University of Toronto Mississauga
Major Curriculum Changes: 2009-2010 Calendar

New Programs

Biology for Health Sciences – Major, BSc

Program Description and Rationale:

This 'streamed' major program was developed to fill a niche for students in Biology at the University of Toronto Mississauga who have an interest in human or health-related studies. This is a high demand area with many requests at the Ontario Universities Recruitment Fair and at the UTM's Open House Recruitment Day. The timing could not be better since over the last few years we have developed new courses that deal with areas related to gaining a fuller understanding of the biological foundation of health in humans, such as, "Human Anatomy and Physiology", "Human Development, and "Human Cell Biology". This new major program is different from the Biology major; it is a highly structured major with a different core of required courses in the second year (i.e. a full year course in human anatomy and physiology is the cornerstone for this program and substitutes for introduction to Physiology which covers plants and animals), plus other second year courses depending on the stream (i.e. Pharmacokinetics Principles and Laboratory in Molecular Biology and Genetics). At present these courses are not required in the major program in Biology. There are also required third year courses which are needed within this major dealing with human development and cell biology, as well as others depending upon the chosen stream. This program has a high CGPA as the entrance requirement whereas the Biology major is set at a CGPA of 2.00. Students within the Biology for Health Sciences Major will have access to courses which, due to demand, may be limited to those within this program and the specialist programs. Overall, this new 'streamed' major is a rigorous set of courses and is highly structured. The timing is also appropriate with the partnership with the Faculty of Medicine and the Academy of Medicine and UTM, and the building of a Health Sciences Complex.

Many of our students in Biology hope to enter some area within the health profession and we have not been able to give them any program that helps them direct their course choice. This program will help them determine courses in which they can get the biological grounding needed to understand health issues. This program builds on a background of Biology, Chemistry and Mathematics, and then leads students through human anatomy, physiology, cell and molecular biology, development, genetics, and statistics, and then streams them through 1 of 3 concentrated areas of biology; 1) Cell, Molecular and Biotechnology, 2) Neuroscience, or 3) Genes and Behaviour. This major program could be combined with a number of other major programs at UTM such as Psychology, Anthropology, Health Sciences Communication, Exceptionality in Human Learning, Forensic Science, and Chemistry, as well as other disciplines, such as the Major in Management. This major program could also be complemented by a Minor in Biomedical Communications (Science).

This will be a popular program and we expect a few hundred students through this program. The entrance requirements are quite high (CGPA of 2.5) and this will limit the number of students in this program. We believe that this program will increase the number of highly qualified students within Biology and we believe that students exiting this program will be better prepared to enter many of the professional programs or industry.

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The Department of Biology is a large group and these courses are already being taught by our faculty. As a second year foundation course, we have increased BIO210H5 (Human Anatomy and Physiology) to a full year course. We believe this is important so that we can give a thorough grounding to all students within this program on form and function of the human body. We have asked for money for a 0.5 stipend to be able to relieve other teaching for an increase in this course. As an aside, this course is very popular and is the Life Science course chosen by most students at the University of Toronto Mississauga to fulfill their requirement for professional schools, and having it a full year option will make this even more suitable for students.

This proposed 'streamed' major program is rigorous and fits with our academic mission and plans. The following groups have been consulted for this proposal and we have not received any concerns: Chairs of Ecology and Evolutionary Biology, Cell and Systems Biology, Anthropology, University of Toronto Mississauga's Director of Forensics and the Director of the Human Biology Program, St. George.

***Learning Objectives*:**

- To provide a foundation for students with an academic interest in human or health-related sciences.
- To provide students with an understanding of the biological foundations of health in humans.
- To provide students with the tools necessary to understand, and critically-examine health-related human issues in the broader context of the biological sciences
- To provide a competitive advantage amongst our students when applying to professional programs or for positions in health-related industries.

Program Requirements

Biology for Health Sciences – Major

This program focuses on areas of biological science that relate to the health of humans and will provide a biological foundation for the health sciences.

