1 General information

Mathematics is a fundamental component within every aspect of scientific endeavour and underlies much of our daily activities. Mathematics is a key component of problem solving, from the modelling of atmospheric physics to the complexities of managing risk in financial markets.

Students in the Applied and Industrial Mathematics program will learn concepts, principles, qualitative and quantitative methods, as well as innovative problem-solving skills. Students will gain valuable experience by learning state-of-the-art algorithms and software in courses and by means of research projects related to the workplace.

Mathematics graduates need to be able to apply relevant advanced numerical skills, including statistical analysis of data, modelling of physical or biological phenomena, and computer implementation of algorithms related to their eventual employment.

These abilities will be developed in the mathematics courses offered in the upper years. Exposure to the distinctive assumptions and modes of analysis of other disciplines will be provided in the non-science electives available in each year of the program.

The curriculum also provides a basic foundation in chemistry, physics, and computing science, providing settings within which to apply the mathematical concepts and expertise acquired in the program; students are particularly encouraged to explore a deeper understanding of one of these disciplines by means of a minor program of study.

The emphasis on Applied and Industrial Mathematics is reflected in the wide range of courses focused on the applications of mathematics (e.g., Differential Equations, Mathematical Modelling, Optimization, Computational Science, Partial Differential Equations, and Industrial Mathematics).

A mandatory fourth-year undergraduate thesis project will introduce the students to the practice of research in the mathematical sciences, and its relevance to solving scientific or industrial problems. Through the thesis project, students will also develop independent research skills, including reading historical and current literature, and writing and communicating technical ideas.

15.2.2 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 70 percent on six 4U or 4M credits including English (ENG4U), calculus (MCB4U), and two of physics (SPH4U), chemistry (SCH4U), biology (SBI4U), or algebra and geometry (MGA4U). In addition, a combined minimum 70 percent average in math and science courses is required. All other applicants should refer to section 4.5 of this calendar for the requirements for their specific category of admission.

There are additional requirements for the Concurrent Education programs. For details, please see the Faculty of Education, section 11, of this calendar.

15.2.3 Work placements

Students will have opportunities to undertake research inside or outside the university and to participate in work placements. In addition, an optional eight- to 16-month Science Internship is available for qualified students and students may participate in four-month Science Co-op programs. Please consult the Faculty of Science website for details.

15.2.4 Careers

There are many opportunities for graduates holding an undergraduate degree in Applied and Industrial Mathematics, whether they choose to continue on to higher education, or go directly into the workplace.

Some of the options include: financial services (banking and financial sector), insurance companies (actuary, analyst), government agencies (Statistics Canada, Department of Defense), computer software industry, communications technology companies, consulting firms, high school teacher (UOIT's Consecutive Education program), post-degree studies (Law School, Medical School), and graduate studies. Graduates of our program will be fully qualified to be admitted to graduate studies in any reputable applied mathematics program worldwide.

Moreover, since many of the basic core topics for a comprehensive pure mathematics education are also covered in the program, the students' knowledge will be sufficiently broad as to also allow them admission into a pure mathematics graduate program.

15.2.5 Program details and degree requirements - Bachelor of Science (Honours) in Applied and Industrial Mathematics

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
CSCI 1020U Fundamentals of Programming

YEAR 2

Semester 1 (15 credit hours)

MATH 2010U Advanced Calculus I
MATH 2050U Linear Algebra
MATH 2080U Discrete Mathematics
STAT 2010U Statistics and Probability for Physical Science
Elective*

Semester 2 (15 credit hours)

MATH 2020U Advanced Calculus II
MATH 2060U Differential Equations
MATH 2072U Computational Science I
Elective*
Elective*

YEAR 3

Semester 1 (15 credit hours)

MATH 3020U Real Analysis
MATH 3040U Optimization
Elective*
Elective*
Elective*

Semester 2 (15 credit hours)

MATH 3050U Mathematical Modelling
MATH 3060U Complex Analysis
MATH 3070U Algebraic Structures
Elective*
Elective*

YEAR 4

Semester 1 (15 credit hours)

MATH 4010U Dynamical Systems and Chaos
MATH 4020U Computational Science II
MATH 4041U Topics in Applied Mathematics I (or elective**)
MATH 4060U Industrial Mathematics
Elective*

Semester 2 (15 credit hours)

MATH 4030U Applied Functional Analysis
MATH 4042U Topics in Applied Mathematics II (or elective**)
MATH 4050U Partial Differential Equations
MATH 4400U Thesis Project
Elective*

*Note: Electives and breadth requirements

Students must complete 33 elective credit hours. At least 15 elective credit hours must be in science courses offered by the Faculty of Science. In order to satisfy breadth requirements, no more than nine elective credit hours may be in mathematics

(MATH) courses; at least 12 elective credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership.

**At least one of MATH 4041U or MATH 4042U must be completed.

Note: No more than 42 credit hours may be taken at the first-year level.

15.3 Program information - Bachelor of Science (Honours) in Biological Science

15.3.1 General information

As students proceed through the Biological Science program, they will obtain a background in cell biology, genetics and molecular biology, physiology, biochemistry and developmental biology. Senior level courses such as Bioethics, Neuroscience, Functional Genomics and Proteomics, along with access to modern laboratories, computational tools, sophisticated equipment and state-of-the-art facilities will enable advanced research work and skills training in industry best practice and in research.

The Biological Science program offers specializations in Life Sciences, Environmental Toxicology, and Pharmaceutical Biotechnology, as well as Complementary studies.

15.3.2 Admission requirements

See section 15.2.2.

15.3.3 Work placements

See section 15.2.3.

15.3.4 Careers

Graduates in these areas are in high demand. The Life Sciences specialization prepares students for careers dealing with medicine, research labs and industry. The Environmental Toxicology specialization prepares students for careers dealing with environmental issues in industry and government, and as consultants in the private sector.

The Pharmaceutical Biotechnology specialization prepares students to work in research and development in the rapidly growing pharmaceutical and biotechnology industries, as well as in government agencies.

15.3.5 Program details and degree requirements - Bachelor of Science (Honours) in Biological Science

Students interested in the three primary specializations (Pharmaceutical Biotechnology, Environmental Toxicology or Life Sciences) will follow specified program maps, which prescribe the sequence of courses. Students taking Complementary Studies will work with the science student advisor to customize a Biological Science program to match their interests and career plans. A graduate of the University of Ontario Institute of Technology's Biological Science program must successfully complete 120 credit hours according to the requirements indicated below. These requirements apply to all specializations.

First-year required science core - 27 credit hours

- BIOL 1010U (Biology I) and BIOL 1020U (Biology II)
- CHEM 1010U (Chemistry I) and CHEM 1020U (Chemistry II)
- CSCI 1000U (Scientific Computing Tools)
- MATH 1010U (Calculus I) and MATH 1020U (Calculus II)
- PHY 1030U (Physics for Biosciences I) and PHY 1040U (Physics for Biosciences II)*

*Students who wish to take upper year physics courses must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher-level physics courses.

