SOC APPROVALS
June 5, 2024

The following proposals were approved at the June 5, 2024 meeting of the Subcommittee on Undergraduate Academic Courses (SOC).

FACULTY OF ARTS AND HUMANITIES

DEPARTMENT OF LANGUAGES AND CULTURES

Course Introduction – Effective September 1, 2024, the following course be introduced:

INTERCULTURAL COMMUNICATIONS 2233A/B/Y:
A TASTE OF ITALY: EXPLORING ITALIAN CUISINE THROUGH THE ARTS
(Short title: A Taste of Italy)
Discover the intimate relationship between food and the arts in Italian culture by exploring how eating, drinking, banqueting, and reveling are portrayed in cinema, literature, music, and painting. This journey reveals the deep connections between the sharing of food and artistic expressions: a unique perspective on Italy's rich cultural tapestry.

Antirequisite(s): Italian 2233A/B/Y.
Extra Information: 2 hours. Taught in English. Select coursework in Italian for students enrolled in Italian modules. Cross-listed with Italian 2233A/B/Y.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

ITALIAN 2233A/B/Y
A TASTE OF ITALY: EXPLORING ITALIAN CUISINE THROUGH THE ARTS
(Short title: A Taste of Italy)
Discover the intimate relationship between food and the arts in Italian culture by exploring how eating, drinking, banqueting, and reveling are portrayed in cinema, literature, music, and painting. This journey reveals the deep connections between the sharing of food and artistic expressions: a unique perspective on Italy's rich cultural tapestry.

Antirequisite(s): Intercultural Communications 2233A/B/Y.
Extra Information: 2 hours. Taught in English. Select coursework in Italian for students enrolled in Italian modules. Cross-listed with Intercultural Communications 2233A/B/Y.
Course Weight: 0.50

FACULTY OF ENGINEERING

Course Introduction – Effective September 1, 2024, the following course be introduced:

ENGINEERING SCIENCE 1050
FOUNDATIONS OF ENGINEERING PRACTICE
Introduction to the principles and practices of professional engineering. The design studio fosters innovative thinking, improves problem solving, and provides context. Includes elements of need recognition, conceptualization, prototyping, and engineering design to satisfy commercial specifications. Emphasis on creativity, teamwork, communication and engineering skills necessary to practice in any engineering discipline.

Extra Information: ~~3~~ **2** lecture hours per week, 2 lab hours per week and 2 tutorial hours per week.
Course Weight: 1.00

Course Introduction – Effective September 1, 2024, the following course be introduced:

ENGIEERING SCIENCE 1022A/B/Y
ENGINEERING STATICS
Analysis of forces on structures and machines, including addition and resolution of forces and moments in two and three-dimensions. The application of the principles of equilibrium. Topics: trusses; frames; friction; and centroids.

Extra Information: **22 lecture hours over 11 weeks each term; 10 tutorial hours over 5 weeks each term** ~~2 lecture hours per week for 10 weeks each term when offered as a Y course; 12 lecture hours per week for 3 weeks when offered as a Summer Intersession course~~.
Course Weight: 0.50

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 3399A/B
PRINCIPLES AND PRACTICES OF DESIGN OF ELECTRONIC SYSTEMS
Principles and Practices of Design of Electronic Systems is a third year design course in the Electrical Engineering Program. Topics include principles and practices of design of electronic systems through projects in the area of communications, microprocessors, control systems and signal processing.

Pre-or Corequisite(s): ECE 3330A/B, ECE 3331A/B **(or AISE 3351A/B or the former ECE 3351A/B)**, ECE 3370A/B, ECE 3375A/B.
Extra Information: 1 lecture hours, 3.0 laboratory hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4429A/B
ADVANCED DIGITAL SIGNAL PROCESSING
Digital Signal Processing (DSP) is widely used in speech and audio processing, biomedical engineering, and telecommunication applications. The objectives of this course are to strengthen the students' knowledge of DSP fundamentals, to introduce them to advanced DSP topics, and to familiarize them with the practical aspects of DSP algorithm implementation.

Prerequisite(s): ECE 3331A/B **or AISE 3351A/B or the former ECE 3351A/B**.
Extra Information: 3 lecture hours, 1 laboratory hour.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4433A/B
DIGITAL COMMUNICATIONS SYSTEMS
Transceiver design for digital communication systems~~, design goals and tradeoffs~~. Deterministic and random signals. Digital modulation techniques**.**~~,~~ ~~optimal receiver design,~~ ~~p~~**P**erformance analysis under noisy conditions. Digital communication through bandlimited channels. Characteristics of wireless channel, ~~intersymbol interference,~~ channel estimation~~, adaptive equalization~~. Synchronization techniques. Multiple access techniques, CDMA, TDMA, FDMA. Principles of OFDM, cyclic prefix, in-band pilots, PAPR, applications of OFDM.

Prerequisite(s): ECE 3331A/B **(or AISE 3351A/B or the former ECE 3351A/B)**, ECE 3370A/B, Statistical Sciences 2141A/B, NMM 3415A/B **(**or the former Applied Mathematics 3415A/B**)**.
Extra Information: 3 lecture hours, 1.5 laboratory hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4436A/B
NETWORKING: PRINCIPLES, PROTOCOLS AND ARCHITECTURE
Introduction to networking, network architecture and protocols, layering, OSI and TCP/IP models. Physical layer: transmission media, data encoding, Asynchronous and synchronous transmission. Data link layer: error detection, flow control, error control. Packet Switching: datagrams, virtual circuits, routing,

congestion control, internetworking. Local area networks, network layer and transport layer.

Antirequisite(s): Computer Science 3357A/B**, AISE 4430A/B, the former SE 4430A/B**.
Prerequisite(s): Engineering Science 1036A/B or Computer Science 1026A/B.
Extra Information: 3 lecture hours, 2 laboratory hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4437A/B
COMMUNICATIONS THEORY
Introduction to communication systems and information theory. Classification of signals and systems. Communication channel modeling. Fourier series and transform applications. Modulation techniques. Sampling theory and digital transmission. Digital modulation, optimum receiver design, performance analysis. Error control. Selected topics.

Prerequisite(s): ECE 3330A/B, ECE 3331A/B **(or AISE 3351A/B or the former ECE 3351A/B)**, ECE 3375A/B, Statistical Sciences 2141A/B or Statistical Sciences 2143A/B, NMM 2276A/B or the former Applied Mathematics 2276A/B.
Extra Information: 3 lecture hours, 1 tutorial hour.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4445A/B
INTRODUCTION TO DIGITAL IMAGE PROCESSING
This course covers the fundamentals of digital image processing, including image representation, histograms, contrast enhancement, geometric operations, registration, digital filtering and segmentation. Emphasis is placed on implementation of algorithms and on practical applications in industry, science and medicine.

Antirequisite(s): ~~MEDBIO 4445A/B.~~
Prerequisite(s): ECE 3331A/B **or AISE 3351A/B or the former ECE 3351A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ELECTRICAL AND COMPUTER ENGINEERING 4469A/B
APPLIED CONTROL SYSTEMS
The course covers analytical methods for analyzing and developing control strategies for industrial processes. These include identification and empirical modeling, tuning of PID controller, digital control systems, z-transformation. PLCs are discussed. Computer based simulation modules using Matlab^® and Simulink^® reused. Examples from different engineering disciplines are studied.

Prerequisite(s): ECE 3331A/B **(or AISE 3351A/B or the former ECE 3351A/B)**, ECE 3330A/B as well as successful completion of the third year of the Engineering program.
Extra Information: 3 lecture hours, 1.5 laboratory hour.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

SOFTWARE ENGINEERING 3314A/B
COMPUTER NETWORKS APPLICATIONS
This course examines and introduces advanced concepts in computer network and data communications. Topics include mobile and wireless data communications, multimedia networking, network management, distributed computing and clusters, and peer to peer network applications.

Prerequisite(s): ECE 4436A/B **or AISE 4430A/B or the former SE 4430A/B**.
Extra Information: 3 lecture hours, 2 laboratory hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

SOFTWARE ENGINEERING 4455A/B
CLOUD COMPUTING: CONCEPTS, TECHNOLOGIES AND APPLICATIONS
The course concentrates on the fundamental elements of cloud computing such as resource virtualization and distributed systems including the main concepts of cloud infrastructures. Laboratory activities will allow students to be exposed to fundamental technologies used by cloud computing such as virtual machines, virtual machine monitors, resource allocations, etc.

Prerequisite(s): (**[**ECE 4436A/B **or AISE 4430A/B or the former SE 4430A/B]**, SE 3313A/B, SE 3314A/B), or (Computer Science 3357A/B, Computer Science 3305A/B). Pre-or Corequisite(s): Computer Science 4457A/B, only for Computer Science students.
Extra Information: 3 lecture hours, 2 laboratory hours.
Course Weight: 0.50

FACULTY OF HEALTH SCIENCES

ARTHUR LABATT FAMILY SCHOOL OF NURSING

Course Introduction – Effective September 1, 2024, the following course be introduced:

NURSING 1101A/B
THEORIZING PRACTICE
Nursing interventions use theory to create environments of care to promote health and healing. In this course, students focus on use of theory-driven clinical practice models in leadership, interprofessional collaborative practice and client safety, to promote positive outcomes of care.

Prerequisite(s): Registration in the Compressed Time Frame BScN Program (RPN Pathway B).
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

NURSING 1102Q/R/S/T
PROFESSIONAL TRANSFORMATION PORTFOLIO
(Short title: Professional Portfolio)
Demonstrating professional accountability as a Registered Nurse is a requirement involving self-reflection, continuous practice review and evidence of how this is enacted in practice. In this course, students develop e-portfolios that articulate their vision of professional nursing and health care and provide evidence of implementation in practice.

Prerequisite(s): Registration in the Compressed Time Frame BScN Program (RPN Pathway B).
Extra Information: 3 lecture hours.
Course Weight: 0.25

Course Introduction – Effective September 1, 2024, the following course be introduced:

NURSING 1140A/B
INTRODUCTION TO HEALTH INFORMATICS WITHIN NURSING
(Short title: Health Informatics in Nursing)
In this course students have an opportunity to develop foundational knowledge, skills, and competencies related to the use, application, and evaluation of technology across all domains of nursing practice. The influence and implications of technology on clients, families, communities, society, the nursing profession, and nursing practice will also be explored.

Antirequisite(s): the former Nursing 2240F/G.
Prerequisite(s): Registration in Year 1 of the Western-Fanshawe Collaborative BScN program or registration in the Compressed Timeframe BScN program.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

NURSING 2240F/G
INTRODUCTION TO HEALTH INFORMATICS WITHIN NURSING
This course will extend students' knowledge and skills related to information literacy and knowledge acquisition skills necessary for professional nursing practice. From a health equity lens, students will recognize how current trends in technology interface with clients' access to health in a digital space.

Prerequisite(s): Registration in Year 1 or 2 of the Western-Fanshawe Collaborative BScN Program or the Compressed Time Frame BScN Program.
Extra Information: 3 lecture hours.
Course Weight: 0.50

SCHOOL OF HEALTH STUDIES

Course Revision – Effective September 1, 2024, the following change(s) be made:

HEALTH SCIENCES 4995A/B/Y
EXPERIENTIAL LEARNING
This course provides 4th year Honours students the opportunity to gain experience applying theoretical knowledge in a community setting, including a full range of elements that comprise the partners' operations. ~~Applications due in the spring of the previous year.~~

Antirequisite(s): the former Health Sciences 4900E, the former Health Sciences 4910F/G. ~~Extra information: Minimum of 75 experiential learning contact hours over the 13 weeks. Students will be permitted to take a maximum of 1.0 credits among Health Sciences 4990F, Health Sciences 4991G, Health Sciences 4995A/B/Y (or the former 4995F/G), and Health Sciences 4996A/B/Y (or the former 4996F/G.~~
Prerequisite(s): Enrolment in the fourth year of an Honours Degree in the School of Health Studies. Application required **(see School for further information)**.
Extra Information: **Pass/Fail. Minimum of 75 experiential learning contact hours over the course of the term in which it is offered. Students will be permitted to take a maximum of 1.0 credits among Health Sciences 4990F, Health Sciences 4991G, Health Sciences 4995A/B/Y (or the former 4995F/G), and Health Sciences 4996A/B/Y (or the former 4996F/G).**
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

HEALTH SCIENCES 4996A/B/Y
EXPERIENTIAL LEARNING
This course provides 4th year Honours students the opportunity to gain experience applying theoretical knowledge in a community setting, including a full range of elements that comprise the partners' operations. ~~Applications due in the spring of the previous year.~~

Antirequisite(s): The former Health Sciences 4900E, the former Health Sciences 4910F/G. ~~Extra information: Minimum of 75 experiential learning contact hours over the 13 weeks. Students will be permitted to take a maximum of 1.0 credits among Health Sciences 4990F, Health Sciences 4991G, Health Sciences 4995A/B/Y (or the former 4995F/G), and Health Sciences 4996A/B/Y (or the former 4996F/G).~~
Prerequisite(s): Enrolment in the fourth year of an Honours Degree in the School of Health Studies. Application required **(see School for further information)**.
Extra Information: **Pass/Fail. Minimum of 75 experiential learning contact hours over the course of the term in which it is offered. Students will be permitted to take a maximum of 1.0 credits among Health Sciences 4990F, Health Sciences 4991G, Health Sciences 4995A/B/Y (or the former 4995F/G), and Health Sciences 4996A/B/Y (or the former 4996F/G).**
Course Weight: 0.50

FACULTY OF LAW

Course Introduction – Effective September 1, 2024, the following course be introduced:

LAW 2301A/B
SEX AND THE LAW
This course explores sex, gender, and sexualities as sites of legal intervention through a study of law's distinctive role in regulating human relationships and institutions. Potential topics may include marriage and intimate relationships; families; reproduction; work; sport; privacy; sexual violence, coercion, and harassment; consent; sex work; and international law.

Antirequisite(s): Registration in the JD program in the Faculty of Law.
Extra Information: 3 lecture hours.
Course Weight: 0.50

SCHULICH SCHOOL OF MEDICINE & DENTISTRY

SCHULICH DENTISTRY

Course Introduction – Effective September 1, 2024, the following course be introduced:

DENTISTRY 5124
GROWTH AND DEVELOPMENT
This course will prepare students to understand details and the general concept of growth and development: early embryology, skeletal development, general and very specific diet and nutrition from pregnancy, childhood, adults to seniors, timelines of growth and development from pre-natal to puberty, craniofacial growth and development and its influence to treatment planning of paediatric dentistry and orthodontic problems. Through milestones the students will learn when the best biological time is to get specific treatments.

Antirequisite(s): Dentistry 5223.
Course Weight: 1.0

Course Withdrawal – Effective September 1, 2025, the following course be withdrawn:

Dentistry 5223: *Growth and Development*

DEPARTMENT OF MEDICAL BIOPHYSICS

Course Revision – Effective September 1, 2024, the following change(s) be made:

MEDICAL BIOPHYSICS 3980E
GENERAL BIOPHYSICS LABORATORY
Laboratory tasks and seminars introduce students to conducting and communicating research in medical biophysics. Students practice data collection and analyses through preset exercises and assessments. Students complete an individual 12-week term project in a research laboratory under supervision by faculty. Laboratory exercises and projects depend on expertise of participating faculty.

