3325 The Irish and Atlantic Canada [IRST 3325]
3 credit hours
Prerequisite: 30 credit hours & ACST 1000 or permission of instructor

This interdisciplinary course will offer a survey of the history and culture of people of Irish descent in the Atlantic Region. Topics will include Irish settlement in the Atlantic Region, religion and politics, sectarian conflict, social status, community organizations and contemporary Irish identity in the Atlantic Region.

3826 – 3849 Selected Topics in Atlantic Canada Studies II
3 credit hours
This semester course will provide the student with an opportunity to take courses on specific Atlantic Canada topics which do not fit in with the standard offerings of other departments of the University.

4411 Atlantic Canada Seminar I
3 credit hours
Prerequisite: a minimum of thirty (30) credit hours.

This course will provide an opportunity for students to integrate their knowledge of Atlantic Canada in an interdisciplinary fashion. Drawing upon the expertise of a number of guest speakers familiar with various aspects of Atlantic Provinces life, the course will deal with such topics as the Atlantic fishery, agriculture, industry and labour, business enterprise, regional protest and cultural ethnicity.

4412 Atlantic Canada Seminar II
3 credit hours
Prerequisite: ACST 4411

This course will continue the work of ACST 4411. In addition, students will be afforded an opportunity to use the vast quantity of primary source material at the Public Archives of Nova Scotia and other local repositories.

4500.0 Honours Seminar
6 credit hours
Prerequisite: a minimum of sixty (60) credit hours.

These courses will provide an opportunity for honours students to integrate their knowledge in an interdisciplinary fashion.

4511 - 4512 Honours Seminar
3 credit hours
Prerequisite: a minimum of sixty (60) credit hours.

These courses will provide an opportunity for honours students to integrate their knowledge in an interdisciplinary fashion.

4876 - 4899 Directed Readings
3 credit hours
Prerequisite: permission of ACST Coordinator.

These courses provide opportunities to study a particular subject in detail. They will normally require a considerable amount of independent, though supervised, study.

Biology (BIOL)

Chairperson, Associate Professor	H. Broders,
Professors	D. Cone, T. Rand, D. Strongman, K. Vessey
Associate Professors	C. Barber, S. Bjornson, Z. Dong, J. Lundholm, R. Russell, G. Sun
Assistant Professor	T. Frasier
Adjunct Professors	M. Agbeti, T. Franz-Odendaal, K. Harper, B. Hicks, M. Jones,, G. Kernaghan, P. Miller, H. Murray
Professor Emeritus	A. Rojo
Dean Emeritus	D. Richardson

Department website:
http://www.smu.ca/academic/science/biology

The Department offers a concentration, major, honours, and minor in biology. The major in Biology has two recommended tracks: Pre-Health Sciences and Ecology and Evolution. It is possible to complete a Biology program by selecting courses from both tracks. A double major or double honours in Biology and another science can be done. Students may pursue a cooperative education option. See the Co-operative Education Office for details.

The Department trains graduate students through the MSc in Applied Science program. Consult the Graduate Academic Calendar for details.

Major in Biology

For a major in Biology, students must complete the following, which include courses that apply to the general requirements for the Bachelor of Science (see Section 3 for details on the requirements for BSc with major):

- Six (6) credit hours in Mathematics at the 1210 level or above
- BIOL 1201 Molecular and Cell Biology
- BIOL 1202 Organismal and Ecological Biology
- CHEM 1210 General Chemistry I
- One of CHEM 1211, 1212 or 1213 General Chemistry II
- Any five of the six 2000-level Biology courses (15 credit hours)
  - BIOL 2004 Cell Physiology and Metabolism
  - BIOL 2307 Genetics
  - BIOL 2308 Biostatistics
    or PSYC 2350 Psychological Statistics (Students will not receive credit for both)

  - BIOL 2321 Cell Biology I
  - BIOL 2324 Ecology
  - BIOL 2423 Evolution
- One of either CHEM 2344 or CHEM 2346
- 24 credit hours of Biology electives at the 3000 and 4000-level, with at least 9 credit hours at each of the 3000 and 4000 level.

