

SCIENCE COURSES FOR NON-SCIENCE MAJORS

- ❖ Not all courses listed below will necessarily be offered every academic year.
- ❖ All courses listed below are three lecture hours per week or equivalent, unless otherwise stated. In addition, laboratory/tutorial time may be scheduled as required.
- ❖ *Note:* Most Computer Science courses require substantial time out of class in writing, correcting, and testing computer programs. Students should be prepared to devote a minimum of three to five hours a week per course to assignment work alone.

1ST YEAR COURSES:

INTEGRATIVE BIOLOGY

BIOL-1101. Cell Biology

Examination of the principles governing living systems, with emphasis on the molecular and cellular basis of life, molecular genetics, energetics, differentiation, and development. (Grade 12 "U" Biology or equivalent, or BIOM-1003 and BIOL-1013 are strongly recommended) (3 lecture, 3 laboratory hours a week.)

BIOL-1111. Biological Diversity

Principles governing living systems; the origins and diversity of life; evolution, reproduction, and heredity; the structure and function of viruses through plants and animals; basic principles of ecology. (Grade 12 "U" Biology or equivalent, or BIOM-1003 and BIOL-1013 are strongly recommended) (3 lecture, 3 laboratory hours a week.)

BIOL-1013. Organisms and the Environment

Organisms interacting with other organisms and with their physical environment. Ecological impacts of human activity. This course is offered on-campus and as a distance course. (Intended for non-majors and students requiring preparation for BIOL-1111 and BIOL-1101) (Not counted for credit in any Faculty of Science program.) (2 lecture hours a week.)

BIOMEDICAL SCIENCES

BIOM-1003. Biology of Organisms

Properties of living organisms from the level of the cell through tissues, organs and organ systems, genetics, to the functioning, integrated organism. This course is offered on-campus and as a distance course. (Intended for non-majors and students requiring preparation for BIOL-1111 and BIOL-1101) (Not counted for credit in any Faculty of Science program.) (2 lecture hours a week.)

CHEMISTRY

CHEM-1000. Introduction to Chemistry

This course stresses fundamental principles of chemistry, and is intended for students lacking SCH4U or equivalent, or requiring additional preparation for CHEM-1100 (General Chemistry I), CHEM-1103 (Topics in General Chemistry) and BIOC-1303 (Organic and Biological Chemistry for Health Sciences). Topics include: basic atomic theory, the periodic table, stoichiometry, properties of gases and liquids, acid-base concepts and chemical equilibria, organic and polymer chemistry. This course can serve as a prerequisite for CHEM-1100, but may not be taken for credit in any Science program. (4 lecture hours and 2 tutorial hours per week; or 3 lecture hours and 1 tutorial hour) (Students who first completed CHEM-1100 may not subsequently enroll in CHEM-1000.)

CHEM-1100. General Chemistry I

Introductory concepts in chemistry, including reactions of atoms, ions, and molecules, solution stoichiometry, thermochemistry, electronic structure of atoms, basic chemical bonding and molecular geometry, periodic properties of the elements, and the theory of gases. (Prerequisite: Grade 12“U” Chemistry or equivalent (CHEM-1000), or consent of the instructor.) (3 lecture, 3 laboratory/tutorial hours a week.)

CHEM-1103. Topics In General Chemistry

An introduction to selected topics in modern chemistry for engineering: atomic and molecular structure, properties of matter and the periodic table, macroscopic chemical systems, stoichiometry, properties of the equilibrium state and applications to thermochemistry and electrochemistry. (Prerequisite: Grade 12“U” Chemistry or equivalent.) (3 lecture, 3 laboratory hours a week.)