Antirequisite(s): the former Medical Biophysics 3970Z.
Pre-or Corequisite(s): Medical Biophysics 3330F~~/G~~, Medical Biophysics 3501A.
Open to students in Year 3 and 4 only.

Extra Information: First term: 1 lecture hour each week and 2 laboratory hours bi-weekly. Second term: students will be expected to spend up to 6 hours per week in the research project lab and up to 3 hours bi-weekly in lecture or laboratory, at the instructor’s discretion.
Course Weight: 1.00

FACULTY OF SCIENCE

DEPARTMENT OF BIOLOGY

Course Revision – Effective September 1, 2024, the following change(s) be made:

BIOLOGY 2601A/B
ORGANISMAL PHYSIOLOGY
This course provides a general background in the mechanisms and consequences of physiological processes in plants and animals. It will take an integrated approach and include a comparative context, wherever possible. It will include ~~hands-on laboratory work with~~ **an overview of physiology in** both plants and animals.

Prerequisite(s): A minimum mark of 60% in either Biology 1001A or Biology 1201A and a minimum mark of 60% in either Biology 1002B or Biology 1202B or Integrated Science 1001X.
Extra Information: 2 lecture hours, **1 lecture/tutorial hour** ~~3 laboratory hours~~.
Course Weight: 0.50

DEPARTMENT OF CHEMISTRY

Course Introduction – Effective September 1, 2024, the following course be introduced:

CHEMISTRY 2274A
PHYSICAL CHEMISTRY I: THERMODYNAMICS AND KINETICS
(Short title: Physical Chemistry I)
Foundations of classical physical chemistry. Topics include chemical thermodynamics, quantitative description of phase transitions and chemical equilibrium, chemical kinetics, reaction dynamics, diffusion and transport processes.

Antirequisite(s): Chemistry 2214A/B, the former Chemistry 2374A.
Prerequisite(s): Chemistry 1301A/B, Chemistry 1302A/B, 0.5 course from Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, and any other 0.5 course at the 1000-level from Calculus, Applied Mathematics, Mathematics, or Numerical and Mathematical Methods. Integrated Science 1001X may be used as a substitute for the combination of Chemistry 1302A/B and Calculus 1301A/B.
Extra Information: 3 lecture hours, 1.5 laboratory hours (3 hours every other week).
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

CHEMISTRY 2284B
PHYSICAL CHEMISTRY II: QUANTUM THEORY
(Short title: Physical Chemistry II)
Foundations of the quantum theory of chemical structure and bonding. Topics include chemically relevant model problems of quantum mechanics, elements of atomic and molecular spectroscopy, relationship between classical and statistical thermodynamics.

Antirequisite(s): Chemistry 2214A/B, Chemistry 3374A, the former Chemistry 2384B.
Prerequisite(s): Chemistry 1301A/B, Chemistry 1302A/B, 0.5 course from Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, and any other 0.5 course at the 1000-level from Calculus, Applied Mathematics, Mathematics, or Numerical and Mathematical Methods. Integrated Science 1001X may be used as a substitute for the combination of Chemistry 1302A/B and Calculus 1301A/B.
Extra Information: 3 lecture hours, 1 tutorial hour.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

CHEMISTRY 2374A
THERMODYNAMICS
Introduction to classical thermodynamics and its real-world applications. Topics include: the four laws of thermodynamics, enthalpy, entropy, Helmholtz and Gibbs energies, chemical potential, real gases, phase diagrams, ideal and real solutions, ionizing solvents, electrolytes, and electrochemical cells

Antirequisite(s): Chemistry 2214A/B.
Prerequisite(s): Chemistry 1301A/B, Chemistry 1302A/B, 0.5 course from Calculus 1000 A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, and any other 0.5 course at the 1000-level from Calculus, Applied Mathematics, Mathematics, or Numerical and Mathematical Methods. Integrated Science 1001X may be used as a substitute for the combination of Chemistry 1302A/B and Calculus 1301A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

CHEMISTRY 2384B
MICROSCOPIC PHENOMENA
Aspects of microscopic chemistry are covered including the introduction to statistical mechanics and its connection with thermodynamics, description of the kinetic theory in gas and liquid phases, chemical dynamics, kinetics, diffusion, and transport processes.

Antirequisite(s): Chemistry 2214A/B.
Prerequisite(s): Chemistry 2374A.
Extra Information: 3 lecture hours, 1.5 laboratory hours/week (3 hours every other week).
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN CHEMISTRY

This honours module builds on the Major module in Chemistry, and allows a student to specialize in a particular area of chemistry. This module includes Chemistry 4491E, an independent research project in which the student works in one of the research laboratories in the Department of Chemistry, typically during the final year of study.

Admission Requirements

Completion of first year requirements with no failures. Students must have an average of at least 70% in 3.0 principal courses, with no mark less than 60% in any course including:

1.0 course: Chemistry 1301A/B**,** ~~and~~ Chemistry 1302A/B.

1.0 course from: (Physics 1201A/B or Physics 1401A/B or Physics 1501A/B or the former Physics 1028A/B or the former Physics 1301A/B) and (Physics 1202A/B or Physics 1402A/B or Physics 1502A/B or the former Physics 1029A/B or the former Physics 1302A/B).

1.0 course from: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Applied Mathematics 1201A/B or Calculus 1301A/B or Calculus 1501A/B or Mathematics 1600A/B **or Mathematics 1700A/B** or Mathematics 1229A/B or Numerical and Mathematical Methods 1411A/B or Numerical and Mathematical

Methods 1414A/B) or the former Applied Mathematics 1411A/B or the former Applied Mathematics 1414A/B), or the former Applied Mathematics 1413.

Note: Physics 1101A/B with a minimum mark of 80% can be used to replace Physics 1201A/B.

Module
10.0 courses:

6.0 courses: Chemistry 2271A, Chemistry 2272F, Chemistry 2273A, **Chemistry 2274A (or the former** Chemistry 2374A**)**, Chemistry 2281G, Chemistry 2283G, **Chemistry 2284B (or the former Chemistry 2384B),** Chemistry 2370A/B (or the former Chemistry 3370A/B), ~~Chemistry 2384B,~~ Chemistry 3371F, Chemistry 3372F/G, Chemistry 3373F, Chemistry 3374A/B.
1.5 courses from*: Chemistry 3300A/B, Chemistry 3320A/B, Chemistry 3330F/G, Chemistry 3364A/B, Chemistry 3391A/B, Chemistry 3393A/B, Biochemistry 2280A, any 0.5 course at the 2000-level or higher from Calculus, Applied Mathematics or Mathematics.
1.0 course~~s~~ from*: 4000-level Chemistry courses.
1.5 course: Chemistry 4491E.

*Selection from these options must include at least 0.5 from the following: Biochemistry 2280A, Chemistry 3391A/B, Chemistry 4493A/B.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN CHEMISTRY

This module builds on the Major in Chemistry, and allows the choice of specializing in a particular area of chemistry. This module includes Chemistry 4491E, an independent research project in which the student works in one of the research laboratories in the Department of Chemistry, typically in the final year of study. This module is identical to the Honours Specialization in Chemistry module but does not require a minimum 70% average.

Admission Requirements

Completion of first year requirements, including the following 3.0 courses with no mark less than 60%:

1.0 course: Chemistry 1301A/B**,** ~~and~~ Chemistry 1302A/B.

1.0 course from: (Physics 1201A/B or Physics 1401A/B or Physics 1501A/B or the former Physics 1028A/B or the former Physics 1301A/B) and (Physics

1202A/B or Physics 1402A/B or Physics 1502A/B or the former Physics 1029A/B or the former Physics 1302A/B).

1.0 course from: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Applied Mathematics 1201A/B or Calculus 1301A/B or Calculus 1501A/B or Mathematics 1600A/B **or Mathematics 1700A/B** or Mathematics 1229A/B or Numerical and Mathematical Methods 1411A/B or Numerical and Mathematical Methods 1414A/B) or the former Applied Mathematics 1411A/B or the former Applied Mathematics 1414A/B), or the former Applied Mathematics 1413.

Note: Physics 1101A/B with a minimum mark of 80% can be used to replace Physics 1201A/B.

Module
10.0 courses:

6.0 courses: Chemistry 2271A, Chemistry 2272F, Chemistry 2273A, **Chemistry 2274A (or the former** Chemistry 2374A**)**, Chemistry 2281G, Chemistry 2283G, **Chemistry 2284B (or the former Chemistry 2384B),** Chemistry 2370A/B (or the former Chemistry 3370A/B), ~~Chemistry 2384B,~~ Chemistry 3371F, Chemistry 3372F/G, Chemistry 3373F, Chemistry 3374A/B.
1.5 courses from*: Chemistry 3300A/B, Chemistry 3320A/B, Chemistry 3330F/G, Chemistry 3364A/B, Chemistry 3391A/B, Chemistry 3393A/B, Biochemistry 2280A, any 0.5 course at the 2000-level or higher from Calculus, Applied Mathematics or Mathematics.
1.0 course~~s~~ from*: 4000-level Chemistry courses.
1.5 course: Chemistry 4491E.

*Selection from these options must include at least 0.5 from the following: Biochemistry 2280A, Chemistry 3391A/B, Chemistry 4493A/B.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN CHEMISTRY

This module forms the core material of those degrees which have Chemistry as a main designation. It is designed to give a foundation in all areas of Chemistry without the need to specialize in any one of them.

Admission Requirements

Completion of first year requirements, including the following 3.0 courses with no mark less than 60%:

1.0 course: Chemistry 1301A/B, ~~and~~ Chemistry 1302A/B.

1.0 course from: (Physics 1201A/B or Physics 1401A/B or Physics 1501A/B or the former Physics 1028A/B or the former Physics 1301A/B) and (Physics 1202A/B or Physics 1402A/B or Physics 1502A/B or the former Physics 1029A/B or the former Physics 1302A/B).

1.0 course from: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Applied Mathematics 1201A/B or Calculus 1301A/B or Calculus 1501A/B or Mathematics 1600A/B **or Mathematics 1700A/B** or Mathematics 1229A/B or Numerical and Mathematical Methods 1411A/B or Numerical and Mathematical Methods 1414A/B) or the former Applied Mathematics 1411A/B or the former Applied Mathematics 1414A/B), or the former Applied Mathematics 1413.

Note: Physics 1101A/B with a minimum mark of 80% can be used to replace Physics 1201A/B.

Module
6.0 courses:

6.0 courses: Chemistry 2271A, Chemistry 2272F, Chemistry 2273A, **Chemistry 2274A (or the former** Chemistry 2374A**)**, Chemistry 2281G, Chemistry 2283G, **Chemistry 2284B (or the former Chemistry 2384B),** Chemistry 2370A/B (or the former Chemistry 3370A/B), ~~Chemistry 2384B,~~ Chemistry 3371F, Chemistry 3372F/G, Chemistry 3373F, Chemistry 3374A/B.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN BIOCHEMISTRY AND CHEMISTRY

This module provides a balance between core Chemistry and Biochemistry. It includes a course which is an independent research project, in which the student works in a research laboratory in one of the Departments of Chemistry or Biochemistry, typically during the final year of study. This module can be completed only within a BSc (Hons) degree.

Admission Requirements

Completion of first year requirements with no failures. Students must have an average of at least 70% in 3.0 principal courses with no mark less than 60% in any course, including:

1.0 course: Chemistry 1301A/B, ~~and~~ Chemistry 1302A/B.

1.0 course: Biology 1001A**,** ~~and~~ Biology 1002B.

1.0 course from: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B)~~;~~ and (Applied Mathematics 1201A/B~~,~~ or Calculus 1301A/B~~,~~ or Calculus 1501A/B~~,~~ or Mathematics 1600A/B **or Mathematics 1700A/B** or Mathematics 1229A/B or Numerical and Mathematical Methods 1411A/B or Numerical and Mathematical Methods 1414A/B) or the former Applied Mathematics 1411A/B or the former Applied Mathematics 1414A/B), or the former Applied Mathematics 1413.

1.0 course from: (Physics 1201A/B or Physics 1401A/B or Physics 1501A/B or the former Physics 1028A/B or the former Physics 1301A/B) and (Physics 1202A/B or Physics 1402A/B or Physics 1502A/B or the former Physics 1029A/B or the former Physics 1302A/B). (This 1.0 course is required but is not considered to be a principal course.)

Note: Biology 1201A with a minimum mark of 70% can be used to replace Biology 1001A, and Biology 1202B with a minimum mark of 70% can be used to replace Biology 1002B.

Note: Physics 1101A/B with a minimum mark of 80% can be used to replace Physics 1201A/B.

Module
11.0 courses:

6.0 courses: Chemistry 2271A, Chemistry 2272F, Chemistry 2273A, **Chemistry 2274A (or the former** Chemistry 2374A**)**, Chemistry 2281G, Chemistry 2283G, **Chemistry 2284B (or the former Chemistry 2384B),** Chemistry 2370A/B (or the former Chemistry 3370A/B), ~~Chemistry 2384B,~~ Chemistry 3371F, Chemistry 3372F/G, Chemistry 3373F, Chemistry 3374A/B.
2.5 courses: Biology 2581A/B, Biochemistry 2280A, Biochemistry 3380G, Biochemistry 3381A, Biochemistry 3382A.
1.0 course from: Biochemistry 4410A, Biochemistry 4415B, Biochemistry 4420A, Biochemistry 4425B, Biochemistry 4450A, the former Biochemistry 4463B.
1.5 course from: Chemistry 4491E, Biochemistry 4483E.

DEPARTMENT OF COMPUTER SCIENCE

Course Revision – Effective September 1, 2024, the following change(s) be made:

COMPUTER SCIENCE 3342A/B
ORGANIZATION OF PROGRAMMING LANGUAGES
Specification and analysis of programming languages; data types and structures; bindings and access structures; run-time behavior of programs; compilation vs. interpretation. Comparative presentation of at least three programming languages addressing the above concepts.

Prerequisite(s): Computer Science 2211A/B or Software Engineering 3313A/B.
Extra Information: 3 lecture hours. **Completion of Computer Science 3331A/B prior to enrolling in Computer Science 3342A/B is recommended but not required.**
Course Weight: 0.50

DEPARTMENT OF EARTH SCIENCES

Course Introduction – Effective September 1, 2024, the following course be introduced:

ENVIRONMENTAL SCIENCE 2300F/G
FOUNDATIONS IN ENVIRONMENTAL SCIENCE
(Short title: Foundations in Enviro Sci)
A foundational course exposing students to the interdisciplinary fields of environmental science by identifying how current environmental issues (e.g., resource extraction, climate change) are addressed by different disciplines. Sustainability metrics will also be explored. Students will work through insightful case studies and assess scientific literature from different stakeholder perspectives.

Antirequisite(s): the former Environmental Science 3300F/G.
Prerequisite(s): Enrolment in any Environmental Science module, Honours Specialization in Integrated Science with Environmental Science, Honours Specialization or Major in One Health, Major in Ecosystem Health, or permission of the Department.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ENVIRONMENTAL SCIENCE 3350F/G
RESEARCH TECHNIQUES IN ENVIRONMENTAL SCIENCE
A multi-module course where a case study approach will be used to acquaint students with the research tools of environmental science, and the analysis, interpretation and presentation of environmental data.