Up to six (6) credit hours of BIOL electives may be substituted with any of the following:

ANTH 3471 Forensic Skeletal Identification
ANTH 3472 Forensic Skeletal Analysis
CHEM 3451 Introductory Biochemistry
CHEM 4452 Biochemistry: Metabolism
GEOL 2335 Paleobotany
PSYC 2350 Psychology Statistics (Group C)
PSYC 4407 Introduction to Ethnology

Note that these courses cannot count simultaneously as Biology electives and "other Science electives" (Regulation 6e) or Arts electives (Regulation 6c) for the Bachelor of Science with major.

Recommended Tracks for Biology Majors

Note that the prerequisites required for courses listed in the two tracks may not appear in each of the lists below. Students will not be able to enroll in a course without the prerequisites.

1) Pre-Health Sciences Track

The Pre-Health Sciences Track is for students interested in pursuing careers in Medicine, Dentistry, Pharmacy, Optometry, Veterinary Medicine, Chiropractic, Genetic Counseling, Hospital Administration, Medical Technology and Diagnostics, Nursing, Paramedical Services, Physiotherapy and Podiatry. It provides all of the foundation courses usually required for admission to these programs. The track also accommodates interests in specialty topics such as Cell and Molecular Biology, Genetics, Histology, Microbiology and Physiology. Students are encouraged to enroll in health related electives in Arts and Business that complement this track. Details on the admission requirements to health profession programs can be obtained from the Science Academic Advisor.

Recommended Pre-Health Biology courses:

BIOL 3001 Principles of Pharmacology and Toxicology
BIOL 3003 Biological Techniques
BIOL 3005 Human Organ Systems
BIOL 3100 Biology of Human Health
BIOL 3398 Microbiology
BIOL 3420 Cell Biology II
BIOL 3426 Animal Tissues
BIOL 4002 Medical Mycology
BIOL 4004 Advanced Biostatistics
BIOL 4411 Medical and Veterinary Parisitology
BIOL 4414 Environmental Microbiology
BIOL 4408 Animal Developmental Biology
BIOL 4419 Molecular Biology
BIOL 4432 Medical and Veterinary Entomology
BIOL 4433 Ecotoxicology

PHYS 1000 or 1001 may be required for some health profession programs. Students are encouraged to take CHEM 2345 or 2346

2) Ecology and Evolution Track

This track is intended for students wishing to pursue careers as biologists with government or private labs, teachers, or those pursuing graduate study.

BIOL 3002 Entomology
BIOL 3003 Biological Techniques
BIOL 3006 Animal Ecophysiology
BIOL 3303 Plant Form and Function
BIOL 3304 Animal Form and Function
BIOL 3329 Systematics
BIOL 3402 Population Genetics
BIOL 3412 Ecology of Animal Parasites
BIOL 3416 Mycology
BIOL 3420 Cell Biology II
BIOL 3421 Applied Plant Biology
BIOL 3424 Diversity and Ecology in Fishes
BIOL 4003 Molecular Ecology
BIOL 4004 Advanced Biostatistics
BIOL 4006 Plant-microbe Interactions
BIOL 4007 Bioinformatics and Genomics
BIOL 4331 Ecosystems
BIOL 4404 Behavioural Ecology
BIOL 4410 Plant Ecology
BIOL 4418 Plant Physiology
BIOL 4419 Molecular Biology
BIOL 4422 Conservation Biology
BIOL 4430 Ornithology
BIOL 4431 Herpetology
BIOL 4433 Ecotoxicology
BIOL 4434 Communication and Defense in Biological Systems
BIOL 4448 Biology Field Course
BIOL 4451 Ecology in the Tropics

Suggested Schedule

The following Schedule is suggested for students taking the Biology major program:

Year 1:

- ENGL 1205 Introduction to Literature
- BIOL 1201 Molecular and Cell Biology
- BIOL 1202 Organismal and Ecological Biology
- CHEM 1210 General Chemistry I
- One of CHEM 1211, 1212 or 1213 General Chemistry II
- Six (6) credit hours in Mathematics at the 1210 level or above
- Six (6) credit hours from Arts or Economics
- Three (3) credit hours from humanities