Biological Science additional core courses - 18 credit hours

In addition to the two first-year courses in biology (BIOL 1010U and BIOL 1020U), the BSc (Hons) in Biological Science program includes required courses in:

- BIOL 2010U Introductory Physiology
- BIOL 2020U Genetics and Molecular Biology
- BIOL 2030U Cell Biology
- BIOL 2040U Biochemistry
- BIOL 3030U Microbiology and Immunology
- BIOL 3050U Developmental Biology

Upper-year specialization - 24 credit hours in biological science

All students in the BSc (Hons) in Biological Science program must successfully complete at least 24 credit hours in additional courses in biological science at the third- or fourth- year level, with a minimum of six of these credit hours at the fourth-year level. Students specializing in Pharmaceutical Biotechnology, Environmental Toxicology, or Life Sciences will be required to take a set of prescribed upper year offerings (which includes 24 credit hours in biological science courses) as specified in the following program maps, to satisfy this requirement.

Additional science courses - total of 27 credit hours

These additional courses must include:

- CHEM 2020U Introduction to Organic Chemistry
- STAT 2020U Statistics and Probability for Biological Science

The remaining science courses must be selected from lists of courses approved by the dean of science. Approved science electives will be identified each semester on the list of course offerings, in the subject areas of:

- Biology
- Chemistry
- Computing Science
- Energy and Environment Science
- Mathematics
- Physics

Particular sets of science electives are designated as minors. Students should consult section 15.11 of this calendar for further information.

Liberal studies courses - 24 credit hours

These include six credit hours in required courses outside or linked to the discipline:

- BIOL 4080U Bioethics
- BUSI 2000U Collaborative Leadership

The remaining 18 credit hours must be outside biological science.

Note: The program must include 36 credit hours in science courses at the third- and fourth-year level; of these, at least 12 credit hours must be at the fourth-year level.

No more than 42 credit hours may be taken at the first-year level.

15.3.5.1 Pharmaceutical Biotechnology**YEAR 1****Semester 1 (15 credit hours)**

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I***

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II***
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
STAT 2020U Statistics and Probability for Biological Science
Elective*

Semester 2 (15 credit hours)

BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
Elective*
Elective*
Elective*

YEAR 3

Semester 1 (15 credit hours)

BIOL 3020U Principles of Pharmacology and Toxicology
BIOL 3030U Microbiology and Immunology
BIOL 3050U Developmental Biology
CHEM 2130U Analytical Chemistry for Biosciences
Elective*

Semester 2 (15 credit hours)

BIOL 3010U Laboratory Methods in Molecular Biology
BIOL 3040U Physiology of Regulatory Systems
CHEM 3830U Instrumental Analytical Chemistry
Elective*
Elective*

YEAR 4

Semester 1 (15 credit hours)

BIOL 4040U Applied Molecular Biology
BIOL 4070U Advanced Biochemistry
BIOL 4430U Directed Studies in Biology or
BIOL 4410U Biology Thesis Project I**
Elective*
Elective*

Semester 2 (15 credit hours)

BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology
BIOL 4060U Functional Genomics and Proteomics
BIOL 4080U Bioethics
Senior biology elective* or
BIOL 4420U Biology Thesis Project II**
Elective*

* Note: Electives and breadth requirements

All students must complete 33 elective credit hours. Students who take BIOL 4430U Directed Studies in Biology must take an additional senior biology elective in the opposite term. At least 15 credit hours must be in courses offered by the Faculty of Science; the additional senior biology elective, if taken, cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than nine credit hours may be in biology (BIOL) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership.

The senior biology elective is defined as any third- or fourth-year (BIOL 3000U- or 4000U-series) biology course not explicitly specified in the program map.

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take BIOL 4430U Directed Studies in Biology. BIOL 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of BIOL 4410U and BIOL 4420U Thesis Project in Biology I and II in place of BIOL 4430U and the senior biology elective. Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

***Students who wish to take upper year physics courses must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

Note: No more than 42 credit hours may be taken at the first-year level.

15.3.5.2 Environmental Toxicology

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
 CHEM 1010U Chemistry I
 CSCI 1000U Scientific Computing Tools
 MATH 1010U Calculus I
 PHY 1030U Physics for Biosciences I ***

Semester 2 (15 credit hours)

BIOL 1020U Biology II
 CHEM 1020U Chemistry II
 MATH 1020U Calculus II
 PHY 1040U Physics for Biosciences II ***
 Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

BIOL 2010U Introductory Physiology
 BIOL 2030U Cell Biology
 CHEM 2020U Introduction to Organic Chemistry
 STAT 2020U Statistics and Probability for Biological Science
 Elective*

Semester 2 (15 credit hours)

BIOL 2020U Genetics and Molecular Biology
 BIOL 2040U Biochemistry
 ENVS 1000U Environmental Science
 Elective*
 Elective*

YEAR 3

Semester 1 (15 credit hours)

BIOL 3020U Principles of Pharmacology and Toxicology

BIOL 3030U Microbiology and Immunology

BIOL 3050U Developmental Biology

CHEM 2130U Analytical Chemistry for Biosciences

Elective*

Semester 2 (15 credit hours)

CHEM 3830U Instrumental Analytical Chemistry

STAT 3010U Biostatistics

Elective*

Elective*

Elective*

YEAR 4

Semester 1 (15 credit hours)

BIOL 4010U Introduction to Environmental Research Methods

BIOL 4020U Environmental Risk Characterization

BIOL 4430U Directed Studies in Biology or

BIOL 4410U Biology Thesis Project I**

CHEM 4050U Environmental Chemistry

Elective*

Semester 2 (15 credit hours)

BIOL 4030U Advanced Topics in Environmental Toxicology

BIOL 4080U Bioethics

Senior biology elective* or

BIOL 4420U Biology Thesis Project II**

Biology elective*

Elective*

*Note: Electives and breadth requirements

All students must complete 33 elective credit hours including the biology elective. Students who take BIOL 4430U Directed Studies in Biology must take an additional senior biology elective in the opposite term. At least 15 credit hours must be in courses offered by the Faculty of Science; the additional senior biology elective, if taken, cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than nine credit hours may be in biology (BIOL) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. The senior biology elective is defined as any third- or fourth-year (BIOL 3000U- or 4000U-series) biology course not explicitly specified in the program map.

**Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take BIOL 4430U Directed Studies in Biology. BIOL 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of BIOL 4410U and BIOL 4420U Thesis Project in Biology I and II in place of BIOL 4430U and the senior biology elective. Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

*** Students who wish to take upper year physics courses must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

Note: No more than 42 credit hours may be taken at the first-year level.