Prerequisite(s): **Environmental Science 2300F/G or the former Environmental Science 3300F/G, and enrolment in any Environmental Science module, Honours Specialization in Integrated Science with Environmental Science, Honours Specialization or Major in One Health, Major in Ecosystem Health, or permission of the Department**. ~~Environmental Science 3300F/G or special permission of the program coordinator.~~
Extra Information: 3 lecture/tutorial hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

EARTH SCIENCES 3369A/B
GEOMICROBIOLOGY
A study of ~~geomicrobiological~~ **biogeochemical** processes ~~recorded~~ in ~~the~~ Earth**'s geologic** record and **of** bacteria interactions in contemporary systems**.**~~,~~ ~~including~~ **Topics include** methods for the analysis of prokaryotes**,**~~. The~~ factors affecting their community structure and function, and their relationship to geochemistry. **Bacteriological culture techniques relevant to geomicrobiological research are introduced in the laboratory component.** ~~In the laboratory, students will develop bacteriological culture techniques used in geomicrobiological research.~~

Prerequisite(s): **1.0 course from Biology 1001A, Biology 1002B, Chemistry 1301A/B, Chemistry 1302A/B, Integrated Science 1001X.** ~~0.5 course from: Earth Sciences 2200A/B, Astronomy 2021A/B, Geography 1100, Geography 1300A/B, Geography 1500F/G.~~
Extra Information: 2 lecture hours, 3 laboratory hours.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

ENVIRONMENTAL SCIENCE 3300F/G
NATURAL SCIENCE OF ENVIRONMENTAL PROBLEMS
Topics will include: water pollution from toxic chemicals and biological sources; waste disposal and recycling of materials; other current pollution problems. Instruction and practice in library research and essay writing involving aspects of these topics.

Pre-or Corequisite(s): Chemistry 2210A/B.
Extra Information: 3 lecture/tutorial hours.
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN ENVIRONMENTAL SCIENCE

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.5 principal courses, with no mark in these principal courses below 60%, including:

1.0 course: Biology 1001A and Biology 1002B or Biology 1201A and Biology 1202B.

1.0 course: Chemistry 1301A/B and Chemistry 1302A/B.

0.5 course from: Environmental Science 1021F/G; a 1000-level 0.5 course in Geography; Earth Sciences 1022A/B, Earth Sciences 1023A/B, Earth Sciences 1070A/B, Earth Sciences 1081A/B; Physics 1101A/B, Physics 1102A/B, Physics 1201A/B, Physics 1202A/B, Physics 1401A/B, Physics 1402A/B, Physics 1501A/B, Physics 1502A/B, the former Physics 1028A/B, the former Physics 1029A/B, the former Physics 1301A/B, the former Physics 1302A/B.

1.0 course from: Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or Mathematics 1225A/B; Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B; Mathematics 1228A/B, Mathematics 1229A/B or Mathematics 1600A/B **or Mathematics 1700A/B** or Numerical and Mathematical Methods 1411A/B; Data Science 1000A/B; Applied Mathematics 1201A/B; or the former Applied Mathematics 1411A/B, the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, the former Statistical Sciences 1024A/B.

Module
9.0 courses:

0.5 course: Biology 2483A/B.
0.5 course: Chemistry 2210A/B.
0.5 course from: Environmental Science 2300F/G, the former Environmental Science 3300F/G.

~~1.0~~ **0.5** course ~~from~~**:** ~~Environmental Science 3300F/G,~~ Environmental Science 3350F/G.
0.5 course **from**: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B.
0.5 course **from**: Geography 2220A/B (strongly recommended) or a Geography half-course from the Environmental Science Course List.
0.5 course at the 2000-level from Earth Sciences courses in the Environmental Physical Sciences Subject Courses List.
1.5 course: Environmental Science 4999E.
0.5 course from: Environmental Science 4949F/G, Biology 4230A/B, Biology 4405A/B, Biology 4410F/G, Biology 4412F/G, Earth Sciences 4431A/B, Earth Sciences 4440A/B.
2.5 additional courses from the Environmental Science Course List, including at least 0.5 course from each of the 3 subject areas.
1.0 additional course at the 3000 level or above from the Environmental Science Course List

Note: Students should plan the modules taking into account prerequisites of senior courses.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN ENVIRONMENTAL SCIENCE

Admission Requirements

Completion of first-year requirements, with no mark in these principal courses below 60%, including:

1.0 course: Biology 1001A and Biology 1002B or Biology 1201A and Biology 1202B**.**

1.0 course: Chemistry 1301A/B and Chemistry 1302A/B**.**

0.5 course from: Environmental Science 1021F/G; a 1000-level 0.5 course in Geography; Earth Sciences 1022A/B, Earth Sciences 1023A/B, Earth Sciences 1070A/B, Earth Sciences 1081A/B; Physics 1101A/B, Physics 1102A/B, Physics 1201A/B, Physics 1202A/B, Physics 1401A/B, Physics 1402A/B, Physics 1501A/B, Physics 1502A/B, the former Physics 1028A/B, the former Physics 1029A/B, the former Physics 1301A/B, the former Physics 1302A/B.

1.0 course from: Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or Mathematics 1225A/B; Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B; Mathematics 1228A/B, Mathematics 1229A/B or Mathematics 1600A/B or **Mathematics 1700A/B or** Numerical and Mathematical Methods

1411A/B; Data Science 1000A/B; Applied Mathematics 1201A/B; or the former Applied Mathematics 1411A/B, the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, the former Statistical Sciences 1024A/B.

Module
9.0 courses:

0.5 course: Biology 2483A/B.
0.5 course: Chemistry 2210A/B.
0.5 course from: Environmental Science 2300F/G, the former Environmental Science 3300F/G.
~~1.0~~ **0.5** course: ~~Environmental Science 3300F/G,~~ Environmental Science 3350F/G.
0.5 course **from**: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B.
0.5 course **from**: Geography 2220A/B (strongly recommended) or a Geography half-course from the Environmental Science Course List.
0.5 course at the 2000-level from Earth Sciences courses in the Environmental Physical Science Courses List.
0.5 course from: Environmental Science 4949F/G, Environmental Science 4970F/G, Biology 4230A/B, Biology 4405A/B, Biology 4410F/G, Biology 4412F/G, Earth Sciences 4431A/B, Earth Sciences 4440A/B.
2.5 additional courses from the Environmental Science Course List, including at least 0.5 course from each of the 3 subject areas.
2.5 additional courses at the 3000 level or above from: Environmental Science 4970F/G or the Environmental Science Course List.

Note: Students should plan the module taking into account prerequisites of senior courses.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN ENVIRONMENTAL SCIENCE

Admission Requirements

Completion of first-year requirements, with no mark in these principal courses below 60%, including:

1.0 course: Biology 1001A and Biology 1002B or Biology 1201A and Biology 1202B**.**

1.0 course: Chemistry 1301A/B and Chemistry 1302A/B**.**

0.5 course from: Environmental Science 1021F/G; a 1000-level 0.5 course in Geography; Earth Sciences 1022A/B, Earth Sciences 1023A/B, Earth Sciences 1070A/B, Earth Sciences 1081A/B; Physics 1101A/B, Physics 1102A/B, Physics 1201A/B, Physics 1202A/B, Physics 1401A/B, Physics 1402A/B, Physics 1501A/B, Physics 1502A/B, the former Physics 1028A/B, the former Physics 1029A/B, the former Physics 1301A/B, the former Physics 1302A/B.

1.0 course from: Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or Mathematics 1225A/B; Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B; Mathematics 1228A/B, Mathematics 1229A/B or Mathematics 1600A/B or **Mathematics 1700A/B or** Numerical and Mathematical Methods 1411A/B; Data Science 1000A/B; Applied Mathematics 1201A/B; or the former Applied Mathematics 1411A/B, the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, the former Statistical Sciences 1024A/B.

Module
6.0 courses:

0.5 course: Biology 2483A/B.
0.5 course: Chemistry 2210A/B.
0.5 course from: Environmental Science 2300F/G, the former Environmental Science 3300F/G.
~~1.0~~ **0.5** course: ~~Environmental Science 3300F/G,~~ Environmental Science 3350F/G.
0.5 course **from**: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B.
0.5 course **from**: Geography 2220A/B (strongly recommended) or a Geography half-course from the Environmental Science Course List.
0.5 course at the 2000-level from Earth Sciences courses in the Environmental Physical Science Courses List.
2.5 additional courses from Environmental Science 4970F/G or the Environmental Science Course List, including at least 0.5 course from each of the 3 subject areas.

Note: Students should plan the modules taking into account prerequisites of senior courses.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MINOR IN ENVIRONMENTAL SCIENCE

Admission Requirements

Completion of first-year requirements, with no mark in these principal courses below 60%, including:

1.0 course: Biology 1001A and Biology 1002B or Biology 1201A and Biology 1202B.

1.0 course: Chemistry 1301A/B and Chemistry 1302A/B.
0.5 course from: Environmental Science 1021F/G; a 1000-level 0.5 course in Geography; Earth Sciences 1022A/B, Earth Sciences 1023A/B, Earth Sciences 1070A/B, Earth Sciences 1081A/B; Physics 1101A/B, Physics 1102A/B, Physics 1201A/B, Physics 1202A/B, Physics 1401A/B, Physics 1402A/B, Physics 1501A/B, Physics 1502A/B, the former Physics 1028A/B, the former Physics 1029A/B, the former Physics 1301A/B, the former Physics 1302A/B.
1.0 course from: Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or Mathematics 1225A/B, Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B; Mathematics 1228A/B, Mathematics 1229A/B or Mathematics 1600A/B or **Mathematics 1700A/B or** Numerical and Mathematical Methods 1411A/B; Data Science 1000A/B Applied Mathematics 1201A/B; or the former Applied Mathematics 1411A/B, the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, the former Statistical Sciences 1024A/B.

Module

4.0 courses

0.5 course: Biology 2483A/B.
0.5 course: Chemistry 2210A/B.
0.5 course from: Environmental Science 2300F/G, the former Environmental Science 3300F/G.
~~1.0~~ **0.5** course: ~~Environmental Science 3300F/G,~~ Environmental Science 3350F/G.
0.5 course **from**: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B.
0.5 course **from**: Geography 2220A/B (strongly recommended) or a Geography half-course from the Environmental Science Course List.
0.5 course at the 2000-level from Earth Sciences courses in the Environmental Physical Science Courses List.
0.5 additional course from the Environmental Science Course List.

Note: Students should plan the module taking into account prerequisites of senior courses.

DEPARTMENT OF MATHEMATICS

Course Introduction – Effective September 1, 2024, the following course be introduced:

MATHEMATICS 1700A/B
LINEAR ALGEBRA I FOR THE MATHEMATICAL SCIENCES
(Short title: Linear Algebra I for Math Sci)
An enriched version of Mathematics 1600A/B. Complex numbers and the integers modulo a prime; vectors, lines, planes; solving linear systems; spanning sets and linear independence; matrix algebra; elementary matrices; subspaces, bases, dimension and rank; introduction to linear transformations; determinants; eigenvalues and eigenvectors; similarity and diagonalization; Markov chains and other applications.

Antirequisite(s): Mathematics 1600A/B, Mathematics 2211A/B, Numerical and Mathematical Methods 1411A/B, the former Applied Mathematics 1411A/B, the former Applied Mathematics 2811A/B, the former Mathematics 2120A/B.
Prerequisite(s): One of Mathematics 1120A/B (recommended), Calculus 1000A/B or Calculus 1500A/B with a minimum mark of 70% in the case of Calculus 1000A/B or Calculus 1500A/B.
Extra Information: 3 lecture hours, 1 tutorial hour.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

MATHEMATICS 2700A/B
LINEAR ALGEBRA II
The Gram-Schmidt process; similarity and orthogonal diagonalization; abstract vector spaces and linear transformations over arbitrary fields; change of basis; inner product spaces; norms and distance; least squares and Fourier approximation; singular value decomposition. Applications to differential equations and other topics will be emphasized throughout the course.

Antirequisite(s): Mathematics 2211A/B, the former Applied Mathematics 2811A/B, the former Mathematics 2120A/B, the former Mathematics 3121A/B.
Prerequisite(s): One of Mathematics 1700A/B (recommended), Mathematics 1600A/B, Numerical and Mathematical Methods 1411A/B, or the former Applied Mathematics 1411A/B; plus one of Calculus 1301A/B, Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics

1413, or the former Applied Mathematics 1414A/B. Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B.
Extra Information: 3 lecture hours, 1 tutorial hour.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

MATHEMATICS 3700A/B
LINEAR ALGEBRA III
Invariant subspaces and the Cayley-Hamilton theorem; normal and self-adjoint operators; unitary and orthogonal operators; the principal axis theorem; orthogonal projections and the spectral theorem; singular value decomposition; bilinear forms; Sylvester's theorem; Jordan canonical form and the minimal polynomial.

Antirequisite(s): the former Mathematics 3121A/B.
Prerequisite(s): Mathematics 2155F/G and one of Mathematics 2700A/B or the former Mathematics 2120A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

APPLIED MATHEMATICS 2402A/B
ORDINARY DIFFERENTIAL EQUATIONS
Introduction to first order differential equations, linear second and higher order differential equations with applications, complex numbers including Euler's formula, series solutions, Bessel and Legendre equations, existence and uniqueness, introduction to systems of linear differential equations.

Prerequisite(s): A minimum mark of 60% in Calculus 1301A/B, or a minimum mark of 55% in Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/B or the former Applied Mathematics 1413. Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B. Pre-or Corequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B**.
Extra Information: 3 lecture hours, 1 laboratory hour.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

APPLIED MATHEMATICS 2814F/G
NUMERICAL ANALYSIS
Introduction to numerical analysis; polynomial interpolation, numerical integration, matrix computations, linear systems, nonlinear equations and optimization, the initial value problem. Assignments using a computer and the software package, Matlab, are an important component of this course.

Prerequisite(s): ~~A~~ **Mathematics 1700A/B or a** minimum mark of 55% in Mathematics 1600A/B. Pre-or Corequisite(s): Calculus 2302A/B, Calculus 2402A/B or Calculus 2502A/B.
Extra Information: 3 lecture hours, 1 laboratory hour.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

APPLIED MATHEMATICS 3615A/B
MATHEMATICAL BIOLOGY
An introduction to mathematical biology. Case studies from neuroscience, immunology, medical imaging, cell biology, molecular evolution and ecology will give an overview of this diverse field, illustrating standard mathematical approaches such as compartmental analysis and evolutionary game theory.

Prerequisite(s): One of Calculus 2302A/B, Calculus 2402A/B, Calculus 2502A/B; plus one of Mathematics 1600A/B**, Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B,** or the former ~~Linear Algebra 1600A/B, or~~ Applied Mathematics 1411A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

APPLIED MATHEMATICS 3813A/B
NONLINEAR ORDINARY DIFFERENTIAL EQUATIONS AND CHAOS
Existence and uniqueness of solutions, phase space, singular points, stability, periodic attractors, Poincaré-Bendixson theorem, examples from physics, biology and engineering, frequency (phase) locking, parametric resonance, Floquet theory, stability of periodic solutions, strange attractors and chaos, Lyapunov exponents, chaos in nature, fractals.