Limited enrolment Enrolment in the Major Program is limited to students who have completed 4.0 credits (including BIO152H5 and BIO153H5) and who have achieved a CGPA of at least 2.5

8.0 credits are required including at least 2.0 at the 300/400 level.

1. BIO152H5, 153H5; CHM140Y5; MAT132Y5/134Y5*/135Y5/137Y5

2. BIO206H5, 207H5, 210Y5, 310H5, 380H5, (BIO360H5/STA220H5/PSY201H5)

3. 1.5 credits from one of the following lists:

   Cell, Molecular, and Biotechnology Stream:
   BIO200H5, 215H5, 314H5, 315H5, 370Y5, 372H5, 374H5, 477H5; JBC472H5

   Neuroscience Stream:
   BIO215H5, 304H5, 315H5, 403H5, 409H5, 411H5, 434H5

   Genes and Behaviour Stream:
   BIO215H5, 315H5, 318Y5, 341H5, 361H5, 407H5, 434H5, 442H5, 443H5

*MAT134Y5 - Calculus for Life Sciences is highly recommended.

Program by course listings

First Year: BIO152H5, BIO153H5 – Introduction to Evolution and Evolutionary Genetics; Diversity of Organisms
CHM140Y5 – The study of Matter and its Transformations
MAT132Y5/134Y5*/135Y5/137Y5 – Mathematics
Total - 3.0 FCE

Second Year and Third Year:
BIO206H5 – Introductory Cell and Molecular Biology
BIO207H5 – Introductory Genetics
BIO210Y5 – Fundamentals of Human Anatomy and Physiology
BIO360H5 / STA220H5 / PSY201H5 – Statistics
BIO310H5 – Integrative Animal Physiology
BIO380H5 – Human Development
Total – 3.5 FCE, cumulative FCE = 6.5

1.5 Full credits from **one** of the following lists:

Cell, Molecular, and Biotechnology Stream:
BIO200H5 – Introduction to Pharmacology: Pharmacokinetic Principles
BIO215H5 – Laboratory in Molecular Biology and Genetics
BIO314H5 – Laboratory in Cell and Molecular Biology
BIO315H5 – Human Cell Biology
BIO370Y5 – Microbiology or BIO371H – Lectures in Microbiology
BIO372H5 – Molecular Biology
BIO374H5 – Biotechnology and Society
BIO477H5 – Molecular Biology of Gene Expression and Cancer
JBC472H5 – Seminars in Biotechnology

Neuroscience Stream:
BIO215H5 – Laboratory in Molecular Biology and Genetics
BIO304H5 – Physiology of Neural Systems
BIO315H5 – Human Cell Biology
BIO403H5 – Developmental Neurobiology
BIO409H5 – Laboratory in Physiology
BIO411H5 – Topics in Molecular and Cellular Physiology
BIO434H5 – Sensory Biology

Genes and Behaviour Stream:
BIO215H5 – Laboratory in Molecular Biology and Genetics
BIO315H5 – Human Cell Biology
BIO318Y5 – Animal Behaviour / BIO328H– Lectures in Animal Behaviour
BIO341H5 – Advanced Genetics
BIO361H5 – Biometrics II
BIO407H5 – Behavior Genetics
BIO434H5 – Sensory Biology
BIO442H5 – Mechanisms of Evolution
BIO443H5 – Phylogenetic Principles

* MAT134Y5 – Calculus for Life Sciences is highly recommended.

Environmental Management Minor, BA
Environmental Science Minor, BSc

Academic Rationale

Ever since the major reorganization of Environment programs was undertaken at the University of Toronto Mississauga in 1995, students have expressed a strong interest in having the option of a Minor programs in Environmental Management and Environmental Science to complement their discipline-based studies. The interdisciplinarity of the Environment Major programs makes them ideal in combination with discipline-based programs; the existence of a Minor in Environmental Management as well as a Minor in Environmental Science will give additional flexibility for students to add an applied focus on the environment to their discipline-based studies.

A core group of courses have been selected for the programs that provide the new Minors a distinct identity while still maintaining interdisciplinarity. At least four different disciplines must be represented among the program-related course selections.