15.3.5.3 Life Sciences

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I ***

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II ***
PSYC 1000U Introductory Psychology

YEAR 2

Semester 1 (15 credit hours)

BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
STAT 2020U Statistics and Probability for Biological Science
Elective*

Semester 2 (15 credit hours)

BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
BIOL 2050U Human Anatomy
CHEM 2120U Organic Chemistry
Elective*

YEAR 3

Semester 1 (15 credit hours)

BIOL 3020U Principles of Pharmacology and Toxicology
BIOL 3030U Microbiology and Immunology
BIOL 3050U Developmental Biology
Elective*
Elective*

Semester 2 (15 credit hours)

BIOL 3010U Laboratory Methods in Molecular Biology
BIOL 3040U Physiology of Regulatory Systems
BIOL 3060U Fundamentals of Neuroscience
Elective*
Elective*

YEAR 4

Semester 1 (15 credit hours)

BIOL 4070U Advanced Biochemistry
BIOL 4430U Directed Studies in Biology or
BIOL 4410U Biology Thesis Project I**

Elective*

Elective*

Elective*

Semester 2 (15 credit hours)

BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology
BIOL 4080U Bioethics
Senior biology elective* or
BIOL 4420U Biology Thesis Project II**

Elective*

Elective*

* Note: Electives and breadth requirements

All students must complete 33 elective credit hours. Students who take BIOL 4430U Directed Studies in Biology must take a senior biology elective in the opposite term. At least 18 credit hours must be in courses offered by the Faculty of Science, including at least six credit hours in biology (BIOL) courses; the senior biology elective required for students who take BIOL 4430U cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than 12 credit hours may be in biology (BIOL) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. The senior biology elective is defined as any third- or fourth-year (BIOL 3000U- or 4000U-series) biology course not explicitly specified in the program map.

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take BIOL 4430U Directed Studies in Biology. BIOL 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of BIOL 4410U and BIOL 4420U Thesis Project in Biology I and II in place of BIOL 4430U and a science elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

*** Students who wish to take upper year physics courses must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

Note: No more than 42 credit hours may be taken at the first-year level.

15.4 Program information - Bachelor of Science (Honours) in Chemistry

15.4.1 General information

Chemistry is known as the central science. At UOIT, students will learn practical and theoretical skills related to this science. The Chemistry program covers the main divisions of chemistry, including physical chemistry, analytical chemistry, organic chemistry, inorganic chemistry and biochemistry. Students will have the privilege of being able to use state-of-the-art laboratories and teaching environments in newly constructed facilities.

The Chemistry program offers specializations in Biological Chemistry and Pharmaceutical Chemistry, as well as a general Chemistry degree (Comprehensive).

15.4.2 Admission requirements

See section 15.2.2.

15.4.3 Work placements

See section 15.2.3

15.4.4 Careers

There are many opportunities for graduates in chemistry, whether you choose to pursue higher education or go directly into the workplace. The following list of career fields is simply a starting point to the variety of career opportunities available for consideration: education and training, industry, medicine and health, and government agencies.

15.4.5 Program details and degree requirements - Bachelor of Science (Honours) in Chemistry

15.4.5.1 Chemistry - Comprehensive

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II

CHEM 1020U Chemistry II

MATH 1020U Calculus II

PHY 1020U Physics II

Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

CHEM 2010U Structure and Bonding

CHEM 2020U Introduction to Organic Chemistry

CHEM 2030U Analytical Chemistry

STAT 2010U Statistics and Probability for Physical Science

Elective*

Semester 2 (15 credit hours)

BIOL 2040U Biochemistry

CHEM 2120U Organic Chemistry

CHEM 2040U Thermodynamics and Kinetics

Elective*

Elective*

YEAR 3

Semester 1 (15 credit hours)

CHEM 3220U Structure Determination of Organic Molecules

CHEM 3510U Inorganic Chemistry I

CHEM 3530U Instrumental Analytical Chemistry I

Elective*

Elective*

Semester 2 (15 credit hours)

CHEM 3040U Fundamentals of Physical Chemistry

CHEM 3120U Advanced Organic Chemistry

CHEM 3520U Inorganic Chemistry II

CHEM 3540U Instrumental Analytical Chemistry II

Elective*

YEAR 4

Semester 1 (15 credit hours)

CHEM 4040U Physical Chemistry

CHEM 4050U Environmental Chemistry

CHEM 4430U Directed Studies in Chemistry or

CHEM 4410U Chemistry Thesis Project I**

Elective*

Elective*

Semester 2 (15 credit hours)

CHEM 4010U Industrial Chemistry

CHEM 4060U Chemical and Molecular Spectroscopy

Science elective* or

CHEM 4420U Chemistry Thesis Project II**

Elective*

Elective*

* Note: Electives and breadth requirements

All students must complete 33 elective credit hours. Students who take CHEM 4430U Directed Studies in Chemistry must take an additional science elective in the opposite term. At least 15 credit hours must be in courses offered by the Faculty of Science; the science elective taken in place of CHEM 4420U cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than nine credit hours may be in chemistry (CHEM) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. A senior science elective is defined as any third- or fourth-year (3000- or 4000-series) science course not explicitly specified in the program map.

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take CHEM 4430U Directed Studies in Chemistry. CHEM 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of CHEM 4410U and CHEM 4420U Thesis Project in Chemistry I and II in place of CHEM 4430U and a science elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

Note: No more than 42 credit hours may be taken at the first-year level.

15.4.5.2 Chemistry - Biological Chemistry specialization

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

BIOL 2030U Cell Biology
CHEM 2010U Structure and Bonding
CHEM 2020U Introduction to Organic Chemistry
CHEM 2030U Analytical Chemistry
STAT 2010U Statistics and Probability for Physical Science

Semester 2 (15 credit hours)

BIOL 2040U Biochemistry
BIOL 2020U Genetics and Molecular Biology
CHEM 2040U Thermodynamics and Kinetics
CHEM 2120U Organic Chemistry
Elective*

YEAR 3

Semester 1 (15 credit hours)

CHEM 3220U Structure Determination of Organic Molecules
CHEM 3510U Inorganic Chemistry I
CHEM 3530U Instrumental Analytical Chemistry I
Elective*
Elective*

Semester 2 (15 credit hours)

BIOL 3010U Laboratory Methods in Molecular Biology
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3120U Advanced Organic Chemistry
CHEM 3520U Inorganic Chemistry II
CHEM 3540U Instrumental Analytical Chemistry II

YEAR 4

Semester 1 (15 credit hours)

BIOL4070U Advanced Biochemistry
CHEM 4110U Bio-Organic Chemistry
CHEM 4430U Directed Studies in Chemistry or
CHEM 4410U Chemistry Thesis Project I**
Elective*

Semester 2 (15 credit hours)

CHEM 4120U Advanced Topics in Biological Chemistry
Science elective* or

CHEM 4420U Chemistry Thesis Project II**

Elective*

Elective*

Elective*

* Note: Electives and breadth requirements

All students must complete 27 elective credit hours. Students who take CHEM 4430U Directed Studies in Chemistry must take an additional science elective in the opposite term. At least 15 credit hours must be in courses offered by the Faculty of Science; the science elective taken in place of CHEM 4420U cannot be used to meet this requirement. In order to satisfy breadth requirements at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership.

Recommended science electives:

CSCI 1020U Fundamentals of Programming

BIOL 4040U Applied Molecular Biology

BIOL 4060U Functional Genomics and Proteomics

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take CHEM 4430U Directed Studies in Chemistry. CHEM 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of CHEM 4410U and CHEM 4420U Thesis Project in Chemistry I and II in place of CHEM 4430U and a science elective.

Opportunities for the thesis option are limited; students must apply to the science fourth- year thesis coordinator by April 30 following completion of the first three years of the program.

Note: No more than 42 credit hours may be taken at the first-year level.