COMPUTER SCIENCE: COURSES**COMP-1047. Computer Concepts for End-Users**

Introduction to the concepts of operation of a computer system, including hardware and software. Development of conceptual understanding of word processors, databases, spreadsheets, etc., and practical experience with their use. Networking concepts and data communication concepts will be introduced. The Internet will be introduced with students having access to internet resources. Management information systems including the systems development lifecycle will be discussed. Fundamental concepts of algorithm development and programming will be introduced. Hands-on experience with microcomputers as well as a distributed-computing environment will be involved. In addition to lecture time, laboratory/tutorial time may be scheduled as required. (May not be used to fulfill the major requirements of any major or joint major in Computer Science.) (3 lecture hours)

COMP-1400. Introduction to Algorithms and Programming I

This course is the first of a two-course sequence designed to introduce students to algorithm design and programming in a high-level language such as C. The main objectives of the course are to develop the ability to identify, understand and design solutions to a wide variety of problems. Topics include: computer system overview, hardware and software, problem solving steps, concepts of variables, constants, data types, algorithmic structure, sequential logic, decisions, loops, modular programming, one-dimensional arrays, text files. If possible, problems like searching/sorting will be addressed. (3 lecture hours and 1.5 laboratory hours a week)

ECONOMICS: COURSES**ECON-1100. Introduction to Economics I**

An introduction to microeconomics intended to provide students with the tools necessary to begin to understand and evaluate how resources are allocated in a market economy. Specific topics include how markets function, theories of the business firm, of consumer behaviour and of income distribution. The economic roles of labour unions and government are also covered. The theories are applied to contemporary Canadian economic problems.

ECON-1110. Introduction to Economics II

This course is an introduction to macroeconomics. The emphasis is upon measuring and explaining what determines economic aggregates such as the total national product (GDP) and the level of prices and employment. The role of money and financial institutions, the impact of international trade and the policy options available to governments for coping with inflation and unemployment are discussed in detail.

ENVIRONMENTAL SCIENCE

ESCI-1000. Natural Hazards and Disasters

The Earth's component systems and their interrelationships. Earth hazards and the Earth's interior processes: volcanism and earthquakes. Hazards and surface processes: landslides and floods. Atmospheric hazards: storms, hurricanes and tornadoes. (May be taken by Science students for credit, but does not count as a Science option towards the fulfillment of the specified requirements for a Science degree). (2 lecture hours per week)

ESCI-1010. Our Changing Earth

Origin of the universe and solar system; focus on the Earth and moon; earliest life forms. Measurement of geological time. Global climatic change in geological history; drifting continents; deserts, floods and ice sheets. Fossils and evolution; extinctions and probable causes. Human evolution and migrations; early technologies. (May be taken by Science students for credit, but does not count as a Science option towards the fulfillment of the specified requirements for a Science degree). (2 lecture hours a week)

ESCI-1020. Introduction to Planetary Science

An introduction to the origin of the Universe and Solar System. Topics include: the Big Bang theory; origin and organization of matter; and formation of galaxies, nebulae, stars, and planetary systems. The focus is on the geological features of planets, moons, asteroids, and comets. Coverage includes historical perspectives and current theory on astronomy, measurement of the ages of the Universe and Solar System, space exploration, Moon and Mars missions, analyses of NASA satellite images, the origin and evolution of life in the Solar System, and the search for possible extra-terrestrial life and intelligence in the Universe. (May be taken by Science students for credit, but does not count as a Science option towards the fulfillment of the specified requirements for a Science degree.) (3 lecture hours a week.)

ESCI-1120. Introduction to Geomorphology

The landscapes of the earth, with particular reference to the glaciers, coastlines, rivers, and northern permafrost regions of Canada. (3 lecture hours a week.)

ESCI-1130. Atmosphere and Climate

An introduction to the atmosphere and the basic principles of meteorology and climatology. Topics include weather systems, atmospheric pollution and inadvertent climate modification, climate change and relationships between climate and living organisms. (3 lecture hours a week.)