Learning Outcomes

All of the Environmental Management/Science programs, including the proposed Minor, start from a Science core course (ENV100Y5 The Environment). In this course students acquire a **basic scientific understanding** of the functioning of the natural environment and human impacts on the natural system. They are taught to think like scientists and to approach environmental issues from a **critical analytical perspective**. Students emerge from this course with the essential Science background to continue in upper-level courses in a variety of disciplines, including Biology, Earth Science, and Geography; the fact that the course is accepted as a prerequisite for upper-level coursework in these (and other) departments is a testament to both the **depth and breadth of content knowledge** students gain through the course. An additional core course in the Minor is ENV201H5, Environmental and Resource Management (SSc). This course focuses on **integrating** the scientific background gained in ENV100Y5Y with **social, economic, and policy approaches** to environmental, resource, and land management.

The concept of **interdisciplinary literacy** has guided the Environment programs at U of T Mississauga from the beginning. It remains a valid philosophical grounding in today's world, where both social awareness on the part of scientists and scientific literacy on the part of policy makers are more important than ever.

One of the core philosophies with regard to the role of the Environment programs in combined degree programs is that the discipline-based course of study gives the student an academic core, while the interdisciplinary course of study gives the student a **practical, applied focus on environmental issues**. This philosophy has worked well for UTM students.

The Department has significant contact with employers in the Environment industry, through their experiential learning and community-based research opportunities, and they tell us that they, too, appreciate the value of a solid, discipline-based foundation combined with an applied focus on environmental issues. In addition to ENV100Y5 and ENV201H5, an integral aspect of all of the Environment programs, including the proposed Minor program, is the opportunity for students to

pursue **fieldwork, independent research opportunities, and/or a service-learning or experiential learning opportunity**.

Through coursework, experiential and service learning, research opportunities, and abundant extracurricular opportunities associated with the program, students will have the opportunity to gain an understanding of the **professions** within the interdisciplinary field of environmental science.

Program requirements
Environmental Management Minor (Arts)

The Environmental Management (H.B.A.) programs (Specialist, Major, and the proposed Minor) focus primarily on the social, economic, and policy aspects of the study of the environment. The programs draw from a variety of disciplines, mainly in the Humanities and Social Sciences. Students specialize through the design of their individual pathway through Environmental Management, customizing the program to suit their interests and skills.

No matter which pathway is taken, students in the Environmental Management (H.B.A.) program streams – even though they are mainly Arts-based students – are expected to take some basic Science courses. The premise is that those who will set environmental policy and guide society through our current environmental challenges should have some basic scientific understanding, in addition to having a firm grounding in social, policy, and/or economic aspects of environmental studies.

4.0 credits are required, of which at least 1.0 must be at the 300 level. Enrolment in this program is limited to students who have completed ENV100Y5 with a mark of 60% or higher.

First Year		
Introduction/Foundation	ENV100Y5	The Environment
Second Year		
Environmental Management Core	*ENV201H5	Environmental and Resource Management
Social Science/Humanities Perspectives	ENG259H5	Literature and the Environment
	GGR202H5	Where in Canada?
	GGR207H5	Cities, Urbanization and Development
	GGR208H5	Places and People
	GGR209H5	People, Money and Places
	GGR288H5	World Fresh Water Resources
	PHL255H5	Philosophy of Science
	PHL273H5	Environmental Ethics
	POL250Y5	Environmental Politics in Canada
	SOC226H5	Sociology of the Environment
Scientific Perspectives	BIO201H5	The Biology Behind the News
	BIO205H5	Ecology
	ERS201H5	Earth Materials
	GGR214H5	Global Weather and Climate
	GGR217H5	The Global Water Cycle
	GGR227H5	Ecosystems and Environmental Change
	PHY237H5	The Physics of the Climate System
Upper Years		
Experiential, Field & Research Perspectives	ENV232H5	Environmental Sustainability Practicum
	ENV299Y5	Research Opportunity Program
	GGR379H5	Field Methods in Physical Geography