15.4.5.3 Chemistry - Pharmaceutical Chemistry specialization

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II

CHEM 1020U Chemistry II

MATH 1020U Calculus II

PHY 1020U Physics II

Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

BIOL 2010U Introductory Physiology
CHEM 2010U Structure and Bonding
CHEM 2020U Introduction to Organic Chemistry
CHEM 2030U Analytical Chemistry
STAT 2010U Statistics and Probability for Physical Science

Semester 2 (15 credit hours)

BIOL 2040U Biochemistry
CHEM 2040U Thermodynamics and Kinetics
CHEM 2120U Organic Chemistry
Elective*
Elective*

YEAR 3

Semester 1 (15 credit hours)

BIOL 3020U Principles of Pharmacology and Toxicology
CHEM 3220U Structure Determination of Organic Molecules
BIOL 4070U Advanced Biochemistry
CHEM 3530U Instrumental Analytical Chemistry I
Elective*

Semester 2 (15 credit hours)

BIOL 4050U Advanced Topics in Pharmaceutical Biotechnology
CHEM 3040U Fundamentals of Physical Chemistry
CHEM 3120U Advanced Organic Chemistry
CHEM 3540U Instrumental Analytical Chemistry II
Elective*

YEAR 4

Semester 1 (15 credit hours)

CHEM 3510U Inorganic Chemistry I
CHEM 4040U Physical Chemistry
CHEM 4430U Directed Studies in Chemistry or
CHEM 4410U Chemistry Thesis Project I**
CHEM 4510U Pharmaceutical Discovery
Elective*

Semester 2 (15 credit hours)

CHEM 3520U Inorganic Chemistry II
CHEM 4520U Advanced Topics in Pharmaceutical Chemistry
Science elective* or
CHEM 4420U Chemistry Thesis Project II**
Elective*
Elective*

* Note: Electives and breadth requirements

All students must complete 24 elective credit hours. Students who take CHEM 4430U Directed Studies in Chemistry must take an additional science elective in the opposite term. At least nine credit hours must be in courses offered by the Faculty of Science; the science elective taken in place of CHEM 4420U cannot be used to meet this requirement. In order to satisfy breadth requirements at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership.

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take CHEM 4430U Directed Studies in Chemistry. CHEM 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of CHEM 4410U and CHEM 4420U Thesis Project in Chemistry I and II in place of CHEM 4430U and a science elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

Note: No more than 42 credit hours may be taken at the first-year level.

15.5 Program information - Bachelor of Science (Honours) in Computing Science

15.5.1 General information

Graduates of this program will obtain a solid foundation in the theory and application of the principles of computing science, as well as in the cognitive capabilities and skills relating to computing science. This program also provides the opportunity for the student to develop practical capabilities and skills, such as software design and implementation, information management, risk assessment, effective deployment of software tools and system evaluation. In addition, transferable skills such as communication, teamwork, self-management and professional development are emphasized in many courses.

The Computing Science program at UOIT was developed in collaboration with leading representatives from both academia and industry and is designed to meet the increasing need for graduates with the knowledge and skills in this important field. Specializations within this degree program include Digital Forensics, and Digital Media, as well as the general Computing Science degree (Comprehensive).

15.5.2 Admission requirements

See section 15.2.2.

15.5.3 Work placements

See section 15.2.3.

15.5.4 Careers

There are many opportunities for graduates in computing science, whether you choose to pursue higher education or go directly into the workplace. The following list of career fields is simply a starting point to the variety of career opportunities available for consideration: computer consultant, scientist, engineer, systems analyst, information specialist, technical support analyst, computer programmer, and software designer.

15.5.5 Program details and degree requirements - Bachelor of Science (Honours) in Computing Science

15.5.5.1 Computing Science - Comprehensive

YEAR 1

Semester 1 (15 credit hours)

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 2050U Linear Algebra

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1840U Biology for Engineers
 CHEM 1020U Chemistry II
 CSCI 1020U Fundamentals of Programming
 MATH 1020U Calculus II
 PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

CSCI 2010U Principles of Computer Science
 CSCI 2050U Computer Architecture I
 CSCI 2110U Discrete Structures in Computer Science
 STAT 2010U Statistics and Probability for Physical Science
 Elective*

Semester 2 (15 credit hours)

CSCI 2020U Software Systems Development and Integration
 MATH 2072U Computational Science I
 Elective*
 Elective*
 Elective*

YEAR 3

Semester 1 (15 credit hours)

CSCI 3020U Operating Systems
 CSCI 3030U Database Systems and Concepts
 CSCI 3040U System Analysis and Design in Applications
 CSCI 3070U Analysis and Design of Algorithms
 CSCI 3150U Computer Networks

Semester 2 (15 credit hours)

CSCI 3050U Computer Architecture II
 CSCI 3060U Software Engineering
 CSCI 3090U Scientific Visualization and Computer Graphics
 CSCI 4020U Compilers
 Elective*

YEAR 4

Semester 1 (15 credit hours)

CSCI 3010U Simulation and Modelling
 CSCI 4400U Thesis Project
 Computing science elective**
 Elective*
 Elective*

Semester 2 (15 credit hours)

CSCI 4040U Ethics, Law, and the Social Impact of Computing
 Computing science elective**
 Computing science elective**
 Elective*
 Elective*

* Note: Electives and breadth requirements

Students must complete 36 elective credit hours including the computing science electives. At least 12 credit hours must be in courses offered by the Faculty of Science, including the computing science electives. In order to satisfy breadth

requirements, no more than 12 credit hours may be in computing science (CSCI) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI2000U Collaborative Leadership.

**Computing science electives:

CSCI 4610U Artificial Intelligence

CSCI 4620U Human-Computer Interaction

CSCI 4630U High-Performance Computing

CSCI 4640U Distributed Computing

CSCI 4650U Elements of Theory of Computation

MATH 4020U Computational Science II

Note: No more than 42 credit hours may be taken at the first-year level.

15.5.5.2 Computing Science – Digital Forensics specialization

YEAR 1

Semester 1 (15 credit hours)

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 2050U Linear Algebra

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

CHEM 1020U Chemistry II

CSCI 1020U Fundamentals of Programming

MATH 1020U Calculus II

FSCI 1010U Introduction to Forensic Science

PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

CSCI 2010U Principles of Computer Science

CSCI 2050U Computer Architecture I

CSCI 2110U Discrete Structures in Computer Science

STAT 2010U Statistics and Probability for Physical Science

FSCI 2010U Crime Scene Science

Semester 2 (15 credit hours)

BIOL 1840U Biology for Engineers

CSCI 2020U Software Systems Development and Integration

MATH 2072U Computational Science I

Elective*

Elective*

YEAR 3

Semester 1 (15 credit hours)

CSCI 3020U Operating Systems

CSCI 3030U Database Systems and Concepts

CSCI 3070U Analysis and Design of Algorithms

CSCI 3150U Computer Networks

FSCI 3010U Criminalistics I

Semester 2 (15 credit hours)

CSCI 3050U Computer Architecture II
CSCI 3090U Scientific Visualization and Computer Graphics
CSCI 4020U Compilers
Elective*
Elective*

YEAR 4

Semester 1 (15 credit hours)

CSCI 3010U Simulation and Modelling
CSCI 4120U Digital Evidence
CSCI 4130U Forensic Informatics
Computing science elective**
Elective*

Semester 2 (15 credit hours)

CSCI 4040U Ethics, Law, and the Social Impact of Computing
CSCI 4400U Thesis Project***
FSCI 4050U Law for Forensic Science
Elective*
Elective*

* Note: Electives and breadth requirements

Students must complete 21 elective credit hours including the computing science elective. Nine credit hours must be in courses offered by the Faculty of Science, including the computing science elective. In order to satisfy breadth requirements, the other six credit hours of science electives may not be in computing science (CSCI) courses. Twelve credit hours must be in courses outside the Faculty of Science, and must include BUSI2000U Collaborative Leadership.