ESCI-1141 Cartography and Digital Mapping

This introductory course focuses on the key elements of map design, representation of spatial data and map interpretation. Topics will include-projections, datums and coordinate reference systems, scale properties and unit calculations, map symbology and map accuracy. Different mapping approaches, such as choropleth, isoline and dot mapping will be utilized throughout the course. Web-based mapping will be introduced. Maps will be designed, generated, and interpreted using paper-based media and modern cartographic software in a laboratory setting. (2 lecture, 2 laboratory hours a week.)

ENVIRONMENTAL STUDIES

ESTU-1100. Humans and the Environment - An Introduction to Environmental Studies

Humans use energy and resources from our natural surroundings to live, and to develop our societies and cultures. This use has an impact on other animals and plants, and on the air, water, and land. Our impact is now so great that we are in danger of depleting or destroying many of the natural systems on which we depend. This course will examine our relationship with, and impact on, the environment; with reference to the physical, cultural, economic, political, and ethical elements. Sustainable practices will also be discussed.)Topics may include: human sustainability and population growth, aquatic and terrestrial sustainability, food and agriculture, water resources, energy production, and climate change. (Can be taken as a Social Science option) (Three lecture hours per week)

FORENSIC SCIENCE: COURSES

FRSC-1107. Introductory Crime Scene Investigation

This course will introduce students to the theoretical background of scientific methods used in Forensic Sciences and their practical applications to crime scene investigation within the multidisciplinary Forensic fields. The focus of the course is exploration and examination of evidence found at crime scenes. The students learn the discovery, identification, collection, examination and processing of various types of Forensic evidence.

PHYSICS: COURSES

PHYS-1010. Introduction to Astronomy II

The stars, galaxies, including pulsars, black holes, and quasars. Current theories of the structure of the universe will be discussed. This is a descriptive course suitable for the non-scientist. (May be taken by B.Sc. students for credit, but does not count as a Physics course or other science course towards the fulfillment of the requirements for the B.Sc. degree.) (2 lecture hours a week.)

2ND YEAR COURSES: *(This is for those student who like to continue elective from the same field/program of previous 1st year elective selection)*

COMPUTER SCIENCE: COURSES

COMP-2057. Introduction to the Internet

Students will be introduced to the Internet as a global information infrastructure, including fundamental concepts in protocols and services, packaging of data, and data transmission. Common tools and multimedia such as HTML, CSS, and CMS, used for the development of websites will also be introduced. Web page design, quality, accessibility and security issues will be discussed. How Web browsers and search engines work will be demonstrated. Social networks and other current Internet applications will be examined. In addition to lecture time, laboratory/ tutorial time may be scheduled as required. **(Prerequisite: COMP-1047 or COMP-2067 or COMP-1400.)** (May not be used to fulfill the major requirements of any major or joint major in Computer Science.) (3 lecture hours a week)

COMP-2067. Programming for Beginners

This course introduces fundamental computer programming principles and structured programming concepts, with an emphasis on good programming. Stages of the software development cycles are introduced: analysis, design, implementation, debugging and deployment. May not be used to fulfill the major requirements of any major or joint major in Computer Science.) (3 lecture hours).

COMP-2077. Problem Solving and Information on the Internet

Students will be introduced to logic and critical appraisals including reasoning skills and critical thinking in the computer age. Problem solving and heuristics will be discussed including how to solve problems by coming up with the right strategies. Searching using Boolean logic to pinpoint useful and reliable information will be introduced. Methods for being self-critical and critical of web information in order to perform evaluations will be studied. **(Prerequisites COMP-1047 and COMP-2057.)** (This course may not be taken to fulfill the major requirements of any major or joint major in Computer Science.) (3 lecture hours a week.)

COMP-2097. Social Media Marketing for End Users

This course provides review, analysis and use of social media and mobile technologies such as Instagram (tm), Facebook (tm), twitter (tm) LinkedIn (tm), texting, and using mobile devices such as laptops, ios (tm) devices, and Android devices. Topics to be covered include: a comprehensive review of available social media and mobile technology, use of social media and mobile technology for sharing of knowledge and for group interaction, security and privacy, ethical principles in social media, methods for analyzing end-user requirements for a social media application, strategies for designing, implementing, and maintaining an ethically-sound social media campaign, and measurement and assessment of social media analytics using industry standard tools and techniques. (This course may not be taken to fulfill the major requirements of any major or joint major in Computer Science.) (3 lecture hours).