	GGR389H5	Field Studies in Human Geography
Additional Credits Chosen from this List	ANT368H5	World Religions and Ecology
	ECO373Y5	The Environment: Perspectives from Economics and Ecology
	*ENV393H5	Methods of Environmental Assessment
	GGR329H5	Environment and the Roots of Globalization
	GGR333H5	Energy and Society
	GGR345H5	Environmental Issues in the Developing World
	GGR348H5	The Great Lakes – A Sustainable Natural Resource?
	GGR349H5	Cities in Transition
	GGR361H5	City Planning and Development
	GGR365H5	Trade and Globalization
	GGR367H5	India and South Asia
	GGR369H5	The Changing Geographies of Latin America
	GGR370H5	Planes, Trains and Automobiles: The Geography of Transportation
	GGR378H5	Natural Hazards: Risks and Vulnerability
	GGR380H5	Communicating with Maps
	HIS318H5	Canadian Environmental History: Contact to Conservation
	HIS318H5	Canadian Environmental History: Conservation to the Modern Environmental Movement
	HPS328H1	Environment, Science and Crisis
	MGT394H5	Legal Environment of Business II
	PHL373H1	Issues in Environmental Ethics
	POL343Y5	Politics of Global Governance
	SCI398Y5	Science Education
	SOC319Y5	Gene Culture Co-Evolution
	SOC339H5	Social and Ecological Issues in Globalization
	SOC349H5	Sociology of Food
	SOC355H5	Introduction to Demographic Methods
	SOC356H5	Population and Society
	WRI375H5	Writing about Environment and Ecology

* New course for 2009-2010

Note: This is intended to be an **interdisciplinary** program. At least four different disciplines must be represented among the courses that are counted as program requirements. For example, a course list selected from ENV + GGR + HIS + PHL is acceptable, but a course list selected only from ENV + GGR + HIS is not; a course list selected from ENV + HIS + ECO + POL is acceptable, but a course list selected only from ENV + HIS + POL is not.

Program requirements
Environmental Science Minor (Science)

The Environmental Science (H.B.Sc.) programs (Specialist, Major, and now the Minor) draw from a variety of disciplines, mainly in the Sciences. The programs, including the proposed Minor, offer an opportunity to acquire a broad foundation in the interdisciplinary sciences required to understand and find solutions for complex environmental problems. Students can tailor the scientific focus of the programs to their specific interests.

No matter which pathway is followed through Environmental Science, some coursework on social and policy perspectives are a required part of the program. The premise is that those who will

develop our scientific knowledge and technological capacities, and whose scientific research will guide environmental policy must also have a basic understanding of the social, economic, and policy implications of their work.

4.0 credits are required, of which at least 1.0 must be at the 300 level. At least four different disciplines* must be represented among the 4.0 credits that are counted as program requirements. Enrolment in this program is limited to student who have completed ENV100Y5 with a mark of 60% or higher.

First Year		
Introduction	ENV100Y5	The Environment
Second Year		
Environmental Management Perspectives	*ENV201H5	Environmental and Resource Management
Biological & Ecological Perspectives	BIO201H5	The Biology Behind the News
	BIO204H5	Introduction to Physiology
	BIO205H5	Ecology
	BIO206H5	Introductory Cell and Molecular Biology
Geographical & Earth Science Perspectives	GGR214H5	Global Weather and Climate
	GGR217H5	The Global Water Cycle
	GGR227H5	Ecosystems and Environmental Change
	ERS201H5	Earth Materials
	ERS202H5	Dynamic Earth
	ERS203H5	Rock Forming Processes
Upper Years		
Field, Experiential & Research Perspectives	ANT318H5	Archaeological Fieldwork
	BIO301H5	Marine Biology
	BIO302H5	Arctic Ecology
	BIO313H5	Field Methods and Quantitative Analyses in Ecology
	BIO316H5	Field Course in Ecology
	*BIO329H5	Mammalian Biology
	ERS325H5	Field Camp I
	ENV232H5	Environmental Sustainability Practicum
	ENV299Y5	Research Opportunity Program
	ENV399Y5	Research Opportunity Program
	GGR317H5	Glaciers
	GGR379H5	Field Methods in Physical Geography
	SCI398Y5	Science Education
Biogeochemical Perspectives	*BIO311H5	Landscape Ecology
	BIO330H5	Plant Ecology
	*BIO333H5	Freshwater Ecology
	BIO373H5	Microbial Ecology
	CHM311H5	Instrumental Analytical Chemistry
	CHM333H5	Bioinorganic Chemistry
	CHM347H5	Organic Chemistry of Biological Compounds
	CHM361H5	Structural Biochemistry
	CHM362H5	Metabolism and Bioenergetics
	CHM391H5	Instrumental Laboratory
	CHM393H5	Chemical Synthesis Laboratory
	ERS315H5	Environmental Geology
	ERS321H5	Past and Present Global Change
	GGR305H5	Biogeography
	GGR307H5	Environmental Soil Science
	GGR309H5	Wetlands: Science, Management and Preservation