Recommended electives:

INFR 2470U
INFR 2480U
INFR 2570U

**Computing science electives:

CSCI 4610U Artificial Intelligence
CSCI 4620U Human-Computer Interaction
CSCI 4630U High-Performance Computing
CSCI 4640U Distributed Computing
CSCI 4650U Elements of Theory of Computation
MATH 4020U Computational Science II

Note: No more than 42 credit hours may be taken at the first-year level.

*** For the Digital Forensics specialization CSCI 4400U – Thesis Project must deal with a topic in digital forensics.

15.5.5.3 Computing Science – Digital Media specialization

YEAR 1

Semester 1 (15 credit hours)

CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 2050U Linear Algebra

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1840U Biology for Engineers

CHEM 1020U Chemistry II

CSCI 1020U Fundamentals of Programming

MATH 1020U Calculus II

PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

CSCI 2010U Principles of Computer Science

CSCI 2050U Computer Architecture I

CSCI 2110U Discrete Structures in Computer Science

STAT 2010U Statistics and Probability for Physical Science

Elective*

Semester 2 (15 credit hours)

CSCI 2020U Software Systems Development and Integration

CSCI 2160U Digital Media

MATH 2072U Computational Science I

Elective*

Elective*

YEAR 3

Semester 1 (15 credit hours)

CSCI 3020U Operating Systems

CSCI 3030U Database Systems and Concepts

CSCI 3040U System Analysis and Design in Applications

CSCI 3070U Analysis and Design of Algorithms

CSCI 3150U Computer Networks

Semester 2 (15 credit hours)

CSCI 3050U Computer Architecture II

CSCI 3060U Software Engineering

CSCI 3090U Scientific Visualization and Computer Graphics

CSCI 4020U Compilers

Elective*

YEAR 4

Semester 1 (15 credit hours)

CSCI 3010U Simulation and Modelling

CSCI 4100U Mobile Devices

CSCI 4110U Advanced Computer Graphics

Computing science elective**

Elective*

Semester 2 (15 credit hours)

CSCI 4040U Ethics, Law, and the Social Impact of Computing

CSCI 4160U Interactive Media

CSCI 4400U Thesis Project

Computing science elective**

Elective*

* Note: Electives and breadth requirements

Students must complete 24 elective credit hours including the computing science electives. Twelve credit hours must be in courses offered by the Faculty of Science, including the computing science electives. In order to satisfy breadth requirements, the other six credit hours of science electives may not be in computing science (CSCI) courses. Twelve credit hours must be in courses outside the Faculty of Science, and must include BUSI2000U Collaborative Leadership.

**Computing science electives:

CSCI 4610U Artificial Intelligence

CSCI 4620U Human-Computer Interaction

CSCI 4630U High-Performance Computing

CSCI 4640U Distributed Computing

CSCI 4650U Elements of Theory of Computation

MATH 4020U Computational Science II

Note: No more than 42 credit hours may be taken at the first-year level.

15.6 Program information - Bachelor of Science (Honours) in Forensic Science

15.6.1 General information

Forensic Science is an emerging interdisciplinary area of science that includes elements of social science and involves the use of scientific principles to analyse evidence for legal investigations. The BSc (Hons) in Forensic Science is distinguished by a strong scientific base in biology and chemistry, with allied courses related to forensic aspects of psychology, anthropology and law.

The Forensic Science program incorporates a foundation in chemistry, biology, physics and calculus. Through elective courses, students may acquire a deeper knowledge of either chemistry or biology, providing them with additional opportunities, including post-degree and graduate studies.

In keeping with UOIT's mission to prepare students for careers, science programs also include development in leadership skills.

15.6.2 Admission requirements

See section 15.2.2.

15.6.3 Work placements

See section 15.2.3.

15.6.4 Careers

The following career options are simply a starting point to the variety of career opportunities available in the field of Forensic Science. Forensic science graduates can find career success as forensic scientists and crime scene investigators within organizations such as police agencies, insurance companies, and private practice firms. Graduates may choose to continue on to higher education in such areas as medical school, law school, graduate school, and teacher's college.

15.6.5 Program details and degree requirements - Bachelor of Science (Honours) in Forensic Science

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1030U Physics for Biosciences I **

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
FSCI 1010U Introductory Forensic Science
MATH 1020U Calculus II
PHY 1040U Physics for Biosciences II **

YEAR 2

Semester 1 (15 credit hours)

BIOL 2010U Introductory Physiology
BIOL 2030U Cell Biology
CHEM 2020U Introduction to Organic Chemistry
FSCI 2010U Crime Scene Science
STAT 2020U Statistics and Probability for Biological Science

Semester 2 (15 credit hours)

BIOL 2020U Genetics and Molecular Biology
BIOL 2040U Biochemistry
BIOL 2050U Human Anatomy
CHEM 2120U Organic Chemistry
PSYC 1000U Introductory Psychology

YEAR 3

Semester 1 (15 credit hours)

BIOL 3020U Principles of Pharmacology and Toxicology
CHEM 2030U Analytical Chemistry
CHEM 3140U Physical Chemistry for Biosciences
FSCI 3010U Criminalistics
Elective*

Semester 2 (15 credit hours)

CHEM 3830U Instrumental Analytical Chemistry
FSCI 3020U Forensic Biology
FSCI 3030U Criminalistics II
FSCI 3040U Forensic Chemistry
Elective*

YEAR 4

Semester 1 (15 credit hours)

FSCI 4020U Forensic Medicine
FSCI 4030U Drug Chemistry and Toxicology
FSCI 4410U Forensic Science Thesis Project I
Elective*
Elective*

Semester 2 (15 credit hours)

FSCI 4010U Forensic Psychology
FSCI 4050U Law for Forensic Scientists
FSCI 4420U Forensic Science Thesis Project II
Elective*
Elective*

* Note: Electives and breadth requirements

Students must complete 18 elective credit hours. Nine credit hours must be in courses offered by the Faculty of Science. In order to satisfy breadth requirements nine credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership.

** Students who wish to take upper year physics courses must take PHY 1010U and PHY 1020U. However, students who achieve a B standing or higher in both PHY 1030U and PHY 1040U will be permitted to proceed to higher level physics courses.

Progression through the Forensic Science program is restricted to students with clear academic standing in the program.

Note: No more than 42 credit hours may be taken at the first-year level.

15.7 Program information - Bachelor of Science (Honours) in Physical Science

15.7.1 General information

The BSc (Hons) in Physical Science provides a foundation in chemistry, physics, mathematics, and computing science. Students will work with an academic advisor to customize a Physical Science program to match their interests and career plans.

Students in this program may also select a minor program. Learning takes place in classroom lectures, tutorials, laboratories, computer simulations, and through independent and group research, as well as multidimensional projects.

15.7.2 Admission requirements

See section 15.2.2.