Prerequisite(s): Applied Mathematics 2402A/B ~~or the former Differential Equations 2402A~~; Calculus 2303A/B or Calculus ~~2503A/B~~ **2502A/B; ~~and~~ plus one of** Mathematics 1600A/B**, Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B,** or the former **Applied Mathematics 1411A/B** ~~Linear Algebra 1600A/B~~.

Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

APPLIED MATHEMATICS 3815A/B
PARTIAL DIFFERENTIAL EQUATIONS I
Boundary value problems for Laplace, heat, and wave equations; derivation of equations; separation of variables; Fourier series; Sturm-Liouville Theory; eigenfunction expansions; cylindrical and spherical problems; Legendre and Bessel functions; spherical harmonics; Fourier and Laplace transforms.

Prerequisite(s): (i) **One of** Mathematics 1600A/B**, Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B, or the former Applied Mathematics 1411A/B**; Applied Mathematics 2402A/B; Calculus 2303A/B or Calculus 2503A/B; or (ii) Calculus 2402A/B and Statistical Sciences 2503A/B. In each course a minimum mark of 60% is required.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

CALCULUS 2502A/B
ADVANCED CALCULUS I
Differential calculus of functions of several variables: level curves and surfaces; limits; continuity; partial derivatives; total differentials; Jacobian matrix; chain rule; implicit functions; inverse functions; curvilinear coordinates; derivatives; the Laplacian; Taylor Series; extrema; Lagrange multipliers; vector and scalar fields; divergence and curl.

Antirequisite(s): Calculus 2302A/B.
Prerequisite(s): A minimum mark of 60% in one of Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, or a minimum mark of 85% in Calculus 1301A/B. Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B. Pre-or Corequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B** or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

DATA SCIENCE 2100A
MATHEMATICS FOR DATA SCIENCE
Mathematical background for students wanting to take Data Science 3000A/B, but missing background in linear algebra and calculus. Vector and matrix algebra, norms, linear dependence, inverses, vector spaces, eigenvectors and eigenvalues, Gradients, Hessians, basics of optimization. All concepts are explained in the context of data science examples.

Antirequisite(s): Mathematics 1600A/B, **Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B, the former** Applied Mathematics 1411A/B.
Prerequisite(s): 1.0 courses from Mathematics, Calculus, or Applied Mathematics (1000 and higher) with a minimal grade of 60%. Data Science 2000A/B or Integrated Science 2002B can be used to fulfil 0.5 of the requirements.
Extra Information: 3 lecture hours/week, 1 tutorial hour/week.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 1120A/B
FUNDAMENTAL CONCEPTS IN MATHEMATICS
Primarily for students interested in pursuing a degree in one of the mathematical sciences. Logic, set theory, relations, functions and operations, careful study of the integers, discussion of the real and complex numbers, polynomials, and infinite sets.

Antirequisite(s): Mathematics 2155F/G.
Prerequisite(s): ~~One or more of~~ Ontario Secondary School MCV4U **or equivalent**~~, Mathematics 1600A/B~~.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 1229A/B
METHODS OF MATRIX ALGEBRA
Matrix algebra including vectors and matrices, linear equations, determinants. This course is intended primarily for students in the Social Sciences, but may meet minimum requirements for some Science modules.

Antirequisite(s): ~~Applied Mathematics 2811B,~~ Mathematics 1600A/B, **Mathematics 1700A/B,** ~~Mathematics 2120A/B,~~ Mathematics 2155F/G, Mathematics 2211A/B, Numerical and Mathematical Methods 1411A/B, ~~or~~ the former Applied Mathematics 1411A/B**, the former Applied Mathematics 2811A/B, the former Mathematics 2120A/B**.
Prerequisite(s): One or more of Ontario Secondary School MCF3M, MCR3U, or equivalent.
Extra Information: 2 lecture hours, 1 tutorial hour (Main campus); 3 lecture hours (Huron, King's).
Course Weight: 0.50

Administrative Note: Mathematics 1229A/B is also offered by Huron University College and King's University College. The antirequisite change will also apply to the offerings at those campuses.

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 1600A/B
LINEAR ALGEBRA I
Complex numbers; vectors, lines and planes; solving linear systems; spanning sets and linear independence; matrix algebra; the fundamental subspaces of a matrix, bases, dimension and rank; introduction to linear transformations; determinants; eigenvalues and eigenvectors; similarity and diagonalization; Markov chains and other applications. ~~Properties and applications of vectors; matrix algebra; solving systems of linear equations; determinants; vector spaces; orthogonality; eigenvalues and eigenvectors.~~

Antirequisite(s): **Mathematics 1700A/B,** Numerical and Mathematical Methods 1411A/B, Applied Mathematics 2811A/B, the former Applied Mathematics 1411A/B.
Prerequisite(s): One or more of Ontario Secondary School MCV4U, Mathematics 1229A/B, **Mathematics 1120A/B,** Calculus 1000A/B or Calculus 1500A/B. Calculus 1000A/B or Calculus 1500A/B may be taken as a pre-or corequisite.
Extra Information: 3 lecture hours **(Main Campus, Huron); 4 hours (King's)**~~, 1 laboratory hour~~.
Course Weight: 0.50

Administrative Note:

Mathematics 1600A/B is also offered by Huron University College and King's University College. The changes to the course description, antirequisites and prerequisites will apply to the offerings at all campuses (i.e., Main Campus, Huron, King's). The change to three lecture hours will apply to Main Campus and Huron University College only. King's University College will maintain "4 hours".

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 2155F/G
MATHEMATICAL STRUCTURES
This course provides an introduction to logical reasoning and proofs. Topics include sets, counting (permutations and combinations), mathematical induction, relations and functions, partial order relations, equivalence relations, binary operations, elementary group theory and applications to error-correcting codes.

Antirequisite(s): Mathematics 2151A/B.
Prerequisite(s): 1.0 course from: Mathematics 1120A/B, Mathematics 1600A/B, **Mathematics 1700A/B,** Numerical and Mathematical Methods 1412A/B, Numerical and Mathematical Methods 1414A/B, Calculus 1000A/B, Calculus 1500A/B, Calculus 1301A/B, Calculus 1501A/B, the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, in each case with a minimum mark of 60%; or permission of the department. Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 2250A/B
HISTORY OF MATHEMATICS
This course will provide a historical overview of the emergence of Mathematics and its impacts. Topics include: the origins of counting, Mathematics in the Ancient World (numbers, geometry, axioms); the emergence of algebra, analytic geometry and calculus (15th – 17th century); explosive modern growth (18th – 21st century).

Prerequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3020A/B
INTRODUCTION TO ABSTRACT ALGEBRA
Properties of integers, rational, real and complex numbers: commutativity, associativity, distributivity. Polynomials, prime and irreducible elements. Rings, ideals, integral and Euclidean domains, fields, and unique factorization. First isomorphism theorem, quotient rings and finite fields. Introduction to groups.

Prerequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B;** ~~and~~ **plus** one of ~~Mathematics 1120A/B, Mathematics 2120A/B, Mathematics 2124A/B,~~ Mathematics 2151A/B, Mathematics 2155F/G **(recommended)**~~, Applied Mathematics 2811A/B,~~ **or** Computer Science 2214A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3120A/B
GROUP THEORY
An introduction to the theory of groups: cyclic, dihedral, symmetric, alternating; subgroups, quotient groups, homomorphisms, cosets, Lagrange's theorem, isomorphism theorems; group actions, class equation, p-groups, Sylow theorems; direct and semidirect products, wreath products, finite abelian groups; Jordan-Hölder theorem, commutator subgroup, solvable and nilpotent groups; free groups, generators and relations.

Prerequisite(s): Mathematics 3020A/B (recommended); or **one of** Mathematics 1600A/B **or Mathematics 1700A/B** and one of Mathematics 1120A/B, **Mathematics 2700A/B,** ~~Mathematics 2120A/B,~~ Mathematics 2124A/B, Mathematics 2155F/G, **the former** Applied Mathematics 2811A/B**, or the former Mathematics 2120A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3123A/B
DIFFERENTIAL EQUATIONS
Rigorous introduction to ordinary differential equations. Existence, uniqueness, and continuation of solutions. Linear systems with constant coefficients. Flows and dynamical systems. Series solutions.

Prerequisite(s): ~~2.0~~ **1.5** courses: Calculus 2503A/B; Mathematics 3122A/B; ~~Mathematics 2120A/B; or Applied Mathematics 2811A/B~~ **plus one of Mathematics 2700A/B, the former Applied Mathematics 2811A/B, or the former Mathematics 2120A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3152A/B
COMBINATORIAL MATH
Enumeration, recursion and generating functions, linear programming, Latin squares, block designs, binary codes, groups of symmetries, orbits, and counting.

Prerequisite(s): 0.5 course from: **Mathematics 2700A/B,** ~~Mathematics 2120A/B,~~ Mathematics 2155F/G, Mathematics 2211A/B, **the former** Applied Mathematics 2811A/B, **the former Mathematics 2120A/B,** or permission of the Department.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3154A/B
INTRODUCTION TO ALGEBRAIC CURVES
Geometry of algebraic curves over the rational, real and complex fields. Classification of affine conics, singularities, intersection numbers, tangents, projective algebraic curves, multiplicity of points, flexes. Some discussion of cubic curves.

Prerequisite(s): ~~Mathematics 1600A/B,~~ **Mathematics 2700A/B or the former** Mathematics 2120A/B; one of Mathematics 2122A/B, Mathematics 2124A/B, Mathematics 2155F/G, **Mathematics 3700A/B** or **the former** Mathematics 3121A/B; an additional 0.5 course in Mathematics, Applied Mathematics, Calculus at the 2100 level or above.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3157A/B
INTRODUCTION TO GAME THEORY
A first course in the mathematical theory of games. Topics begin with the modelling of games: extensive and strategic forms; perfect information; chance. Sprague-Grundy theory of impartial combinatorial games. Modelling preferences with utility functions. Nash equilibria, analysis of two-player games.

Prerequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B**, Calculus 1301A/B or Calculus 1501A/B, and one of Mathematics 1120A/B, ~~Mathematics 2120A/B,~~ Mathematics 2122A/B, Mathematics 2124A/B**,** ~~or~~ Mathematics 2155F/G**,** ~~or~~ **Mathematics 2700A/B, the former Mathematics 2120A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 3159A/B
INTRODUCTION TO CRYPTOGRAPHY
Modern cryptological algorithms will be discussed with an emphasis placed on their mathematical foundation. Main topics will include: basic number theory, complexity of algorithms, symmetric-key cryptosystems, public-key cryptosystems, RSA encryption, primality and factoring, discrete logarithms, elliptic curves and information theory.

Prerequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B** and one of ~~Mathematics 2120A/B,~~ Mathematics 2124A/B, Mathematics 2151A/B, Mathematics 2155F/G, **Mathematics 2700A/B,** Mathematics 3150A/B, ~~Applied Mathematics 2811A/B, or~~ Computer Science 2214A/B**, the former Applied Mathematics 2811A/B, the former Mathematics 2120A/B**.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 4123A/B
RINGS AND MODULES
Rings: fractions and localization, Chinese Remainder Theorem, factorization in commutative rings, Euclidean algorithm, PIDs, algebraic integers, polynomials and formal power series, factorization in polynomial rings; Modules: generation, direct products and sums, freeness, presentations, tensor algebras, exact sequences, projectivity, injectivity, Hom and duality, Zorn's Lemma, chain conditions, modules over PIDs.

Prerequisite(s): Mathematics 3020A/B.

Extra Information: 3 lecture hours. Note: It is recommended that **Mathematics 3700A/B or the former** Mathematics 3121A/B ~~(or the former Math 2121A/B)~~ be taken before or concurrently with Mathematics 4123A/B.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

MATHEMATICS 4154A/B
FUNCTIONAL ANALYSIS
Hilbert spaces: L^2 spaces, orthogonal complements, dual spaces, Riesz representation theorem, the Fredholm alternative, spectral resolution of compact normal operators. Banach spaces: Hahn-Banach theorem, bounded linear operators, adjoints, closed graph and Banach Steinhaus theorems.

Prerequisite(s): **Mathematics 2700A/B or the former** Mathematics 2120A/B, Mathematics 3122A/B. Pre-or Corequisite(s): Mathematics 3124A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

APPLIED MATHEMATICS 2811A/B
LINEAR ALGEBRA II
Vector space examples. Inner products, orthogonal sets including Legendre polynomials, trigonometric functions, wavelets. Projections, least squares, normal equations, Fourier approximations. Eigenvalue problems, diagonalization, defective matrices. Coupled difference and differential equations; applications such as predator-prey, business competition, coupled oscillators. Singular value decomposition, image approximations. Linear transformations, graphics.

Prerequisite(s): (Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, or Mathematics 1600A/B) and (Numerical and Mathematical Methods 1414A/B or Calculus 1301A/B or Calculus 1501A/B, or the former Applied Mathematics 1413 or the former Applied Mathematics 1414A/B). Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

MATHEMATICS 2120A/B
INTERMEDIATE LINEAR ALGEBRA
A rigorous development of lines and planes in Rn; linear transformations and abstract vector spaces. Determinants and an introduction to diagonalization and its applications including the characteristic polynomials, eigenvalues and eigenvectors.

Antirequisite(s): The former Mathematics 2211A/B.
Prerequisite(s): Mathematics 1600A/B.
Extra Information: 3 lecture hours, 1 tutorial hour.
Course Weight: 0.50

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

MATHEMATICS 3121A/B
ADVANCED LINEAR ALGEBRA
A continuation of the material of Mathematics 2120A/B including properties of complex numbers and the principal axis theorem; singular value decomposition; linear groups; similarity; Jordan canonical form; Cayley-Hamilton theorem; bilinear forms; Sylvester's theorem.

Prerequisite(s): Mathematics 2120A/B.
Extra Information: 3 lecture hours.
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN APPLIED MATHEMATICS

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.0 principal courses, including 0.5 course from Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, the former Applied Mathematics 1412A/B, and 0.5 course from Calculus 1301A/B (with a mark of at least 85%), Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics 1414A/B, plus 2.0 additional courses, with no mark in these principal courses below 60%. The former Applied Mathematics 1413 may be substituted for the 1.0 Calculus course requirements.

One of Mathematics 1700A/B (recommended), Mathematics 1600A/B, ~~or~~ Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, with a mark of at least 60% and completed by the end of Term 1 in Year 2.