	GGR311H5	Landscape Biogeography
	GGR315H5	Physical Hydrology
	GGR316H5	Landforms
	GGR317H5	Glaciers
	GGR321H5	Geographic Information Processing
	GGR337H5	Environmental Remote Sensing
	GGR338H5	Environmental Modeling
	GGR372H5	Geographical Analysis of Land Resources
	GGR375H5	Physical Environmental of the City
	GGR377H5	Global Climate Change
	GGR378H5	Natural Hazards: Risks and Vulnerability
	JBG312H5	Landscape Ecology of Animal Populations
	PHY331H5	Foundations of Biophysics
	PHY332H5	Molecular Biophysics

* New course for 2009-2010

Note: This is intended to be an **interdisciplinary** program. At least four different disciplines must be represented among the courses that are counted as program requirements. For example, a course list selected from ENV + BIO + ERS + GGR is acceptable, but a course list selected only from ENV + BIO + GGR is not; a course list selected from ENV + BIO + ERS + CHM is acceptable, but a course list selected only from ENV + BIO + ERS is not.

Proposed Deleted Programs – Curriculum 2008

Environmental Analysis and Monitoring (Science): Major & Specialist
Environment and Human Society (Arts): Major

It has been the consensus for a number of years among those involved in the interdisciplinary Environment and Human Society program and the Environmental Analysis and Monitoring programs to discontinue them, due to the historically low enrollments in each. These changes to the programs are a consolidation of four program streams into two; and the two programs that remain are a harmonization of the content and objectives of the original four.

The Environmental Analysis and Monitoring Major & Specialist will be combined with the better-subscribed Environmental Science Specialist Program (Science). Within the new Environmental Science Specialist it will still be feasible for students to follow a pathway that emphasizes the application of laboratory analytical sciences to environmental problems. The originator of these programs has been consulted and the discontinuation has been approved. The current enrollment in the Major program is 2 students while the Specialist has only 1 registered student; the program will not be disestablished until all of the students currently registered in it have graduated.

Along with the Environmental Analysis Major & Specialist programs proposed for discontinuation, the Environment and Human Society Major program will be discontinued and its content and objectives merged into the Environmental Management Major Program (Arts). Within the new Environmental Management Major Program it will still be feasible for students to follow a pathway that emphasizes the application of concepts and knowledge from the Humanities (Philosophy, History, etc.) to the understanding of environmental problems. The originators of this program have been consulted and have approved the discontinuation of this program. At present there are 15 students registered in the Environment and Human Society Major; the program will not be disestablished until all of the students currently registered in it have graduated.

Health Sciences Communication (Science): Specialist

Since its inception in 2005, the Health Sciences Communication Specialist program in CCIT has attracted only two students. To date, none have graduated. The reason for the low participation is that students in CCIT do not have the requisite science background for the HSC Specialist program, nor do they typically possess the required GPA. In 2007, the Health Sciences Communication Major program was designed to replace the Specialist Program eventually. The course selection is similar to the Specialist Program; however, the number of Biology courses and minimum GPA were lowered. It is recommended that interested students consider the Health Science Communication Major.

The discontinuation of the Health Sciences Communication Specialist program is in line with the academic direction the Institute is seeking to establish. .