15.7.3 Work placements

See section 15.2.3.

15.7.4 Careers

There is a wealth of opportunities for graduates in the physical sciences in industry, government, and in the field of applied science. Combined with the university's Bachelor of Education students can help to fill the need for mathematics, science and computer science teachers in Ontario's secondary schools.

15.7.5 Program details and degree requirements - Bachelor of Science (Honours) in Physical Science

A graduate from one of UOIT's Physical Science programs must successfully complete 120 credit hours according to the requirements indicated below.

First-year required science core - 27 credit hours

- BIOL 1010U (Biology I) and BIOL 1020U (Biology II)
- CHEM 1010U (Chemistry I) and CHEM 1020U (Chemistry II)
- CSCI 1000U (Scientific Computing Tools)
- MATH 1010U (Calculus I) and MATH 1020U (Calculus II)
- PHY 1010U (Physics I) and PHY 1020U (Physics II)

Additional science courses - 69 credit hours

These must include:

STAT 2010U Statistics and Probability for Physical Science

All students in the BSc (Hons) Physical Science programs must successfully complete at least 48 credit hours in additional courses in physical science in the areas of chemistry, computing science, mathematics, and physics.

The remaining science courses must be selected from lists of science electives approved by the dean of science. Approved science electives will be identified each semester on the list of course offerings including:

- Biology
- Chemistry
- Computing Science
- Mathematics
- Energy and Environment Science
- Physics

Particular sets of science courses are designated as minors; see the listing of minor programs in section 15.11. A unique minor is offered in computational science. Students should consult with the science academic advisor for further information.

Liberal studies electives - 24 credit hours

These include three credit hours in a required course outside the discipline:

- BUSI 2000U Collaborative Leadership

The remaining 21 credit hours must be outside physical science.

Note:

- The program must include 36 credit hours in science courses at the third- and fourth-year level. Of these, at least 12 credit hours must be at the fourth-year level.
- No more than 42 credit hours may be taken at the first-year level.

15.8 Program information - Bachelor of Science (Honours) in Physics

15.8.1 General information

The BSc (Hons) in Physics provides a basic foundation in biology, chemistry, mathematics and physics, and a solid education in classical and modern physics. The program meets the rapidly increasing demand for graduates with knowledge and skills in technology-oriented fields such as energy, materials science, microelectronics, health, optoelectronics and communication technologies.

The Physics program offers specializations in Energy and the Environment, Forensic Physics, and Medical Physics, as well as a general Physics degree (Comprehensive).

15.8.2 Admission requirements

See section 15.2.2.

15.8.3 Work placements

See section 15.2.3

15.8.4 Careers

Graduates from the BSc (Hons) in Physics will be positioned for careers in industry, government, optoelectronics, materials science and novel energy industries in the private and public sector. Many students will continue their physics studies in graduate MSc and PhD programs or combine their BSc with the university's Bachelor of Education in order to help to fill the need for science teachers in Ontario's secondary schools.

15.8.5 Program details and degree requirements - Bachelor of Science (Honours) in Physics

15.8.5.1 Physics - Comprehensive

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

MATH 2050U Linear Algebra
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
PHY 2060U Nuclear Physics and Relativity
STAT 2010U Statistics and Probability for Physical Science

Semester 2 (15 credit hours)

MATH 2060U Differential Equations
PHY 2020U Electricity and Magnetism II
PHY 2040U Mechanics II
PHY 2050U Thermodynamics and Heat Transfer
Elective*

YEAR 3

Semester 1 (15 credit hours)

PHY 3010U Statistical Mechanics I
PHY 3020U Quantum Mechanics I
PHY 3030U Electronics
Elective*
Elective*52

Semester 2 (15 credit hours)

PHY 3040U Mathematical Physics
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
Elective*
Elective*

YEAR 4

Semester 1 (15 credit hours)

PHY 4020U Quantum Mechanics II
PHY 4430U Directed Studies in Physics or
PHY 4410U Physics Thesis Project I**
Senior physics elective ***
Elective*
Elective*

Semester 2 (15 credit hours)

PHY 4010U Statistical Mechanics II

PHY 4030U Modern Physics

Senior physics elective*** or

PHY 4420U Physics Thesis Project II**

Elective*

Elective*

* Note: Electives and breadth requirements

All students must complete 33 elective credit hours, including the senior physics elective. Students who take PHY 4430U Directed Studies in Physics must take an additional senior physics elective in the opposite term. At least 12 credit hours must be in courses offered by the Faculty of Science, including the senior physics electives; the senior physics elective, if taken in place of PHY 4420U, cannot be used to meet this requirement. In order to satisfy breadth requirements, no more than 12 credit hours may be in physics (PHY) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. One of the science electives must be a mathematics course at the second-year (MATH 2000-series) or higher level not explicitly specified in the program map.

** Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take PHY 4430U Directed Studies in Physics. PHY 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two-course sequence consisting of PHY 4410U and PHY 4420U Thesis Project in Physics I and II in place of PHY 4430U and a senior physics elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

*** A senior physics elective is defined as any fourth-year (PHY 4000U-series) physics course not explicitly specified in the program map.

Note: No more than 42 credit hours may be taken at the first-year level.

15.8.5.2 Physics - Energy and the Environment specialization**YEAR 1**

Semester 1 (15 credit hours)

BIOL 1010U Biology I

CHEM 1010U Chemistry I

CSCI 1000U Scientific Computing Tools

MATH 1010U Calculus I

PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II

CHEM 1020U Chemistry II

MATH 1020U Calculus II

PHY 1020U Physics II

Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

MATH 2050U Linear Algebra
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
PHY 2060U Nuclear Physics and Relativity
STAT 2010U Statistics and Probability for Physical Science

Semester 2 (15 credit hours)

ENVS 2010U Introductory Environment Science
MATH 2060U Differential Equations
PHY 2020U Electricity and Magnetism II
PHY 2050U Thermodynamics and Heat Transfer
Elective *

YEAR 3

Semester 1 (15 credit hours)

ENVS 3020U Introductory Energy Science
MATH 2010U Advanced Calculus I
PHY 3010U Statistical Mechanics I
PHY 3020U Quantum Mechanics I
PHY 3030U Electronics

Semester 2 (15 credit hours)

MATH 3050U Mathematical Modelling
PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
ENVS 3110U Economics and Politics of the Environment
Elective*

YEAR 4

Semester 1 (15 credit hours)

PHY 4040U Solar Energy and Photovoltaics
PHY 4050U Earth-Based Energy Systems
PHY 4430U Directed Studies in Physics or
PHY 4410U Physics Thesis Project I**
Senior physics elective***
Elective*

Semester 2 (15 credit hours)

PHY 4080U Hydrogen-Based Energy Systems and Fuel Cells
Senior physics elective*** or
PHY 4420U Physics Thesis Project II**
Senior physics elective***
Elective*
Elective*

*Note: Electives and breadth requirements

Students must complete 24 elective credit hours including the senior physics electives. Students who take PHY 4430U Directed Studies in Physics must take an additional senior physics elective in the opposite term. Six credit hours must be senior physics electives. In order to satisfy breadth requirements, the remaining 18 elective credit hours may not be in physics (PHY) courses, and at least 12 credit hours must be in courses outside the Faculty of Science and must include BUSI 2000U Collaborative Leadership.

**Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take PHY 4430U Directed Studies in Physics. PHY 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of PHY 4410U and PHY 4420U Thesis Project in Physics I and II in place of PHY 4430U and a senior physics elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

***A senior physics elective is defined as any fourth-year (PHY 4000U-series) physics course not explicitly specified in the program map.

Note: No more than 42 credit hours may be taken at the first-year level.

15.8.5.3 Physics – Forensic Physics specialization

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
FSCI 1010U Introductory Forensic Science

YEAR 2

Semester 1 (15 credit hours)

MATH 2050U Linear Algebra I
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
STAT 2010U Statistics and Probability for Physical Science
FSCI 2010U Crime Scene Science

Semester 2 (15 credit hours)

MATH 2060U Differential Equations
PHY 2020U Electricity and Magnetism II
PHY 2050U Thermodynamics and Heat Transfer
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)
Elective*

YEAR 3

Semester 1 (15 credit hours)

PHY 3010U Statistical Mechanics I
PHY 3020U Quantum Mechanics I
PHY 3030U Electronics
FSCI 3010U Criminalistics I
Elective*

Semester 2 (15 credit hours)

PHY 3040U Mathematical Physics

PHY 3050U Waves and Optics

PHY 3060U Fluid Mechanics

Elective*

Elective*

YEAR 4

Semester 1 (15 credit hours)

PHY 4020U Quantum Mechanics II

PHY 4430U Directed Studies in Physics or

PHY 4410U Physics Thesis Project I**

PHY 2060U Nuclear Physics and Relativity

Elective*

Elective*

Semester 2 (15 credit hours)

FSCI 4050U Law for Forensic Scientists

PHY 4010U Statistical Mechanics II

PHY 4030U Modern Physics

Senior physics elective*** or

PHY 4420U Physics Thesis Project II**

PHY 4120U Forensic Physics Applications

*** Note: Electives and breadth requirements**

All students must complete 18 elective credit hours. Students who take PHY 4430U Directed Studies in Physics must take an additional senior physics elective in the opposite term. In order to satisfy breadth requirements, the 18 credit hours of electives may not be in physics (PHY) courses; at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. One of the science electives must be a mathematics course at the second-year (MATH 2000-series) or higher level not explicitly specified in the program map.

**** Note: Directed Studies and Thesis Project courses**

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take PHY 4430U Directed Studies in Physics. PHY 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of PHY 4410U and PHY 4420U Thesis Project in Physics I and II in place of PHY 4430U and a senior physics elective. In the Forensic Physics specialization, PHY 4430U Directed Studies, or PHY 4410U and PHY 4420U Thesis Project must deal with a topic in forensic physics.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

***** A senior physics elective is defined as any fourth-year (PHY 4000U-series) physics course not explicitly specified in the program map.****Note: No more than 42 credit hours may be taken at the first-year level.**

15.8.5.4 Physics - Medical Physics specialization

YEAR 1

Semester 1 (15 credit hours)

BIOL 1010U Biology I
CHEM 1010U Chemistry I
CSCI 1000U Scientific Computing Tools
MATH 1010U Calculus I
PHY 1010U Physics I

Semester 2 (15 credit hours)

BIOL 1020U Biology II
CHEM 1020U Chemistry II
MATH 1020U Calculus II
PHY 1020U Physics II
Elective* (CSCI 1020U - Fundamentals of Programming is recommended)

YEAR 2

Semester 1 (15 credit hours)

BIOL 2840U Cell and Molecular Biology
MATH 2050U Linear Algebra
PHY 2010U Electricity and Magnetism I
PHY 2030U Mechanics I
PHY 2060U Nuclear Physics and Relativity

Semester 2 (15 credit hours)

PHY 2020U Electricity and Magnetism II
PHY 2050U Thermodynamics and Heat Transfer
MATH 2060U Differential Equations
Elective*
Elective*

YEAR 3

Semester 1 (15 credit hours)

PHY 3010U Statistical Mechanics I
PHY 3020U Quantum Mechanics I
PHY 3030U Electronics
STAT 2010U Statistics and Probability for Physical Science
Elective*

Semester 2 (15 credit hours)

PHY 3050U Waves and Optics
PHY 3060U Fluid Mechanics
RADI 2100U Radiological and Health Physics
RADI 2110U Health Physics Laboratory
Elective*

YEAR 4

Semester 1 (15 credit hours)

PHY 4100U Medical Imaging
PHY 4430U Directed Studies in Physics or
PHY 4410U Physics Thesis Project I**
RADI 4440U Radioisotopes and Radiation Machines
Elective*
Elective*

Semester 2 (15 credit hours)

RADI 3220U Radiation Biophysics and Dosimetry
 RADI 4320U Medical Applications of Radiation Techniques

Senior science elective*** or

PHY 4420U Physics Thesis Project II**

Elective*

Elective*

*Note: Electives and breadth requirements

All students must complete 27 elective credit hours. Students who take PHY 4430U Directed Studies in Physics must take an additional senior science elective in the opposite term. At least nine credit hours must be in courses offered by the Faculty of Science; the senior science elective, if taken in place of PHY 4420U, cannot be used to meet this requirement. In order to satisfy breadth requirements at least 12 credit hours must be in courses outside the Faculty of Science, and must include BUSI 2000U Collaborative Leadership. Students with interest in medical school should take a full year of organic chemistry (Organic Chemistry CHEM2020U Introduction to Organic Chemistry and CHEM2120U Organic Chemistry)

**Note: Directed Studies and Thesis Project courses

Students in clear academic standing who have completed 90 credit hours of their program and six third-year required courses in their area of specialization are eligible to take PHY 4430U Directed Studies in Physics. PHY 4430U may be offered in either semester, depending on demand. Students who meet these qualifications may optionally apply to do a two course sequence consisting of PHY 4410U and PHY 4420U Thesis Project in Physics I and II in place of PHY 4430U and the senior science elective.

Opportunities for the thesis option are limited; students must apply to the science fourth-year thesis coordinator by April 30 following completion of the first three years of the program.

***Senior science elective chosen from the following:

PHY 4010U Statistical Mechanics II

PHY 4020U Quantum Mechanics II

PHY 4030U Modern Physics

PHY 4610U Biophysics of Excitable Cells

ENGR 2950U Radiation Protection

ENGR 3570U Environmental Effects of Radiation

Note: No more than 42 credit hours may be taken at the first-year level.

15.9 Science and Management programs

15.9.1 General information

UOIT's Bachelor of Science and Management (Honours) is available to students in any specialization within the Biological Science program or the Physical Science program.

The combination Science and Management program will consist of the curriculum from the selected science program and 10 courses in business and management that are taken in year five of the program. Graduates will benefit from a complete science education complemented by solid accounting, finance, operations, human resources and marketing skills.

15.9.2 Admission requirements

See section 15.2.2.

15.9.3 Work placements

See section 15.2.3.

15.9.4 Careers

There is a wealth of opportunities for graduates in the sciences in industry, government, and in fields of applied science, and the combination of a science degree and business and management education will give an added advantage to graduates of these programs to establish careers in practical areas.