Year 2:
- Five of the six 2000-level Biology courses (15 credit hours)
  - BIOL 2004 Cell Physiology and Metabolism
  - BIOL 2307 Genetics
  - BIOL 2308 Biostatistics
    or PSYC 2350 Psychological Statistics
  - BIOL 2321 Cell Biology I
  - BIOL 2324 Ecology
  - BIOL 2423 Evolution
- CHEM 2344 Organic Chemistry I or 2346.1(.2) Organic Chemistry for Life Sciences
- Six (6) credit hours non-Biology science
- Three (3) credit hours in the humanities
- Three (3) credit hours of electives

Year 3:
- Twelve (12) credit hours BIOL at the 3000 level or above
- Nine (9) credit hours non-Biology science
- Three (3) credit hours from Arts or Economics
- Six (6) credit hours of electives

Year 4:
- Twelve (12) credit hours BIOL at the 4000 level or above
- Eighteen (18) credit hours of electives

Double Major in Biology

To complete a double major in Biology and another science, students must complete all of the major requirements above, except that they need only complete eighteen (18) credit hours of BIOL electives at the 3000 and 4000-level, with at least six (6) credit hours at each of the 3000 and 4000-levels.

Honours in Biology

Students with a cumulative GPA of 3.00 or above are encouraged to apply for admission to the honours program. It is the student's responsibility to secure a supervisor for the honours thesis (BIOL 4500) before enrolling in the honours program. Check the Department website for research interests of the faculty. For honours in Biology, students must fulfill the major requirements plus

BIOL 4549 Honours Seminar
BIOL 4500 Honours Thesis
Three (3) additional credit hours in Biology at the 3000-level and three (3) additional credit hours in Biology at the 4000-level, for a total of 30 credit hours of Biology electives at the 3000 and 4000-level, with at least 12 credit hours at each of the 3000 and 4000-levels.

Students must achieve a Degree GPA of 3.00 or above on all those courses presented in fulfillment of the Bachelor of Science with Honours in Biology requirements.

Double Honours in Biology

The requirements from biology for Double Honours (which includes Biology) are the same as those for the major, plus
BIOL 4549 Honours Seminar
BIOL 4500 Honours Thesis

Students must achieve a Degree GPA of 3.00 or above on those courses presented in fulfillment of the Bachelor of Science with Honours in Biology requirements.

Concentration in Biology:

Students interested in a career in the health professions are advised not to pursue a 3 year BSc with concentration in Biology as a 4 year degree is required for admission to most programs.

Requirements for a 3 year BSc with concentration in Biology are as follows (in addition to the normal requirements for the Bachelor of Science):

- Six (6) credit hours in Mathematics at the 1210 level or above
- CHEM 1210.1(.2) General Chemistry I
- One of CHEM 1211.1(.2), 1212.1(.2) or 1213.1(.2) General Chemistry II
- CHEM 2344.1(.2) Organic Chemistry I or CHEM 2346.1(.2) Organic Chemistry for Life Sciences
- BIOL 1201.1(.2) Molecular and Cell Biology
- BIOL 1202.1(.2) Organismal and Ecological Biology
- Any five of the six 2000-level Biology courses (15 credit hours)
  - BIOL 2004.1(.2) Cell Physiology and Metabolism
  - BIOL 2307.1(.2) Genetics
  - BIOL 2308.1(.2) Biostatistics
    or PSYC 2350.1(.2) Psychological Statistics
  - BIOL 2321.1(.2) Cell Biology I
  - BIOL 2324.1(.2) Ecology
  - BIOL 2423.1(.2) Evolution

Nine (9) credit hours of BIOL at the 3000 level or above

Minor in Biology:

Requirements for a minor in Biology are:
- BIOL 1201 Molecular and Cell Biology
- BIOL 1202 Organismal and Ecological Biology
- Any five of the six 2000-level Biology courses (15 credit hours)
  - BIOL 2004 Cell Physiology and Metabolism
  - BIOL 2307 Genetics
  - BIOL 2308 Biostatistics
    or PSYC 2350 Psychological Statistics
  - BIOL 2321 Cell Biology I
  - BIOL 2324 Ecology
  - BIOL 2423 Evolution

Nine (9) other credit hours in BIOL the 3000-level or above.