ENVIRONMENTAL SCIENCE

ESCI-2010. Geology and the Environment

Effect of geological factors on the environment; pollution of groundwater, ground subsidence, nuclear waste disposal, subsurface disposal of liquid wastes, earthquake prediction and control. This course is designed specifically for the non-scientist. (May not be taken for credit towards a B.Sc. Degree in Environmental Science.) (2 lecture hours a week or equivalent.)

ESCI-2020. Discovering Dinosaurs

The origin, evolution, behaviour, ecology, and extinction of dinosaurs, and how these aspects of dinosaur science are understood through the study of their fossils. How the public perception and scientific interpretation of dinosaurs have changed over time as a result of new discoveries. (3 lecture hours per week)

SCI-2300. Introduction to Oceanography

Examination of the physical, chemical, geological and biological aspects of the oceans. Topics will include the interconnectedness of global climate, ocean currents, waves and tides, anthropogenic stressors, and their influence on marine biodiversity and ecosystems. (3 lecture hours a week.)

ESCI-2400. Geomorphology

The geological processes operating on or near Earth's surface and the development and evolution of erosional and depositional landforms as a result of glacial ice, permafrost, wind, running water, gravity, waves and tides, and exposure to the atmosphere. (3 lecture hours a week.)

ESCI-2600. Principles of Resource Management

Systems analysis methodologies, scientific theories, ecological approaches, and sustainable resource management principles will be presented to examine the interrelationships governing the availability and cumulative impacts of utilizing both renewable and non-renewable resources. Resource management auditing methods and techniques will be applied for the assessment of several indicators, including carrying capacity, ecological footprints, demographic transition, energy flows, agrosystems, land degradation, air and water quality, deforestation, biodiversity and successional changes. Discussions will also focus on integrative and adaptive resource management techniques and best management practices. (3 lecture hours a week.)

ESCI-2610. Environmental Decision Analysis

Earth systems, including climatic extremes, the industrialized ecosystem; decisions under uncertainty in mineral-resource exploration and development; rational approach to decision making, alternatives to decision analysis; environmental impact assessment and risk management, expert systems approach to environmental problem solving, applications in less developed countries. (3 lecture hours a week.)

ESCI-2620. Environmental Auditing in Mineral Resource Development

Cyclical flow of energy and matter in nature, human interaction with environmental processes, elements of policy analysis; environmental management systems and environmental impact assessment; environmental audit processes, steps in design and delivery; mineral resource development and the audit protocols; from audit to action plan, auditing the audit. (3 lecture hours a week.)

ESCI-2630. Geology and International Development

Aid, international development, and Earth processes; integration of water-resource management, soil conservation and agroforestry; geological hazards in a tropical setting; small-scale mining and conservation of mineral resources; engineering an improved quality of life in developing nations. (May not be taken for credit towards a B.Sc. Degree in Environmental Science.) (2 lecture hours a week or equivalent.)

ESCI-2711. Scripting and Programming in GIS

Knowledge and competence in programming are an essential skill set and a critical requirement for most geospatial job opportunities. This course will introduce the basics of constructing scripts (lists, loops, syntax, classes, objects) and programming them into a GIS framework for the purpose of automating workflows, visualizing geospatial data, building and running tools from GUIs and APIs. Other topics will include: methods to enhance functionalities within current geospatial software and web-based systems, the utilization of geospatial libraries, and the construction of effective tools for spatial analysis purposes using Python and other programming languages. (2 lecture, 2 laboratory hours per week.)