15.9.5 Program overview and degree requirements

Bachelor of Science (Honours) in Biological Science and Management - BSc and Mgt (Hons)

- Complementary Studies
- Environmental Toxicology specialization
- Life Sciences specialization
- Pharmaceutical Biotechnology specialization

Bachelor of Science (Honours) in Physical Science and Management - BSc and Mgt (Hons)

The Science and Management programs follow the same program map as the four-year degree program for each specialization with the addition of the following 10 courses in fifth year.

YEAR 5

Semester 1 (15 credit hours)

BUSI 1101U Financial Accounting

BUSI 2201U Marketing I

BUSI 2311U Organizational Behaviour

BUSI 2401U Finance I

BUSI 2603U Introduction to Operations Management

Semester 2 (15 credit hours)

BUSI 2170U Managerial Accounting

BUSI 2402U Finance II

BUSI 2202U Marketing II

BUSI 2312U Introduction to Human Resources Management

BUSI 2604U Introduction to Project Management and Supply Chain Management

15.10 Concurrent Education program

15.10.1 General Information

A five-year Concurrent Education program is offered in collaboration with the Faculty of Education. The Concurrent Education program allows students to complete a four-year Honours Bachelor of Science and a Bachelor of Education simultaneously.

15.10.2 Admission requirements

Current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with a minimum overall average of 75 percent on six 4U or 4M credits including English (ENG4U), calculus (MCB4U) and two of biology (SBI4U), chemistry (SCH4U), physics (SPH4U) or algebra and geometry (MGA4U). In addition, a combined minimum 75 percent average in mathematics and science courses is required. All other applicants should refer to section 4.5 of this calendar for the requirements for their specific category of admission.

15.10.3 Careers

Graduates will be prepared to teach in the Ontario education system where the demand for teachers of mathematics, science and computer science is on the rise.

Graduates are also prepared to teach outside the province and some may be able to teach at the college-level or to undertake roles in business in the areas of training and professional development. The university's concurrent education programs are designed to meet all Ontario regulatory requirements and incorporate the Standards of Practice and Ethical Standards for the Teaching Profession of the Ontario College of Teachers.

Graduates will be recommended by the University to the Ontario College of Teachers for certification to practice in the Ontario education system.

15.10.4 Program details and degree requirements

The first year of the Concurrent Education program has similar science content to that of the science programs; concurrent education students will also take EDUC 2900U Introduction to Teaching and Field Experience in year one, semester two of the science programs. The detailed program maps are listed under the Faculty of Education, section 10, of this calendar.

15.11 Science minor programs

15.11.1 Minors in Biology, Chemistry, Mathematics and Physics

General requirements: A student must take a minimum of 18 credit hours in courses with the designation BIOL, CHEM, MATH or PHY respectively, of which at least three credit hours must be taken as science electives (i.e. not be a required by the major program) and at least six must be at the 3000- or 4000-level. If all the courses in a minor group are required by the major program, one additional course in the minor subject must be taken to satisfy the elective rule above.

Note:

Suggested course groups for minors in Biology and Chemistry are given below; students may choose to follow these course groups, or develop other course groups in consultation with the Science student advisor. Specific courses are required for the minor programs in Mathematics and Physics. The courses are listed below.

15.11.1.1 Biology

Two mandatory courses: BIOL 1010U; BIOL 1020U

One of the following groups of four or five courses (themes indicated in parentheses):

BIOL 2020U; BIOL 2030U; BIOL 3030U; BIOL 3050U
(Microbiology and Developmental Biology)

BIOL 2010U; BIOL 2020U; BIOL 2030U; BIOL 3030U; BIOL 3040U
(Microbiology and Physiology)

BIOL 2020U; BIOL 2030U; BIOL 2040U; BIOL 3010U; BIOL 3050U
(Molecular and Developmental Biology)

BIOL 2020U; BIOL 2030U; BIOL 2040U; BIOL 3010U; BIOL 3030U
(Molecular Biology and Microbiology)

BIOL 2010U; BIOL 2020U; BIOL 2040U; BIOL 3010U; BIOL 3020U
(Molecular Biology and Toxicology)

BIOL 2010U; BIOL 2020U; BIOL 2030U; BIOL 3040U; BIOL 3050U
(Physiology and Developmental Biology)

BIOL 2010U; BIOL 2030U; BIOL 2040U; BIOL 3020U; BIOL 3040U
(Physiology and Toxicology)

Other course groups may be developed in consultation with the science student advisor, subject to the general rules above.

15.11.1.2 Chemistry

Two mandatory courses: CHEM 1010U; CHEM 1020U

One of the following groups of four courses (themes indicated in parentheses):

CHEM 2010U or CHEM 2040U; CHEM 2030U; CHEM 3530U; CHEM 3540U
(Analytical Chemistry)

CHEM 2010U; CHEM 2020U or CHEM 2030U or CHEM 2130U or CHEM 2040U;
CHEM 3510U; CHEM 3520U (Inorganic Chemistry)

CHEM 2020U; CHEM 2120U; CHEM 3120U; CHEM 3220U (Organic Chemistry)

CHEM 2010U; CHEM 2040U; CHEM 3040U; CHEM 4040U (Physical Chemistry)

Other course groups may be developed in consultation with the science student advisor, subject to the general rules above.

15.11.1.3 Mathematics

Four mandatory courses: MATH 1010U; MATH 1020U; MATH 2010U; MATH 2050U

Two additional courses selected from the following:

MATH 3020U; MATH 3040U; MATH 3050U; MATH 3060U; MATH 3070U; MATH 4010U

Note that some of the selected courses will require one or more additional MATH or STAT 2000-series courses to be taken as prerequisites.

15.11.1.4 Physics

Four mandatory courses: PHY 1010U or PHY 1030U; PHY 1020U or PHY 1040U;
PHY 2010U; PHY 2030U

Two additional courses selected from the following:

PHY 3010U; PHY 3020U; PHY 3030U; PHY 3040U; PHY 3050U; PHY 3060U;
PHY 4010U; PHY 4020U

Note that some of the selected courses will require an additional PHY or MATH 2000-series course to be taken as a prerequisite.

15.11.2 Minor in Computational Science

A minor consisting of 24 credit hours is available in Computational Science. The new discipline of computational science has emerged primarily over the past decade as a third methodology for carrying out scientific investigations, alongside the traditional approaches of theory and experiment. Computational science combines the application of numerical methods, mathematical models, and computer algorithms, with knowledge in a particular discipline to study problems that are intractable or difficult to study using conventional approaches. Examples include the study of stock market collapses, the evolution of interstellar galaxies, and the molecular-level properties of nanomaterials.

Computational science seeks to gain insight through the development and implementation of mathematical models of phenomena by means of their computer simulation. Visualization of the results of such simulations is a key ingredient in the methodology.

This minor may be combined with any of the UOIT science degree programs. Students with this minor can expect to enhance their opportunities in the marketplace.

Course Requirements

- CSCI 1000U Scientific Computing Tools
- CSCI 1020U Fundamentals of Programming
- CSCI 2010U Principles of Computer Science
- CSCI 2110U Discrete Structures in Computer Science or
MATH 2080U Discrete Mathematics
- CSCI 3010U Simulation and Modelling
- CSCI 3090U Scientific Visualization and Computer Graphics
- MATH 2072U Computational Science I
- MATH 4020U Computational Science II