Module
9.0 courses:

0.5 course from: Mathematics 2700A/B, the former Applied Mathematics 2811A/B.
~~2.5~~ **2.0** courses: ~~Applied Mathematics 2811A/B,~~ Applied Mathematics 2814F/G, Applied Mathematics 3811A/B, Applied Mathematics 3815A/B, Mathematics 2155F/G.
0.5 course from: Applied Mathematics 3813A/B, Applied Mathematics 4815A/B, Numerical and Mathematical Methods 4617A/B or the former Applied Mathematics 4617A/B.
1.0 course: Calculus 2502A/B**,** ~~and~~ Calculus 2503A/B.
0.5 course: Applied Mathematics 2402A/B.
0.5 course from: Mathematics 2122A/B, Mathematics 3020A/B, Mathematics 3120A/B.
0.5 course: Statistical Sciences 2857A/B.
1.5 additional courses from: Financial Modelling 3613A/B, Financial Modelling 3817A/B, Mathematics 2124A/B, Mathematics 2156A/B, Mathematics 3152A/B, Mathematics 3153A/B, Mathematics 3157A/B, Mathematics 3159A/B, Physics 3151A/B, Physics 3926F/G, Statistical Sciences 2858A/B, Statistical Sciences 3657A/B or any course in Applied Mathematics, Data Science, or Numerical and Mathematical Methods at the 3000 level or above. Note that some of these courses have prerequisites that are not part of the module.
1.0 additional course in Applied Mathematics, Mathematics, or Numerical and Mathematical Methods at the 2100 level or above.
1.0 additional course in Applied Mathematics or Numerical and Mathematical Methods at the 4000 level or above.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN APPLIED MATHEMATICS

Admission Requirements

Completion of first-year requirements, including 0.5 course from Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, the former Applied Mathematics 1412A/B, and 0.5 course from Calculus 1301A/B (with a mark of at least 85%), Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics 1414A/B. The

former Applied Mathematics 1413 may be substituted for the 1.0 Calculus course requirement. Each of these courses requires a minimum mark of 60%.

One of Mathematics 1700A/B (recommended), Mathematics 1600A/B, ~~or~~ Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, with a mark of at least 60% and completed by the end of Term 1 in Year 2.

Module
6.0 courses:

0.5 course from: Mathematics 2700A/B, the former Applied Mathematics 2811A/B.
~~2.5~~ **2.0** courses: ~~Applied Mathematics 2811A/B,~~ Applied Mathematics 2814F/G, Applied Mathematics 3811A/B, Applied Mathematics 3815A/B, Mathematics 2155F/G.
1.0 course: Calculus 2502A/B**,** ~~and~~ Calculus 2503A/B.
0.5 course: Applied Mathematics 2402A/B.
0.5 course from: ~~Mathematics 2120A/B,~~ Mathematics 2122A/B, Mathematics 3020A/B, Mathematics 3120A/B**, the former Mathematics 2120A/B**.
0.5 course: Statistical Sciences 2857A/B.
0.5 course from: Applied Mathematics 3813A/B, Applied Mathematics 4815A/B, Numerical and Mathematical Methods 4617A/B**,** ~~or~~ the former Applied Mathematics 4617A/B.
0.5 additional course from: Financial Modelling 3613A/B, Financial Modelling 3817A/B, Mathematics 2124A/B, Mathematics 2156A/B, Mathematics 3152A/B, Mathematics 3153A/B, Mathematics 3157A/B, Mathematics 3159A/B, Statistical Sciences 2858A/B, or any course in Applied Mathematics, Data Science, or Numerical and Mathematical Methods at the 3000 level or above.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN MATHEMATICS

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.0 principal courses, including:

0.5 course: Calculus 1000A/B or Calculus 1500A/B;

0.5 course: ~~(~~Calculus 1501A/B (recommended) or ~~(~~Calculus 1301A/B with a mark of at least 85%~~)~~;

plus 2.0 additional courses, with no mark in these principal courses below 60%. ~~Mathematics 1600A/B,~~ **(Mathematics 1600A/B or Mathematics 1700A/B)** and Mathematics 1120A/B, if taken in first year, will count toward the 3.0 principal courses. Mathematics 1120A/B and Mathematics ~~1600A/B~~ **1700A/B** are recommended.

~~Note: Mathematics 1600A/B must be completed prior to Mathematics 2120A/B.~~

Note: One of Mathematics 1600A/B, Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B must be completed prior to Mathematics 2700A/B. Consequently, the preferred option here must be completed by the end of Term 1 in Year 2.

Module
9.0 courses:

0.5 course from: Mathematics 2700A/B, the former Mathematics 2120A/B.
~~4.5~~ **4.0** courses: Calculus 2502A/B, Calculus 2503A/B, ~~Mathematics 2120A/B,~~ Mathematics 2122A/B, Mathematics 2155F/G, Mathematics 3020A/B, Mathematics 3120A/B, Mathematics 3122A/B, Mathematics 3124A/B.
1.0 course~~s~~ from: Statistical Sciences 2857A/B, Statistical Sciences 2858A/B, or any courses in Actuarial Science, Applied Mathematics, Data Science, Financial Modelling or Numerical and Mathematical Methods at the 2100 level or above.
2.5 additional courses from: Mathematics 2124A/B, Mathematics 2156A/B or any courses in Mathematics at the 3000 level or above.
1.0 additional course in Mathematics at the 4000 level.

It is strongly recommended that Mathematics 2122A/B be completed in the year of entry into the module.

Note: Those students who plan to apply for graduate studies in Mathematics should take Mathematics 4120A/B, Mathematics 4121A/B, Mathematics 4122A/B, Mathematics 4123A/B, and at least one of Mathematics 4151A/B, Mathematics 4152A/B, Mathematics 4153A/B or Mathematics 4156A/B.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN MATHEMATICS

Admission Requirements

Completion of first-year requirements, including:

0.5 course: A mark of at least 60% in Calculus 1000A/B or Calculus 1500A/B.

0.5 course: A mark of at least 60% in Calculus 1501A/B (recommended) or a mark of at least 85% in Calculus 1301A/B. (Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/B), or the former Applied Mathematics 1413 (each with a mark of at least 60%) may be used to replace the 1.0 Calculus course requirement.

Mathematics 1120A/B and Mathematics ~~1600A/B~~ **1700A/B** are recommended.

Note: one of Mathematics 1600A/B, **Mathematics 1700A/B,** Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B must be completed prior to **Mathematics 2700A/B** ~~Applied Mathematics 2811A/B and Mathematics 1600A/B must be completed prior to Mathematics 2120A/B~~. **Consequently, the preferred option here must be completed by the end of Term 1 in Year 2.**

Module
9.0 courses:

1.0 course ~~from~~**:** Calculus 2502A/B**,** ~~and~~ Calculus 2503A/B.
~~0.5 course from: Applied Mathematics 2811A/B or Mathematics 2120A/B or the former Mathematics 2211A/B.~~
0.5 course from: Mathematics 2700A/B, the former Applied Mathematics 2811A/B, the former Mathematics 2120A/B.
0.5 course: Mathematics 2155F/G.
0.5 course **from:** Applied Mathematics 2814F/G**,** ~~or~~ Mathematics 2122A/B.
0.5 additional course from: Mathematics 2122A/B, Mathematics 3020A/B, Mathematics 3120A/B.
1.0 additional course from: Statistical Sciences 2857A/B, Statistical Sciences 2858A/B, Statistical Sciences 3657A/B or any courses in Applied Mathematics or Numerical and Mathematical Methods at the 2100 level or above.
2.5 additional courses from: Physics 3151A/B, Physics 3926F/G, or any courses in Actuarial Science, Applied Mathematics, Data Science, Financial Modelling, Mathematics, Numerical and Mathematical Methods or Statistical Sciences at the 2100 level or above.
2.5 additional courses from: courses in Applied Mathematics, Mathematics or Numerical and Mathematical Methods at the 3000 level or above.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN MATHEMATICS

Admission Requirements

Completion of first-year requirements with no mark below 60% in 3.0 principal courses, including:

0.5 course: Calculus 1000A/B or Calculus 1500A/B;

0.5 course: (Calculus 1501A/B (recommended)) or (Calculus 1301A/B with a mark of at least 85%), plus 2.0 additional courses.

~~Mathematics 1600A/B,~~ **(Mathematics 1600A/B or Mathematics 1700A/B)** and Mathematics 1120A/B, if taken in first year, will count toward the 3.0 principal courses. Mathematics 1120A/B and Mathematics ~~1600A/B~~ **1700A/B** are recommended.

~~Note: Mathematics 1600A/B must be completed prior to Mathematics 2120A/B.~~

Note: One of Mathematics 1600A/B, Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B must be completed prior to Mathematics 2700A/B. Consequently, the preferred option here must be completed by the end of Term 1 in Year 2.

Module
6.0 courses:

0.5 course from: Mathematics 2700A/B, the former Mathematics 2120A/B.
~~3.0~~ **2.5** courses: Calculus 2502A/B, Calculus 2503A/B, ~~Mathematics 2120A/B,~~ Mathematics 2122A/B, Mathematics 2155F/G, Mathematics 3020A/B.
0.5 course from: Statistical Sciences 2857A/B or any course in Actuarial Science, Applied Mathematics, Data Science, Financial Modelling or Numerical and Mathematical Methods at the 2100 level or above
1.0 additional course from: Statistical Sciences 2857A/B, Statistical Sciences 2858A/B, Statistical Sciences 3657A/B, or any courses in Mathematics, Actuarial Science, Applied Mathematics, Data Science, Financial Modelling or Numerical and Mathematical Methods at the 2100 level or above.
1.5 additional courses in Mathematics at the 3000 level or above.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MINOR IN MATHEMATICS

Admission Requirements

Completion of first-year requirements, including:

0.5 course: A mark of at least 60% in Calculus 1000A/B or Calculus 1500A/B.

0.5 course: A mark of at least 60% in Calculus 1501A/B (recommended) or a mark of at least 85% in Calculus 1301A/B. (Numerical and Mathematical Methods 1412A/B and Numerical and Mathematical Methods 1414A/B) or (the former Applied Mathematics 1412A/B and Applied Mathematics 1414A/B) or the former Applied Mathematics 1413 (each with a mark of at least 60%) may be used to replace the 1.0 Calculus course requirement.

Mathematics 1120A/B and Mathematics ~~1600A/B~~ **1700A/B** are recommended.

Students with a complete first year that does not meet the above requirements may be admitted after a second-year half-course in Calculus with a mark of at least 60%.

Module

4.0 courses:

0.5 course **from**: **Mathematics 2700A/B, the former** Mathematics 2120A/B ~~or the former Mathematics 2211A/B~~.
0.5 course from: Calculus 2302A/B, Calculus 2402A/B**,** ~~or~~ Calculus 2502A/B.
0.5 course from: Applied Mathematics 2402A/B, Applied Mathematics 2814F/G, Calculus 2303A/B, Calculus 2503A/B, ~~or~~ Mathematics 2122A/B**.**
2.5 additional courses from: Earth Sciences 2222A/B, Economics 2122A/B, Economics 2123A/B, Economics 2141A/B, Economics 2210A/B, Economics 2222A/B, Economics 2223A/B, Economics 3310A/B, Philosophy 2250, Philosophy 2251F/G, Philosophy 2252W/X, Philosophy 2254A/B, **the former** Philosophy 3201A/B, any Actuarial Science, Applied Mathematics, Computer Science, Data Science, Financial Modelling, Mathematics, Numerical and Mathematical Methods, or Statistical Sciences course at the 2000 level or above. Note that some of these courses have prerequisites that are not part of the module.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN MATHEMATICAL AND STATISTICAL SCIENCES

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.0 principal courses, including 0.5 course from Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B, the former Applied Mathematics 1412A/B, and 0.5 course from Calculus 1301A/B **(with a mark of at least 85%)**, Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics 1414A/B, plus 2.0 additional courses, with no mark in these principal courses below 60%. The former Applied Mathematics 1413 may be substituted for the 1.0 Calculus course requirements.

~~Students who take Calculus 1301A/B must have a mark of at least 85% in the course.~~

One of Mathematics 1700A/B (recommended), Mathematics 1600A/B, ~~or~~ Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, with a mark of at least 60% and completed by the end of Term 1 in Year 2.

Statistical Sciences 1023A/B, while not required, will be useful for students in this module**.**

Module
10.0 courses:

0.5 course **from**: **Mathematics 2700A/B, the former** Mathematics 2120A/B**,** ~~or~~ **the former** Applied Mathematics 2811A/B.
5.0 courses ~~from~~: Applied Mathematics 2402A/B, Applied Mathematics 2814F/G, Applied Mathematics 3815A/B, Calculus 2502A/B, Calculus 2503A/B, Mathematics 2122A/B, Mathematics 2155F/G, Mathematics 3020A/B, Statistical Sciences 2857A/B, Statistical Sciences 2858A/B.
0.5 course **from**: Applied Mathematics 3811A/B**,** ~~or~~ Mathematics 3124A/B.
0.5 course in Applied Mathematics at the 2100 level or above.
0.5 course in Mathematics at the 2100 level or above.
1.5 courses in Statistical Sciences, Actuarial Science or Financial Modeling at the 2100 level or above.
1.5 courses in Actuarial Sciences, Applied Mathematics, Financial Modelling, Mathematics, or Statistical Sciences at the 3000 level or above.

Note: It is strongly recommended that Mathematics 2122A/B be completed in the year of entry into the module. Students intending to pursue graduate studies in Pure Mathematics should take the Honours Specialization in Mathematics module. Students intending to pursue graduate studies in Statistical Sciences, Actuarial Science or Financial Modeling should take Statistical Sciences 3657A/B and Statistical Sciences 3858A/B, and consult the graduate page of the Department of Statistical and Actuarial Sciences website for additional requirements pertaining to their respective fields of study.

DEPARTMENT OF PHYSICS AND ASTRONOMY

Course Revision – Effective September 1, 2024, the following change(s) be made:

ASTRONOMY 2021A/B
THE SEARCH FOR LIFE IN THE UNIVERSE
This course ~~is designed for non-science students as an introduction to~~ **introduces** current scientific thinking on the possibility of extraterrestrial life and intelligence. **It is suitable for non-science students.** ~~Ideas, observations, and experiments from the frontiers of many areas of science converge in this unique interdisciplinary field.~~ Emphasis will be on topics of current interest, including searches for life in our Solar System, detection of extrasolar planets, and the origins of life on Earth.

~~Antirequisite(s): Physics 1101A/B, Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1028A/B, the former Physics 1301A/B.~~
Extra Information: 3 lecture hours. **This course cannot be used for credit in any Physics and Astronomy module other than the Minor in Conceptual Astronomy.**
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ASTRONOMY 2022A/B
THE ORIGIN OF THE UNIVERSE
This course is designed ~~for non-science students~~ as an introduction to current ideas about the universe. **It is suitable for non-science students.** Topics include the Big Bang, cosmic microwave background, origin of elements, and origin of galaxies, stars, and planetary systems.

Antirequisite(s): **Astronomy 4602A/B,** Earth Sciences 1086F/G~~, Physics 1101A/B, Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1028A/B, the former Physics 1301A/B~~.

Extra Information: 2 lecture hours. **This course cannot be used for credit in any Physics and Astronomy module other than the Minor in Conceptual Astronomy.**
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

PHYSICS 2110A/B
OSCILLATIONS AND WAVES
A unified treatment of oscillatory and wave motion, with examples from mechanics, electromagnetism, optics and materials science. Topics include simple harmonic motion, forced oscillations and resonance, coupled oscillations, transverse waves on strings and in crystals, longitudinal waves in gases and solids, electromagnetic waves, Fourier methods, nonlinear oscillations and chaos.