All of the following courses have a 3 hour per week lab component unless otherwise noted. Students must pass both the laboratory and the lecture components of a course to pass the course. Majors must achieve a minimum grade of C in all BIOL courses applied to their degree.

Course Descriptions

1201 Molecular and Cell Biology
3 credit hours
Prerequisite: Nova Scotia Grade 12 BIO or equivalent.

An introductory study of the principles and organization of life including molecular, cell biology and heredity.

1202 Organismal and Ecological Biology
3 credit hours
Prerequisite: Nova Scotia Grade 12 BIO or equivalent.

An introductory study of the principles and organization of life including anatomy, form and function, physiology, life history and ecology.

1203 Biology and the Human Environment (for non-science students) [ENVS 1203]
6 credit hours
This course has no lab component.

Note: Please note that this course may not be used by B. Sc. Students to satisfy the requirement of a science elective under regulations 3.e., 6.e., 10.c., and 12.b. for B.Sc. degrees.

1204 Biology and the Human Environment I
3 credit hours
This course explores core concepts in Biology with emphasis on understanding the nature of scientific enquiry and current issues in society. Topics covered will include ecology and the environment; diversity and evolution; inheritance; genetics and biotechnology.

Note: This course is for students who do not intend to major in BIOL. This course can not be used toward a BIOL major and credit will not be given for this course if taken after completion of BIOL 1201 and/or BIOL 1202.

1205 Biology and the Human Environment 2
3 credit hours
Prerequisite: BIOL 1204.

An introduction to the biological basis of human interactions with other species including the biology of domesticated plants and animals; food production systems from hunter-gatherer to modern agriculture; fisheries and aquaculture; and the human-companion animal bond.

Note: This course is for students who do not intend to major in BIOL or do not have the prerequisite for BIOL 1201 and BIOL 1202. This course can not be used toward a BIOL major and credit will not be given for this course if taken after completion of BIOL 1201 and/or BIOL 1202.

2004 Cell Physiology and Metabolism
3 credit hours
Prerequisite: BIOL 1201

This course is designed to a thorough understanding of the life-sustaining physiological and biophysical concepts associated with cell and tissue processes (including those of humans). Topics covered include membrane structure and function, enzymes and enzyme kinetics, bioenergetics, signal transduction, regulation and homeostasis.

2307 Genetics
3 credit hours
Prerequisite: BIOL 1201.

Principles and history of heredity. Gene interactions, association of genes on eukaryotic chromosomes. Autosomal and sex-linked genetic inheritance and sex determination. Statistical test of genetic hypotheses. Laboratory study includes genetic experiments and problem solving.

2308 Biostatistics
3 credit hours
Prerequisite: BIOL 1202.

Introduction to the methods of analyzing quantitative data in the biological sciences. The emphasis will be on practical applications of statistics in biology and its graphical presentation. Descriptive statistics, distributions, regression, correlation, analysis of variance, and sampling methods will be covered. This course is recommended for biology majors. **NOTE: Students will not receive credit for both BIOL 2308 and PSYC 2350.**

2321 Cell Biology I
3 credit hours
Prerequisite: BIOL 1201

An introduction to the eukaryotic cell with emphasis on the chemical and genetic basis of cellular activities and the division of the cell into membrane-bound and biochemically specialized compartments. The plasma membrane, cytosol, nucleus, cytoskeleton, Golgi apparatus, mitochondrion, chloroplasts and endoplasmic reticulum will be considered.

2324 Ecology
3 credit hours
Prerequisite: BIOL 1202.

A study of modern ecology including energy flow, biogeochemical cycles, population biology and community structure. Field trips are an important part of the laboratory component.