ENVIRONMENTAL STUDIES**ESTU-2100. Canadian Regional Environments**

Canada is a complex and varied nation. The environmental issues that concern each region of the country are also complex and varied. This course surveys the dominant environmental issues and impacts in each region of Canada, and explores the reasons for the regional variation through a variety of lenses: its physical landscape, its resource opportunities and challenges, its historical settlement patterns and economic development, and its social, cultural, and demographic structure. This context is used to develop an understanding of current environmental news and events across the country. (Can be taken as a Social Science option.) (Three lecture hours per week.)

ECONOMICS: COURSES

ECON-2000. Life Choices and Economics

The course is designed for Arts and Social Sciences students. It will introduce them to key concepts and methods in Microeconomics. The application and understanding of economic analysis as applied to individual decision-making and public policy will be emphasized. The course provides a non-technical and intuitive way for students to master an understanding of real world problems. (May not be taken for credit in any program within the School of Business, or Faculty of Engineering. Science students may take the course only as a Social Sciences option.) (Antirequisite: ECON-1100.)

ECON-2010. Life Choices and Economics II

The course is designed for Arts and Social Sciences students. It will introduce them to key concepts and methods in Macroeconomics. Key Macroeconomic concepts, such as unemployment, inflation, international trade, and investment will be examined. The course will be a non-technical look at the Canadian and world economies. (May not be taken for credit in any program within the School of Business, or Faculty of Engineering. Science students may take the course only as a Social Sciences option.) (Antirequisite: ECON-1110.)

ECON-2100. Games and Behaviour

The course is designed for Arts, Social Science and Business students. It is intended to introduce them to key concepts and methods in game theory. The application and understanding of behavioral analysis as applied to individual decision making and public policy will be emphasized. The course provides a non-technical and intuitive way for students to master an understanding of real world problems and decision making. Students will learn about strategies for conflict resolutions, co-operation, social interaction, voting strategies, individual and business behaviour. (May not be taken for credit in Economics or joint programs with Economics, Science or the Faculty of Engineering.)

ECON-2210. Intermediate Microeconomics I

The theory of markets, the theory of consumer behaviour and demand; the firm, production, cost, and supply. (Prerequisite: ECON-1100.)

ECON-2310. Intermediate Macroeconomics I

A theoretical and policy oriented treatment of the determination of employment, output, interest rates, and the price level; stabilization policies and their effectiveness. (Prerequisites: ECON-1110.)

ECON-2510. Macroeconomics for the Real World

This course will focus on the application of techniques of economics to the analysis of practical problems in areas of current interest like globalization, inequality, protectionism and government spending and taxes. The course will emphasize more policy, as opposed to theoretical, aspects of macroeconomics. (May not be taken for credit in Economics or combined major programs with Economics). (Prerequisite ECON-1110 or ECON-2010) (Anti-requisite: ECON-2310.)

ECON-2660. Selected Issues in Economics

(Prerequisites: ECON-1100 and ECON-1110.)

ECON-2900. Health Economics

This course will explore the unique economic features of health care with emphasis on international models of delivery, determinants of the demand and supply of health services, and public *versus* private health care systems. The Canadian experience will be considered with a focus on demographic patterns and legislation. (Pre-requisites: ECON-1100, ECON-1110; plus any university-level course in statistics.)

FORENSIC SCIENCE:

FRSC-2007. Introduction to Forensic Science

This course will survey the many specialties of Forensic Science, including forensic pathology, entomology, anthropology, biology, botany, geology, etc. Special guest lectures by practicing forensic scientists will give students direct contact with the role they play in the extraction and meaning of evidence.

FRSC-2100. Crime Scene Evidence Analysis

This course builds upon the protocols developed in the Introductory Crime Scene Investigation (FRSC-1107) and it is designed to familiarize students with the diverse scientific techniques utilized by Forensic professionals. The techniques for analyses of forensic evidence span natural sciences, social sciences and computer sciences. **Pre-requisite: (FRSC-1107 or FRSC-2007 or permission by course instructor).**