Prerequisite(s): Physics 1201A/B or Physics 1401A/B or Physics 1501A/B or the former Physics 1301A/B, each with a minimum mark of 60%, or the former Physics 1028A/B with a minimum mark of 80%; Physics 1202A/B or Physics 1402A/B or Physics 1502A/B or the former Physics 1302A/B, each with a minimum mark of 60%, or the former Physics 1029A/B with a minimum mark of 80%; a minimum mark of 60% in each of (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Calculus 1301A/B or Calculus 1501A/B or Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/B), or in the former Applied Mathematics 1413. Integrated Science 1001X with a minimum mark of 60% can be used in place of Physics 1202A/B and Calculus 1301A/B. Pre-or Corequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B** or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B.
Extra Information: 3 lecture hours, 2 laboratory/tutorial hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

PHYSICS 3200A/B
QUANTUM MECHANICS 1
The Schrodinger equation in one dimension, wave packets, stationary states, the harmonic oscillator, the postulates of Quantum Mechanics, operators and eigenvalue equations, angular momentum, the hydrogen atom.

Antirequisite(s): Chemistry 3374A/B.
Prerequisite(s): Mathematics 1600A/B **or Mathematics 1700A/B** or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B; Physics 2101A/B and Physics 2102A/B; Physics 2110A/B.

Extra Information: 3 lecture hours.
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

MINOR IN CONCEPTUAL ASTRONOMY

This ~~minor~~ **Minor** is especially designed for students with a general interest in Astronomy. **Students enrolled in any other module offered by the Department of Physics and Astronomy cannot simultaneously be enrolled in this Minor**. ~~It is not intended for students considering a Major or Honours Specialization in Astrophysics.~~

Admission Requirements

Completion of first-year requirements.

Module
4.0 courses:

~~1.5~~ **1.0** course~~s~~: Astronomy 2021A/B, Astronomy 2022A/B~~, Astronomy 2232F/G~~.
0.5 course from: **Astronomy 2232F/G, Earth Sciences 2232F/G.**
0.5 course: Physics 2070A/B.
~~1.0~~ **0.5** course at the 2000 level or above from the Faculty of Science.
~~1.0~~ **1.5** course from: **Astronomy 2201A/B, Astronomy 2801A/B**, **Earth Sciences 2200A/B**, **Earth Sciences 2240F/G, Earth Sciences 3001A/B, Earth Sciences 3312A/B**, **Earth Sciences 3321A/B,** Geography 2153A/B~~, the former Geography 2151A/B, the former Geography 3312A/B, or a course at the 2000 level or above from the Faculty of Science~~.

Note: Some courses listed in this module have prerequisites not included in the module.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN ASTROPHYSICS

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.5 principal courses, with no mark in these principal courses below 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 85% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Sciences 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN ASTROPHYSICS

Admission Requirements

Completion of first-year requirements including the following 3.5 courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Sciences 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN ASTROPHYSICS

Admission Requirements

Completion of first-year requirements including the following 2.0 courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B with a minimum mark of 55% by the end of Term 1 in Year 2.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN MEDICAL PHYSICS

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.5 principal courses, each with a mark of at least 60%

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 85% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Science 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN MEDICAL PHYSICS

Admission Requirements

Completion of first-year requirements including the following 3.5 courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics

1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Science 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN MEDICAL PHYSICS

Completion of first-year requirements including the following 2.0 courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B with a minimum mark of 55% by the end of Term 1 in Year 2.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN PHYSICS

Admission Requirements

Completion of first-year requirements with no failures. Students must have an average of at least 70% in 3.5 principal courses, with no mark in these principal courses below 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 85% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Science 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN PHYSICS

Admission Requirements

Completion of first-year requirements including the following 3.5 courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics

1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

0.5 course **from**: **Mathematics 1700A/B,** Mathematics 1600A/B**,** ~~or~~ Numerical and Mathematical Methods 1411A/B**,** ~~or~~ the former Applied Mathematics 1411A/B.

0.5 additional course from the Faculty of Science. It is highly recommended that students complete one of the following: Chemistry 1301A/B, Chemistry 1302A/B, Computer Science 1025A/B or Computer Science 1026A/B, Data Science 1000A/B or the former Statistical Sciences 1024A/B.

0.5 additional course.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN PHYSICS

Completion of first-year requirements including the following courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

1.0 additional course, at least 0.5 of which must be from the Faculty of Science.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B or Numerical and Mathematical Methods 1411A/B or the former Applied

Mathematics 1411A/B with a minimum mark of 55% by the end of Term 1 in Year 2.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MINOR IN PHYSICS

Completion of first-year requirements including the following courses, each with a mark of at least 60%:

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B, the former Physics 1301A/B or 80% in the former Physics 1028A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B, the former Physics 1302A/B or 80% in the former Physics 1029A/B).

1.0 course: (Calculus 1000A/B or Calculus 1500A/B or Numerical and Mathematical Methods 1412A/B) and (Calculus 1501A/B (recommended) or Calculus 1301A/B with a minimum mark of 70% or Numerical and Mathematical Methods 1414A/B); or the former Applied Mathematics 1413 or the former Applied Mathematics 1412A/B and the former Applied Mathematics 1414A/B.

1.0 additional course, at least 0.5 of which must be from the Faculty of Science.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B or Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B with a minimum mark of 55% by the end of Term 1 in Year 2.

Program Revision – Effective September 1, 2024, the following change(s) be made:

MAJOR IN SCIENTIFIC COMPUTING AND NUMERICAL METHODS

Admission Requirements

Completion of first-year requirements including the following courses, each with a mark of at least 60%:

1.0 course from: (Calculus 1000A/B, Calculus 1500A/B, Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B) and (Calculus 1301A/B, Calculus 1501A/B (recommended), Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/B); or the former Applied Mathematics 1413.

1.0 course from: (Physics 1201A/B, Physics 1401A/B, Physics 1501A/B or the former Physics 1301A/B) and (Physics 1202A/B, Physics 1402A/B, Physics 1502A/B or the former Physics 1302A/B).
1.0 course from: Computer Science 1025A/B or Computer Science 1026A/B and Computer Science 1027A/B.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B or Numerical and Mathematical Methods 1411A/B ~~or the former Linear Algebra 1600A/B~~ with a minimum mark of 55% by the end of Term 1 in Year 2.

Module
6.0 courses:

0.5 course: Applied Mathematics 2814F/G.
0.5 course from: Calculus 2302A/B**,** ~~or~~ Calculus 2502A/B.
0.5 course from: Calculus 2303A/B**,** ~~or~~ Calculus 2503A/B.
0.5 course: Applied Mathematics 2402A/B.
0.5 course **from**: Physics 3926F/G**,** ~~or~~ the former Applied Mathematics 3911F/G.
0.5 course from: ~~Numerical and Mathematical Methods 3415A/B or the former Applied Mathematics 3415A/B,~~ Applied Mathematics 3815A/B, **Numerical and Mathematical Methods 3415A/B,** Physics 3151A/B**,**~~; or~~ the former Applied Mathematics 3413A/B**, the former Applied Mathematics 3415A/B**.
1.0 course from: EITHER Statistical Sciences 2141A/B and 0.5 course at the 2100 level or above in Applied Mathematics, Mathematics, Numerical and Mathematical Methods, Physics or Statistical and Actuarial Science, OR Statistical Sciences 2857A/B and Statistical Sciences 2858A/B.
1.0 course: Computer Science 2210A/B, Computer Science 2211A/B.
1.0 course from: Applied Mathematics 4264A/B, Applied Mathematics 4615F/G*, Applied Mathematics 4815A/B, Chemistry 3300A/B*, Chemistry 4424A/B, Numerical and Mathematical Methods 4613A/B**, Numerical and Mathematical Methods 4617A/B, Numerical and Mathematical Methods 4817A/B*, Physics 2300A/B, Physics 4910F/G****, the former Applied Mathematics 4613A/B, the former Applied Mathematics 4617A/B, the former Applied Mathematics 4817A/B, the former Chemistry 4444A/B.**

~~1.0 course from: Numerical and Mathematical Methods 4613A/B** or the former Applied Mathematics 4613A/B, Applied Mathematics 4615F/G*, Numerical and Mathematical Methods 4617A/B or the former Applied Mathematics 4617A/B* , Applied Mathematics 4815A/B, Numerical and Mathematical Methods 4817A/B* or the former Applied Mathematics 4817A/B, Applied Mathematics 4264A/B, Chemistry 3300F/G***, Chemistry 4444A/B***, Physics 4910F/G****~~

* May be offered only in odd-numbered academic years.
**May be offered only in even-numbered academic years.
*** Only possible for students who have the appropriate Chemistry prerequisites.
**** Only possible for students who have the appropriate Physics prerequisites.

WESTERN INTEGRATED SCIENCE PROGRAM

Course Revision – Effective September 1, 2024, the following change(s) be made:

INTEGRATED SCIENCE 1001X
EXPLORING SCIENCE
Explore foundational topics in astronomy, biology, chemistry, ~~computer science,~~ earth science, mathematics, and physics through an integrated questions-based approach. Small-group interactions and interdisciplinary laboratory experiments are designed to foster teamwork, interdisciplinary thinking, and the development problem-solving and critical-thinking skills.

Antirequisite(s): Chemistry 1302A/B; Physics 1102A/B, Physics 1202A/B, Physics 1502A/B, the former Physics 1029A/B, and the former Physics 1302A/B; Biology 1002B; Mathematics 1225A/B; Calculus 1301A/B and Calculus 1501A/B~~;~~ ~~Computer Science 1026A/B; Data Science 1200A/B~~.
Prerequisite(s): Enrolment in Year 1 of the Western Integrated Science program and a minimum of 60% in each of Calculus 1000A/B or Calculus 1500A/B; Chemistry 1301A/B; and Physics 1201A/B or Physics 1501A/B or the former Physics 1301A/B.
Extra Information: 13 lecture hours and 10 laboratory/tutorial hours per week.
Course Weight: 2.00

Course Withdrawal – Effective September 1, 2024, the following course be withdrawn:

INTEGRATED SCIENCE 2002B
INTRODUCTION TO DATA SCIENCE
Three basic data science concepts and their corresponding techniques are explored while emphasizing practical data handling and programming skills in Python: Sampling to estimate the properties of a population (Bootstrap), random assignment and experiments to make causal inferences (randomization test), and model selection to enable good predictions (cross-validation).

Antirequisite(s): Computer Science 2034A/B, Computer Science 2035A/B, Data Science 2000A/B.
Prerequisite(s): Enrolment in Year 2 of the Western Integrated Science program; Calculus 1000A/B or Calculus 1500A/B; Integrated Science 1001X.
Extra Information: 2 lecture hours/week, 2 tutorial hours/week
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH ASTROPHYSICS

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
2.0 course: Integrated Science 1001X;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course*** from**: **Mathematics 1700A/B,** Mathematics 1600A/B~~*~~.

~~*~~Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B by the end of Term 1 in Year 2.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E*.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course ~~from~~*: Philosophy 2320F/G ~~(preferred), Philosophy 2033A/B, Philosophy 2035F/G, Philosophy 2078F/G, Philosophy 2370F/G~~.
0.5 course **from**: Science 3377A/B~~**~~.**, Business Administration 1220E****, Business Administration 2257****, Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E***.~~
~~1.0 course: Calculus 2502A/B (preferred) or Calculus 2302A/B, Calculus 2503A/B (preferred) or Calculus 2303A/B.~~
0.5 course from: Calculus 2502A/B (preferred), Calculus 2302A/B.
0.5 course from: Calculus 2503A/B (preferred), Calculus 2303A/B.
0.5 course: Applied Mathematics 2402A/B.
3.5 courses: Physics 2101A/B, Physics 2102A/B, Physics 2110A/B, Physics 2910F/G, Physics 3300A/B, Physics 3926F/G, Physics 4351A/B.
0.5 course from: Physics 3151A/B, Physics 3200A/B, Physics 3400A/B.
1.0 course~~s~~: Astronomy 2201A/B, Astronomy 2801A/B.
1.0 course~~s~~ from: Astronomy 3302A/B, Astronomy 3303A/B, Astronomy 4101A/B, Astronomy 4602A/B.
0.5 course~~s~~ from: any Physics and Astronomy course not yet taken numbered 4000 or above.

Students must also complete Physics 2950Y, Physics 3950Y (non-credit seminar courses).

Notes:

Year 1 consists of 5.5 courses.
* indicates courses taken in Second Year of Program
** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH BIOLOGY

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course: Biology 1001A;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G**, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G***, Integrated Science 3002A/B***, Integrated Science 4001Y****.

1.5 course: Integrated Science 4999E**.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course**: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**~~, **Business Administration 1220E*****, **Business Administration 2257*****, **Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E****.~~
0.5 course: Biochemistry 2280A.
2.5 courses: Biology 2290F/G, Biology 2382A/B, Biology 2483A/B, Biology 2581A/B, Biology 2601A/B.
0.5 course: Chemistry 2213A/B.
0.5 course from: Biology 2244A/B, Statistical Sciences 2244A/B.
4.0 additional courses at the 3000 level or above, chosen from the Department of Biology and the Basic Medical Sciences disciplines*, of which at least 3.0 courses must be chosen from the Department of Biology. At least 1.5 of these 4.0 courses must have a laboratory component.

*Basic Medical Sciences Disciplines: Anatomy and Cell Biology, Biochemistry, Epidemiology and Biostatistics, Medical Biophysics, Microbiology and Immunology, Pathology, Physiology, and Pharmacology.

Notes:
Year 1 consists of 5.5 courses.
** indicates courses taken in Second Year of Program
*** indicates courses taken in Third Year of Program
**** indicates courses taken in Fourth Year of Program
***** **The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH CHEMISTRY

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G, ~~Integrated Science 2002B,~~ Integrated Science 3001F/G, Integrated Science 3002A/B, Integrated Science 4001Y.
1.5 course: Integrated Science 4999E.
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B**, Business Administration 1220E**, Business Administration 2257**, Business Administration 2295F/G**.
~~1.5 course: Integrated Science 4999E.~~
6.0 courses: Chemistry 2271A, Chemistry 2272F, Chemistry 2273A, ~~Chemistry 2374A,~~ **Chemistry 2274A (or the former Chemistry 2374A),** Chemistry 2281G, Chemistry 2283G, ~~Chemistry 2384B,~~ **Chemistry 2284B (or the former Chemistry 2384B),** Chemistry 2370A/B* (or the former Chemistry 3370A/B), Chemistry 3371F, Chemistry 3372F/G, Chemistry 3373F, Chemistry 3374A/B.
1.0 course from: Chemistry 3300A/B, Chemistry 3320A/B, Chemistry 3330F/G, Chemistry 3364A/B, Chemistry 3391A/B, Chemistry 3393A/B.
1.0 course from: 4000-level Chemistry courses.

~~Any 1.5 course selection~~ **Selection** from the above options must include at least 0.5 course from: Chemistry 3391A/B, Chemistry 4493A/B.

Notes:

Year 1 consists of 5.5 courses.

Unless indicated otherwise, courses should be taken in the year corresponding to the first digit of the course number.

* Chemistry 2370A/B should be taken in Year 3 of the Program.
**** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH COMPUTER SCIENCE

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science
website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E*.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course*: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**~~., **Business Administration 1220E****, **Business Administration 2257****, **Business Administration 2295F/G**.
~~1.5 course: Integrated Science 4999E***.~~
0.5 course: Computer Science 2121A/B.
3.5 courses: Computer Science 2208A/B, Computer Science 2209A/B, Computer Science 2210A/B, Computer Science 2211A/B, Computer Science 2212A/B/Y, Computer Science 3305A/B, Computer Science 3307A/B/Y.
0.5 course from: Computer Science 2214A/B, Mathematics 2155F/G.
3.5 additional courses from: Mathematics 2156A/B, Computer Science courses at the 3000 level or above.