2423 Evolution
3 credit hours
Prerequisite: BIOL 1201.and BIOL 1202

The Darwinian natural selection hypothesis. History of biological evolution from the 16th century. The modern synthesis of genetics and natural selection. Laboratory data analysis and problem solving.

3001 Principles of Pharmacology and Toxicology
3 credit hours
Prerequisite: BIOL2004 and BIOL 3005 (formerly BIOL 2005.

This course is designed to provide students with a working knowledge of the fundamental principles of pharmacology and toxicology. This course will emphasize the basic concepts required to understand drug/toxin action and

disposition. The second unit will cover topics that are related to the pharmacological management of pathologies associated with selected body systems and will includeantimicrobial agents. In addition, the effect of environmental toxicants on selected body systems will be studied.

3002 Entomology
3 credit hours
Prerequisite: BIOL 3304 (formerly BIOL 2001, or BIOL 2326)

An introduction to the fascinating world of insects, their anatomy, physiology, taxonomy and ecology. Topics covered include the impact of insects on human activities, adaptations in insects that suit their habitat, and biological control.

3003 Biological Techniques
3 credit hours
Prerequisite: BIOL 1201 and 1202.

This course examines fundamental concepts and field and laboratory methods in Biology. Students will get exposure to basic biological techniques including: use and calibration of microscopes; use of dichotomous keys for identification of organisms; separation and quantitation techniques; sterile technique; safety and quality control procedures; as well as basic ecological sampling methods.

3005 Human Organ Systems
3 credit hours
Prerequisite: BIOL 2004

This course is designed to provide the student with an understanding of the organ and system levels of the human body. Unifying themes of anatomy and physiology including the interrelationships of body organ systems, homeostasis and complementarities of structure and function will be emphasized. Topics covered in this course will include integumentary, skeletal, nervous, endocrine and muscular systems. Problem-based learning tutorials will allow students to apply their knowledge to clinical situations.

3006 Animal Ecophysiology
3 credit hours
Prerequisite: BIOL 2004

This course addresses the diversity of physiological adaptations of vertebrates to their environment. Topics covered include the interrelationship between physiology and ecology, and the effects of environmental factors such as temperature, pH, salinity and oxygen debt on animal activity.

3100 Biology of Human Health
3 credit hours
Prerequisite: BIOL 1201 and 1202.

This course will provide students with scientific knowledge of the human body and factors that affect the health and wellness of humans. Specific topics will include: (1) Body organization, (2) Human development, maturity and aging and the effects of external factors on these processes, (3) General mechanisms of homeostasis and examples of clinical conditions that may occur when the body is out of homeostasis, (4) Human disease and transmission/tracking of human pathogens, and (5) Effects of fitness and nutrition on human health. Students will develop critical thinking skills as well as scientific writing and presentation skills. This course will be a valuable introduction for students interested in pursuing a career related to human health or veterinary medicine.

3303 Plant Form and Function
3 credit hours
Prerequisite: BIOL 1201 and 1202.

Taxonomic treatment of major plant phyla (including nonvascular and vascular plants) with reference to anatomy, function and ecological significance.

3304 Animal Form and Function
3 credit hours
Prerequisite: BIOL 1201 and 1202.

This course will introduce students to the taxonomic treatment of major animal phyla with reference to anatomy, function and ecological significance.

3329 Systematics
3 credit hours
Prerequisite: BIOL 1201.and BIOL 1202.

This course examines the fundamentals of animal and plant systematics including rules of nomenclature, the basis of classification, and the theory of phylogenetics.

3398 Microbiology
3 credit hours
Prerequisite: BIOL 1201.and BIOL 1202

This course is designed to introduce students to the world of microorganisms. Topics covered include morphology, classification, taxonomy, and metabolism of bacteria, fungi, and viruses.

3402 Population Genetics
3 credit hours
Prerequisite: BIOL 2307.

The measurement of gene frequencies in a population and the factors which affect these frequencies (including mutation, genetic drift, migration, and natural selection) will be considered conceptually and mathematically.

3416 Mycology
3 credit hours
Prerequisites: BIOL 1202

Introduction to the fungi. Students will become familiar with the members of this diverse group of organisms by studying the morphology and ecology of representatives from each of the major taxonomic groups. Important physiological processes, growth and metabolism will also be discussed.

3420 Cell Biology II
3 credit hours
Prerequisite: BIOL 3321.

An investigation of specific functions of the eukaryotic cell, particularly those that are important in multicellular organisms. Topics include cell division, cell signaling,

neurons, cells of the immune system, the extracellular matrix, cellular differentiation and cancer.

3421 Applied Plant Biology
3 credit hours
Prerequisite: BIOL 3303 (formerly BIOL 2303).

The application of botany, plant physiology and anatomy and plant ecology to the problems of human societies. An introduction to the study of plants used by people, their origin, domestication, botany, cultivation, harvesting, uses, diseases, breeding, and their role in the modern world economy. Plants and plant products of industrial importance, medicinal plants, food plants, psychoactive plants, and food additives will be examined in detail.

3424 Diversity and Ecology of Fishes
3 credit hours
Prerequisite: BIOL 2324.

The study of ecology of fishes, their classification, life history and global distribution. The laboratory portion of the course emphasizes study of representatives of world taxa and the fishes of Nova Scotia.

3426 Animal Tissues
3 credit hours
Prerequisite: BIOL 3005 (formerly BIOL 2005)

An introduction to the structure and function of animal tissues. Laboratory work will involve the interpretation of histological preparations of representative vertebrate tissues.

4002 Medical Mycology
3 credit hours
Prerequisite: BIOL 3416

This course examines the impact of fungi on human health. Topics include pathogens, allergens, dermatophytes and the impact of toxin-producing species on humans and food safety.

4003 Molecular Ecology
3 credit hours
Prerequisite: BIOL 2324 and BIOL 4419

This course introduces students to current molecular biology techniques and associated analyses that are most frequently used in ecological research will be covered. Specific applications of molecular ecology in natural populations of animals, microbes and plants will be discussed. This course will give students conceptual understanding of molecular techniques and their application in natural populations.

Three hours per week.

4004 Advanced Biostatistics
3 credit hours
Prerequisite: BIOL 2308 or PSYC 2350

This course will provide students with the basic tools to design and conduct biological experiments. Topics will include analysis of variance, regression, multivariate analysis, nonparametric methods, and model selection.

4006 Plant-microbe Interactions
3 credit hours
Prerequisite: BIOL 3303 (formerly BIOL 2303)

This course will cover some of the practical aspects of plant microbial relationships such as viruses, bacteria, fungi and some protists..

4007 Bioinformatics and Genomics
3 credit hours
Prerequisite: BIOL 4419

This course provides an introduction and overview to the fields of bioinformatics and genomics, covering genomics technologies, bioinformatics technologies and their use in analysis and interpretation of genomics data. The aim is to provide practical descriptions of the topics, tools and current trends instead of the theoretical and computational aspects of the field.

4331 Ecosystems
3 credit hours
Prerequisite: BIOL 2324

Development of the ecosystem concept in modern Biology. Specific topics include energy and material flow, food webs, ecosystem engineers, directionality and succession and ecosystem health.

4404 Behavioral Ecology
3 credit hours
Prerequisite: BIOL 2324 and BIOL 2308 or PSYC 2350 or MATH 1216.

Study of animals and how they interact in their environment with emphasis on the adaptive value of behavior. Students will conduct independent research in labs.

4408 Animal Developmental Biology
3 credit hours
Prerequisite: BIOL 2004

Early developmental processes involved in the transformation of the fertilized egg into a new individual.

4410 Plant Ecology
3 credit hours
Prerequisite: BIOL 3303 (formerly BIOL 2303 and BIOL 2324)

This is a hands-on course on the identification and ecology of plants in the important vegetation types of Nova Scotia. In the first half of the course, students will learn plant-sampling techniques during field trips to various natural habitats around Halifax. The second half will involve the preparation and identification of plant specimens and ecological comparisons between habitat types. Students will also learn conservation biology and applied ecology of key habitat types. This course will provide valuable preparation for employment in natural resource management, ecological restoration or research.