Notes:

Year 1 consists of 5.5 courses.

* indicates courses taken in Second Year of Program
** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH EARTH SCIENCES

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G**, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G***, Integrated Science 3002A/B***, Integrated Science 4001Y****.

1.5 course: Integrated Science 4999E**.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course**: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**~~, **Business Administration 1220E*****, **Business Administration 2257*****, **Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E****.~~
3.0 courses: Earth Sciences 2200A/B, Earth Sciences 2201A/B, Earth Sciences 2206A/B, Earth Sciences 2250Y, Earth Sciences 2260A/B, Earth Sciences 2265A/B.
0.5 course from: Earth Sciences 3313A/B, Earth Sciences 3314A/B, Earth Sciences 3315A/B.
1.0 course from: Earth Sciences 2123F/G*, Earth Sciences 2130Y, Earth Sciences 2220A/B, Earth Sciences 2230A/B, Earth Sciences 2240F/G or Earth Sciences 2241A/B.
1.5 additional courses in Earth Sciences at the 2000 level or above.
2.0 additional courses in Earth Sciences at the 3000 level or above.

*If Earth Sciences 1023A/B has been taken, Earth Sciences 2123F/G cannot be taken.

Notes:
Year 1 consists of 5.5 courses.
** indicates courses taken in Second Year of Program
*** indicates courses taken in Third Year of Program
**** indicates courses taken in Fourth Year of Program
***** **The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH ENVIRONMENTAL SCIENCE

Admission Requirements

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;

0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course: Biology 1001A;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E***.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course*: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**.~~**, Business Administration 1220E**** or Business Administration 2257****, Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E***.~~
0.5 course: Biology 2483A/B.
0.5 course: Chemistry 2210A/B.
0.5 course from: Environmental Science 2300F/G, the former Environmental Science 3300F/G.
~~1.0~~ **0.5** course: ~~Environmental Science 3300F/G,~~ Environmental Science 3350F/G.
0.5 course from: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B.
0.5 course **from**: Geography 2220A/B (strongly recommended) or a Geography half-course from the Environmental Science Course List.
0.5 course at the 2000-level from Earth Sciences courses in the Environmental Physical Science Courses List.
0.5 course from: Environmental Science 4949F/G, Biology 4230A/B, Biology 4405A/B, Biology 4410F/G, Biology 4412F/G, Earth Sciences 4431A/B, Earth Sciences 4440A/B.
2.5 additional courses from Environmental Science 4970F/G or the Environmental Science Course List, including at least 0.5 course from each of the 3 subject areas.
1.5 additional courses at the 3000 level or above from the Environmental Science Course List.

Notes:
Year 1 consists of 5.5 courses.
* indicates courses taken in Second Year of Program
** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business**

Administration 1220E cannot be used towards both First Year Requirements and modular requirements.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH GENETICS

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course: Biology 1001A;
2.0 course: Integrated Science 1001X.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science~~

~~2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E*.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course*: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**.~~**, Business Administration 1220E****, Business Administration 2257****, Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E***.~~
1.5 courses: Biology 2290F/G, Biology 2382A/B, Biology 2581A/B.
0.5 course from: Biology 2244A/B**,** ~~or~~ Statistical Sciences 2244A/B
0.5 course: Biochemistry 2280A.
0.5 course: Biology 3596A/B.
0.5 course~~s~~ from: Biology 3594A/B, Biology 3595A/B, Biology 3597A/B.
1.5 courses (not already taken above) from: Biology 3466A/B, Biology 3592A/B, Biology 3593A/B, Biology 3594A/B, Biology 3595A/B, Biology 3597A/B.
1.0 course from: Biology 4289A/B, Biology 4540F/G, Biology 4560A/B, Biology 4561F/G, Biology 4562A/B.
0.5 course **from**: Biology 4583F/G**,** ~~or~~ the former Biology 4582.
1.5 additional courses from Biology listed above but not already taken.

Notes:
Year 1 consists of 5.5 courses.
* indicates courses taken in Second Year of Program
** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Biology 3596A/B requires a minimum mark of 70% in each of Biology 2581A/B and Biology 2290F/G.

Biology 3595A/B requires a minimum mark of 70% in Biology 2581A/B.

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH MATHEMATICAL AND STATISTICAL SCIENCES

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change,

world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
2.0 course: Integrated Science 1001X;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course **from**: Mathematics 1600A/B**, Mathematics 1700A/B (preferred)**.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E*.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course*: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**~~**, Business Administration 1220E****, Business Administration 2257****, Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E***.~~
0.5 course **from**: **Mathematics 2700A/B, the former** Mathematics 2120A/B, ~~or~~ **the former** Applied Mathematics 2811A/B.
5.0 courses: Applied Mathematics 2402A/B, Applied Mathematics

2814F/G, Applied Mathematics 3815A/B, Calculus 2502A/B, Calculus 2503A/B, Mathematics 2122A/B, Mathematics 2155F/G, Mathematics 3020A/B, Statistical Sciences 2857A/B, Statistical Sciences 2858A/B.
1.0 additional course in Actuarial Science, Financial Modelling or Statistical Sciences at the 2100 level or above.
1.5 courses at the 3000 level or above from Actuarial Science~~s~~, Applied Mathematics, Financial Modelling, Mathematics, or Statistical Sciences.

Notes:
Year 1 consists of 5.5 courses.
* indicates courses taken in Second Year of Program
** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH PHYSICS

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Admission into WISc is competitive, limited and open only to students who apply to Western through the ES stream of the Ontario Universities' Application Centre. In addition to the Grade 12 requirements, a personal statement is required and will be used as part of the adjudication for admission. See the Western Faculty of Science website (https://www.uwo.ca/sci/undergraduate/future_students/index.html) for details about the admission selection process.

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
2.0 course: Integrated Science 1001X;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B**,** ~~or~~ the former Physics 1301A/B;
0.5 course*** from**: **Mathematics 1700A/B,** Mathematics 1600A/B~~*~~.

Students must complete **Mathematics 1700A/B or** Mathematics 1600A/B by the end of Term 1 in Year 2.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G*, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G**, Integrated Science 3002A/B**, Integrated Science 4001Y***.
1.5 course: Integrated Science 4999E*.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B, Computer Science 2120A/B (recommended).
0.5 course*: Philosophy 2320F/G.
0.5 course **from**: Science 3377A/B~~**.~~**, Business Administration 1220E****, Business Administration 2257****, Business Administration 2295F/G.**
~~1.5 course: Integrated Science 4999E***.~~
0.5 course from: Calculus 2502A/B (preferred), Calculus 2302A/B.
0.5 course from: Calculus 2503A/B (preferred), Calculus 2303A/B.
0.5 course: Applied Mathematics 2402A/B.
2.0 courses: Physics 2101A/B, Physics 2102A/B, Physics 2110A/B, Physics 2910F/G.
0.5 course from: Physics 3900F/G/Z, Physics 3926F/G.
1.0 course from: Physics 3151A/B, Physics 3200A/B, Physics 3300A/B, Physics 3400A/B.
3.0 courses from: Applied Mathematics 3815A/B, any Physics or Astronomy course not yet taken numbered 2100 or above, Chemistry 4424A/B

Students must also complete Physics 2950Y, Physics 3950Y (non-credit seminar courses).

Notes:
Year 1 consists of 5.5 courses.
* indicates courses taken in Second Year of Program

** indicates courses taken in Third Year of Program
*** indicates courses taken in Fourth Year of Program
****** The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.**

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN INTEGRATED SCIENCE WITH SYNTHETIC BIOLOGY

The Western Integrated Science (WISc) program is a first entry, four-year program administered by the Faculty of Science. It is designed to provide select students with the diverse science education necessary to address the interdisciplinarity of today's major scientific challenges (e.g., climate change, world hunger, alternative energy). WISC combines unique Integrated Science courses with traditional discipline-specific courses. In Year 2, WISC students will enroll in an Integrated Science Honours Specialization module administered jointly by the Faculty of Science and individual Science departments.

Students who complete WISc Program will graduate with an “Honours Bachelor of Science in Integrated Science with (specific discipline).”

Admission Requirements

Completion of first year requirements with no failures. Students must complete the following courses with an average of at least 70%, with no individual course mark below 60%:

0.5 course: Integrated Science 1000Z;
2.0 course: Integrated Science 1001X;
0.5 course **from**: Calculus 1000A/B**,** ~~or~~ Calculus 1500A/B;
0.5 course: Chemistry 1301A/B;
0.5 course **from**: Physics 1201A/B**,** ~~or~~ Physics 1501A/B;
0.5 course: Biology 1001A.

Module
13.0 courses:

~~2.5~~ **2.0** courses: Integrated Science 2001F/G**, ~~Integrated Science 2002B*,~~ Integrated Science 3001F/G***, Integrated Science 3002A/B***, Integrated Science 4001Y****.
1.5 course: Integrated Science 4999E**.**
0.5 course from: Computer Science 2034A/B, Computer Science 2035A/B,

Computer Science 2120A/B (recommended).
0.5 course: Biochemistry 2280A with a mark of at least 65%.
1.0 course: Biology 2290F/G, Biology 2581A/B, with a grade of at least 70% in each.
0.5 course: Biology 2382A/B.
0.5 course from: Biology 2244A/B, ~~or~~ Statistical Sciences 2244A/B.
0.5 course from: Chemistry 2213A/B, ~~or~~ Chemistry 2273A.
0.5 course from: Chemistry 2223B, ~~or~~ Chemistry 2283G.
1.5 courses: Biochemistry 3381A, Biochemistry 3382A, Biochemistry 3392F/G.
0.5 course from: Biochemistry 3380G, ~~or~~ Biochemistry 3390B.
1.0 course: Biology 3593A/B, Biology 3596A/B.
0.5 course: Science 3377A/B***.
0.5 course from: **Business 1220E*, Business 2257*,** Business Administration 2295F/G~~, or one of Business Administration 1220E or Business Administration 2257*.~~
0.5 course: Philosophy 2320F/G**.
0.5 course: Biology 4260A/B.
0.5 course: Biochemistry 4415B.
~~1.5 course: Integrated Science 4999E****.~~

Notes:

Year 1 consists of 5.5 courses.

* The module will consist of 13.5 courses if either Business Administration 1220E or Business Administration 2257 is taken. Business Administration 1220E cannot be used towards both First Year Requirements and modular requirements.
** indicates courses taken in Second Year of Program
*** indicates courses taken in Third Year of Program
**** indicates courses taken in Fourth Year of Program

HURON UNIVERSITY COLLEGE

CENTRE FOR GLOBAL STUDIES – FACULTY OF ARTS AND SOCIAL SCIENCE

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN GLOBAL HEALTH STUDIES

Module
9.0 courses:

5.0 courses: CGS 2002F/G, **CGS 3220F/G (or the former CGS 3520F/G),** CGS 3519F/G, ~~CGS 3520F/G;~~ CGS 3532F/G, CGS 3533F/G; Geography 2411F/G or Indigenous Studies 2601F/G; Health Sciences 2244 or GSWS 2244; Health Sciences 2250A/B, Health Sciences 3250F/G.
0.5 course from: CGS 2003F/G, CGS 2004F/G.
0.5 course from: CGS 3001F/G, CGS 3006F/G.
1.0 course~~s~~ from: CGS 3509F/G, CGS 3512F/G, CGS 3513F/G, CGS 3514F/G, CGS 3517F/G, CGS 3518F/G, CGS 3525F/G, CGS 3526F/G, CGS 3527F/G, CGS 3528F/G, CGS 3530F/G; and with permission: CGS 3100E, CGS 3101F/G, CGS 3201F/G, CGS 3202F/G, CGS 3203F/G, CGS 3206F/G.
0.5 course from: Geography 2430A/B, Geography 3431A/B, Geography 3432A/B.
0.5 course from: Health Sciences 3010F/G, Health Sciences 3025A/B, Health Sciences 3042A/B, Health Sciences 3071A/B, Health Sciences 3262F/G, Health Sciences 3624A/B, Health Sciences 3630F/G, Health Sciences 3704A/B, Law 3101A/B, and with permission: Health Sciences 3090A/B, Health Sciences 3091A/B, Health Sciences 3092A/B, Health Sciences 3093F/G, the former Health Sciences 3290A/B, Sociology 3370F/G, Sociology 3371F/G.
0.5 course from: CGS 4000-level.
0.5 course from: Health Sciences 4044A/B, Health Sciences 4200F/G, Health Sciences 4205A/B, Health Sciences 4220F/G, Health Sciences 4250A/B, Health Sciences 4505F/G, and with permission: Health Sciences 4090A/B, Health Sciences 4091A/B, Health Sciences 4092F/G, Sociology 4472F/G.

<u>Language Requirement</u>

- 2.0 language courses with progression from one level to the next (e.g. 1030 level to 2000 level or 2000 level to 3000 level) in a language other than English, or
- 2.0 language courses in two different languages other than English at any level, or
- By demonstrating working fluency in a language other than English

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN GLOBAL HEALTH STUDIES

Module
9.0 courses:

5.0 courses: CGS 2002F/G, **CGS 3220F/G (or the former CGS 3520F/G)**, CGS 3519F/G, ~~CGS 3520F/G,~~ CGS 3532F/G, CGS 3533F/G; Geography 2411F/G or Indigenous Studies 2601F/G; Health Sciences 2244 or GSWS 2244; Health Sciences 2250A/B, Health Sciences 3250F/G.
0.5 course from: CGS 2003F/G, CGS 2004F/G.
0.5 course from: CGS 3001F/G, CGS 3006F/G.
1.5 courses from: CGS 3509F/G, CGS 3512F/G, CGS 3513F/G, CGS 3514F/G, CGS 3517F/G, CGS 3518F/G, CGS 3525F/G, CGS 3526F/G, CGS 3527F/G, CGS 3528F/G, CGS 3530F/G; and with permission: CGS 3201F/G, CGS 3202F/G, CGS 3203F/G, CGS 3206F/G.
1.0 course from: Health Sciences 3010F/G, Health Sciences 3025A/B, Health Sciences 3042A/B, Health Sciences 3071A/B, Health Sciences 3262F/G, Health Sciences 3624A/B, Health Sciences 3630F/G, Health Sciences 3704A/B, Law 3101A/B, and with permission: Health Sciences 3090A/B, Health Sciences 3091A/B, Health Sciences 3092A/B, Health Sciences 3093F/G, the former Health Sciences 3290A/B, Sociology 3370F/G, Sociology 3371F/G.
0.5 course from: Geography 2430A/B, Geography 3431A/B, Geography 3432A/B.

Language Requirement

- 2.0 language courses with progression from one level to the next (e.g. 1030 level to 2000 level or 2000 level to 3000 level) in a language other than English, or
- 2.0 language courses in two different languages (other than English) at any level, or
- By demonstrating fluency in a language other than English

CHINESE, JAPANESE, AND EAST ASIAN STUDIES – FACULTY OF ARTS AND SOCIAL SCIENCE

Course Revision – Effective September 1, 2024, the following change(s) be made:

CHINESE 1150
BEGINNERS' CHINESE I
An introduction to oral and written standard Chinese for students with no previous knowledge of the language and no previous exposure to Chinese culture. Students will learn approximately 400 characters, 40 sentence structures, basic grammar, and will be able to write short passages and conduct brief, informal dialogues. The pinyin romanization system will be introduced. Prepares students for progression to Chinese 2250.

Antirequisite(s): Chinese 1151, Chinese 1152A/B, Chinese 1153A/B, Grade 12U Chinese or equivalent.
Prerequisite(s): Permission of the department **based on placement**.
Extra Information: 4 hours.
Course Weight: 1.00

Course Revision – Effective September 1, 2024, the following change(s) be made:

CHINESE 1151
CHINESE I
An introduction to oral and written standard Chinese for students with no previous knowledge of the language. Students will learn approximately 400 characters, 40 sentence structures, basic grammar, and will be able to write short passages and conduct brief, informal dialogues. The pinyin romanization system will be introduced.

Antirequisite(s): Chinese 1150, Chinese 1152A/B, Chinese 1153A/B; Grade 12U Chinese or equivalent.
Prerequisite(s): Permission of the department **based on placement**.
Extra Information: 4 hours.
Course Weight: 1.00

Course Revision – Effective September 1, 2024, the following change(s) be made:

CHINESE 2250
BEGINNERS' CHINESE 2
A course in standard Chinese and a continuation of Chinese 1150. Students will build on skills in reading, writing, and speaking developed in earlier courses. They will gain an increased vocabulary (approximately 1000 characters) and a greater understanding of more complex grammatical structures. The pinyin romanization system will be used.

Antirequisite(s): Chinese 2252A/B, Chinese 2253A/B.
Prerequisite(s): Chinese 1150 or Chinese 1151, or permission of the department **based on placement**.
Extra Information: 4 hours.
Course Weight: 1.00

Course Revision – Effective September 1, 2024, the following change(s) be made:

CHINESE 3350
CHINESE 3
A third-level course in standard Chinese. Advanced conversation, written composition, listening and speaking skills, and translation techniques will be emphasized. Students will learn all the basic grammatical patterns and gain a larger vocabulary (approximately 1600 characters). Selections from newspapers and short essays will be incorporated.

Antirequisite(s): Chinese 3352A/B, Chinese 3353A/B.
Prerequisite(s): Chinese 2250 or permission of the department **based on placement**.
Extra Information: 4 hours.
Course Weight: 1.00

Course Revision – Effective September 1, 2024, the following change(s) be made:

CHINESE 4450
CHINESE 4
An advanced course in standard Chinese, building on skills developed in earlier Chinese courses. Students will read short Chinese literary texts, newspapers and journals, develop skills in conversation and discussion of topics related to the readings, and develop practical writing skills. Students will develop comprehension skills by using Chinese media broadcasts.

Antirequisite(s): Chinese 4452A/B, Chinese 4453A/B.
Prerequisite(s): Chinese 3350 or permission of the department **based on placement**.
Extra Information: 4 hours.
Course Weight: 1.00

MANAGEMENT AND ORGANIZATIONAL STUDIES (BMOS PROGRAM) – FACULTY OF ARTS AND SOCIAL SCIENCE

Course Revision – Effective September 1, 2024, the following change(s) be made:

MANAGEMENT AND ORGANIZATIONAL STUDIES 2185A/B
ANIMALS, SUSTAINABILITY, AND BUSINESS
~~ANIMAL WELFARE AND SUSTAINABILITY LEADERSHIP~~
(Short title: **Animals, Sustain & Business**)
An examination of animal welfare and sustainability challenges, strategies, and solutions in **business** sectors such as fashion, beauty, sports, entertainment, food, and animal care.

Antirequisite(s): MOS 3398A/B if taken in Winter term of 2022-23.
Extra Information: 3 hours.
Course Weight: 0.50

Program Revision – Effective September 1, 2024, the following change(s) be made:

HONOURS SPECIALIZATION IN BUSINESS INTELLIGENCE

Module
10.5 courses:

1.0 course normally taken in second year from: Business Administration 2257 or MOS 2227A/B and MOS 2228A/B.
1.5 courses normally taken in second year: MOS 2242A/B, MOS 2275A/B, MOS 2310A/B (or the former MOS 3310A/B).
0.5 course normally taken in second year from: MOS 2320A/B, MOS 3320A/B.
0.5 course from: MOS 2155A/B, MOS 2181A/B, MOS 2182F/G.

Business Intelligence Group:

1.5 courses normally taken in second or third year: MOS 2235A/B, MOS 3335A/B, MOS 3365A/B.
0.5 course normally taken in third or fourth year from: MOS 3323A/B, MOS 4410A/B, MOS 4486A/B.
0.5 course normally taken in fourth year: MOS 4490A/B.

Long-term Strategic Success Group:

1.0 course normally taken in third or fourth year from: MOS 3330A/B, MOS 3398A/B, **MOS 4489A/B** ~~MOS 4498A/B~~.
1.0 course from: MOS 2265F/G, MOS 3321F/G, MOS 3331A/B, MOS 3385A/B, MOS 4488A/B.

Programming, Data Searching, Data Analysis and Data Interpretation Group:

1.0 course from: Analytics and Decision Sciences 2298A/B, Computer Science 2035A/B, Computer Science 2120A/B, Data Science 2100A, Digital Communication 2309A/B, Digital Communication 3203F/G, Digital Communication 3204A/B, Digital Communication 3209F/G.

Interdisciplinary Perspectives Group:

1.5 courses from: Arabic 2050A/B, Arabic 2250, Centre for Global Studies 2002F/G, Centre for Global Studies 2003F/G, Centre for Global Studies 2004F/G, Centre for Global Studies 3516F/G, Centre for Global Studies 3525F/G, Chinese 2250, Economics 2120A/B, Economics 2124A/B, Economics 2125A/B, Economics 2154A/B, French 2901A/B, French 2902F/G, French 2301A/B, Geography 2220A/B, Geography 2132A/B, German 2220A/B, GLE 2003F/G, Italian 2220A/B, Japanese 2250, MOS 2255F/G, MOS 3250A/B, MOS 4486A/B, Philosophy 2074F/G, Philosophy 2253A/B, Spanish 2200.

Note: Some courses may have antirequisites or require prerequisites or department permission in advance of enrolment.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN BUSINESS INTELLIGENCE

Module
10.5 courses:

1.0 course normally taken in second year from: Business Administration 2257 or MOS 2227A/B and MOS 2228A/B.
1.5 courses normally taken in second year: MOS 2242A/B, MOS 2275A/B, MOS 2310A/B (or the former MOS 3310A/B).
0.5 course normally taken in second year from: MOS 2320A/B, MOS 3320A/B.
0.5 course from: MOS 2155A/B, MOS 2181A/B, MOS 2182F/G.

Business Intelligence Group:

1.5 courses normally taken in second or third year: ~~MOS 2242A/B,~~ MOS 2235A/B, MOS 3335A/B, MOS 3365A/B.
0.5 course normally taken in third or fourth year from: MOS 3323A/B, MOS 4410A/B, MOS 4486A/B.
0.5 course normally taken in fourth year: MOS 4490A/B.

Long-term Strategic Success Group:

1.0 course normally taken in third or fourth year from: MOS 3330A/B, MOS 3398A/B, **MOS 4489A/B** ~~MOS 4498A/B~~.
1.0 course from: MOS 2265F/G, MOS 3321F/G, MOS 3331A/B, MOS 3385A/B, MOS 4488A/B.

Programming, Data Searching, Data Analysis and Data Interpretation Group:

1.0 course from: Analytics and Decision Sciences 2298A/B, Computer Science 2035A/B, Computer Science 2120A/B, Data Science 2100A, Digital Communication 2309A/B, Digital Communication 3203F/G, Digital Communication 3204A/B, Digital Communication 3209F/G.

Interdisciplinary Perspectives Group:

1.5 courses from: Arabic 2050A/B, Arabic 2250, Centre for Global Studies 2002F/G, Centre for Global Studies 2003F/G, Centre for Global Studies 2004F/G, Centre for Global Studies 3516F/G, Centre for Global Studies 3525F/G, Chinese 2250, Economics 2120A/B, Economics 2124A/B, Economics 2125A/B, Economics 2154A/B, French 2901A/B, French 2902F/G, French 2301A/B, Geography 2220A/B, Geography 2132A/B, German 2220A/B, GLE 2003F/G, Italian 2220A/B, Japanese 2250, MOS 2255F/G, MOS 3250A/B, MOS 4486A/B, Philosophy 2074F/G, Philosophy 2253A/B, Spanish 2200.

Note: Some courses may have antirequisites or require prerequisites or department permission in advance of enrolment.

Program Revision – Effective September 1, 2024, the following change(s) be made:

SPECIALIZATION IN FINANCE AND ADMINISTRATION

Module
11.0 senior courses:

1.0 course normally taken in second year: Business Administration 2257 or MOS 2227A/B and MOS 2228A/B.
1.0 course normally taken in second year: Economics 2220A/B, Economics 2260A/B.
1.0 course: Economics 2222A/B and Economics 2223A/B; OR MOS 2242A/B and 0.5 MOS course at 2000-level or above.
0.5 course normally taken in second year: MOS 2310A/B (or the former MOS

3310A/B).
1.5 courses normally taken in second or third year from: MOS 2181A/B, MOS 2275A/B, MOS 2320A/B (or MOS 3320A/B), MOS 3330A/B.
1.0 course normally taken in third year: MOS 3316A/B, MOS 3311A/B (or the former MOS 4310A/B).
2.0 courses normally taken in third year from: MOS 2277A/B, MOS 3312A/B, **MOS 3331A/B,** MOS 3360A/B, MOS 3361A/B, MOS 3370A/B, MOS 4315A/B, MOS 4317A/B.
0.5 course normally taken in fourth year: MOS 4410A/B.
1.0 course from: MOS 2182F/G, MOS 2235A/B, MOS 2255F/G, MOS 2265F/G, MOS 3250A/B, MOS 3321F/G, MOS 3325A/B, MOS 3335A/B, MOS 3353F/G, MOS 3362A/B, MOS 3388A/B, MOS 3398A/B, MOS 4465A/B, MOS 4471A/B, MOS 4486A/B, MOS 4488A/B, MOS 4489F/G, MOS 4498A/B, MOS 4998F/G.
1.0 course from: Actuarial Science 2053, Economics 2120A/B, Economics 2154A/B, Economics 2156A/B, Economics 2221A/B, Economics 2261A/B, Economics 3328A/B, Economics 3329A/B, Economics 3340F/G, Economics 3352A/B, Economics 3357A/B, Economics 3370A/B.
0.5 course from: GLE 2001F/G, GLE 2003F/G, History 2125F/G, History 2127F/G, History 2204F/G, MOS 2198A/B, MOS 2298A/B, MOS 2299F/G, Philosophy 2074F/G, Philosophy 2821F/G, Philosophy 2822F/G, Political Science 2211E, Political Science 2246E.

THEOLOGY PROGRAM – FACULTY OF THEOLOGY

Course Introduction – Effective September 1, 2024, the following course be introduced:

RELIGIOUS STUDIES 2245F/G
RELIGIONS AND SOCIAL JUSTICE
How do major religious traditions conceptualize and work toward social justice? In this course, students will study the notion of justice in Hinduism, Buddhism, Sikhism, Islam, Judaism and Christianity, and consider the relevance of social justice as a common ground for inter-religious dialogue, solidarity, and activism.

Extra Information: 3 hours.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

RELIGIOUS STUDIES 3210F/G
ISLAM AND WELLNESS
How do Islamic traditions and communities understand and promote wellness, especially mental health? This course explores historical and contemporary perceptions of mental health within an Islamic theological perspective, with a special focus on Islamic principles of holistic well-being and the mental health challenges facing Muslim communities today.

Prerequisite(s): 0.5 course in Religious Studies.
Extra Information: 3 hours.
Course Weight: 0.50

Course Introduction – Effective September 1, 2024, the following course be introduced:

RELIGIOUS STUDIES 3280F/G
INTERRELIGIOUS DIALOGUE: THEORY AND PRACTICE
(Short title: Interreligious Dialogue)
This course introduces students to the theory and practice of interreligious dialogue, with the goal of encouraging critical, generous, and constructive thinking about diverse religious perspectives. Students navigate the complexities of interreligious dialogue to foster mutual learning and respect, and to promote universal values and collaborative justice advocacy.

Prerequisite(s): 0.5 course in Religious Studies.
Extra Information: 3 hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

ARABIC 3260A/B
ADVANCED QURANIC ARABIC ~~READINGS FROM THE QUR'AN~~
~~Readings from the Qur'an~~ **This course** is a study in classical Arabic. Its main focus is the vocabulary frequently encountered in the Qur'an. The course objective is to equip the student with the skills necessary to understand the grammar, vocabulary, and syntactical and morphological structure of the Qur'an.

Antirequisite(s): ~~Arabic 5260A/B.~~
Prerequisite(s): Arabic 2080A/B or permission of instructor.
Extra Information: 3 hours.
Course Weight: 0.50

Course Revision – Effective September 1, 2024, the following change(s) be made:

RELIGIOUS STUDIES 3100F/G
STUDIES IN THE ~~QUR'AN,~~ SUNNAH AND HADITH
An exploration of the meaning of the Sunnah (the normative example of the Prophet Mohammed) and the development of the corpus of Hadith (narrations of these reports) and their role in diverse schools of Islamic thought and in the lives of Muslims. ~~This course examines the Qur'an in the interpretative traditions in the Sunnah (the sayings and practices of Mohammed) and the Hadith (narrations concerning Mohammed, his companions, and his successors), with attention to the role these interpretations play in the branches of Islam, Islamic jurisprudence, and contemporary Muslim life.~~

Prerequisite(s): Religious Studies 2310F/G or Religious Studies 2500F/G or permission of instructor.
Extra Information: 3 hours.
Course Weight: 0.50

KING'S UNIVERSITY COLLEGE

SCHOOL OF MANAGEMENT, ECONOMICS, AND MATHEMATICS

Course Revision – Effective September 1, 2024, the following change(s) be made:

ANALYTICS AND DECISION SCIENCES 2036A/B
PREDICTIVE ANALYTICS
Predictive analytics for business, accounting, and marketing with emphasis on multiple regression models, inference for regression parameters, categorical independent variables, model assumptions and diagnostics, goodness of fit and test of independence, analysis of variance for one factor and multiple factor designs, and model selection and validation.

Prerequisite(s): Economics 2122A/B or Economics 2222A/B, or permission of the department.
Antirequisite(s): ~~All other courses in Introductory Statistics (except Statistical Sciences 1023A/B, Data Science 1000A/B or Statistical Sciences 1024A/B):~~ Biology 2244A/B, Data Science 2000A/B, ~~Economics 2122A/B, Economics 2222A/B,~~ Geography 2210A/B, Health Sciences 3801A/B, MOS 2242A/B, Psychology 2811A/B or the former Psychology 2810, Psychology 2801F/G or the former Psychology 2820E, Psychology 2830A/B, Psychology 2850A/B, Psychology 2851A/B, Sociology 2205A/B, Statistical Sciences 2035, Statistical Sciences 2141A/B, Statistical Sciences 2143A/B, Statistical Sciences 2244A/B, Statistical Sciences 2858A/B.
Extra Information: 3 lecture hours, 2 laboratory hours.
Course Weight: 0.50