4411 Medical and Veterinary Parasitology
3 credit hours
Prerequisite: BIOL 2326 or BIOL 3412 (formerly BIOL 4412)

The study of animal parasites of humans and domesticated animals. The taxonomy, life cycle and epidemiology of protists and helminthes are emphasized. Laboratory work involves microscopic diagnostics of the important parasite species.

4414 Environmental Microbiology
3 credit hours
Prerequisite: BIOL 3398 (formerly BIOL 2398).

A course in the biology of microorganisms highlighting molecular biology (physiology and genetics), ecology, and the exploitation of microorganisms by humans (biotechnology and industrial microbiology).

4418 Plant Physiology
3 credit hours
Prerequisite: BIOL 3303 (formerly BIOL 2303)

The physiology of higher plants. Topics include photosynthesis, water and resource allocation, transpiration, photohormones, differential growth, photomorphogenesis, photoperiodism, and flowering.

4419 Molecular Biology
3 credit hours
Prerequisite: BIOL 2307 and CHEM 2344.

Chemistry of genes and history of molecular biology. Structure of DNA, RNA, and proteins. Transcription, translation, and replication of DNA and RNA. Organization of genes and genomes. Laboratory study of DNA preparation and analysis, and gene isolation.

4422 Conservation Biology
3 credit hours
Prerequisite: BIOL 2324

This course introduces how principles of evolutionary-ecology can be applied to help us understand how human exploitation of natural resources affects biodiversity. The course will characterize biodiversity and explore topics such as the biology of small populations, conservation genetics, ecological economics, and landscape ecology. In the lab students explore current topics in Conservation Biology through critiques, population modeling and independent research.

4430 Ornithology
3 credit hours
Prerequisite: BIOL 2324

Introduction to bird biology that covers morphology, classification, life history, and behavior. Labs provide hands-on experience and complement lectures.

4431 Herpetology
3 credit hours
Prerequisite: BIOL 2324

Herpetology is the study of amphibians and reptiles. Topics include ecology, natural history, form and function of amphibians and reptiles with emphasis on Nova Scotia herpetofauna.

4432 Medical and Veterinary Entomology
3 credit hours
Prerequisite: BIOL 3002 (formerly BIOL 2427).

This course presents an introduction to the biology of insects and arthropods that cause disease in humans and domestic animals. Topics include the biology and behaviour of disease vectors and external parasites, the role of vectors in the transmission of disease organisms, life cycles of vectorome pathogens, and the mechanisms of vector and disease control.

4433 Ecotoxicology
3 credit hours
Prerequisite: BIOL 2324 and CHEM 1212.

Ecotoxicology is the study of anthropogenic contaminants in the natural environment. This course will provide an introduction to the study of the fate and effects of toxic chemicals on the structure and function of ecological systems.

4434 Communication and Defense in Biological Systems
3 credit hours
Prerequisites: BIOL 3303 (formerly BIOL 2303) and BIOL 2324

This course explores the ecological interrelationships between plants and animals and the ways in which they use chemicals to communicate, attract mates, and protect themselves from predators. Topics include the chemical and morphological adaptations of insect defense, plant toxins and their effects on animals, insect and animal venoms, plant and fungal hallucinogens, hormonal and chemical interactions between plants and animals, animal pheromones, and plant allelopathy and its ecological importance.

4448 Biology Field Course
3 credit hours
Prerequisite: BIOL 2324, and BIOL 2308 or PSYC 2350 or MATH 1216.

The design and practice of biological study of communities under field conditions at selected sites in Nova Scotia. The main emphasis is on how ecologists document the abundance of organisms and quantify the structure of a community.

Note: Enrolment in this course is limited. Normally this course is held over 10-12 consecutive days and nights at an off-campus site.

4451 Ecology in the Tropics
3 credit hours
Prerequisites: BIOL 2324, BIOL 2308 or PSYC 2350 or MATH 1216 and application to the department.

This course will provide students with an opportunity to study ecology of a tropical environment, the highlight of which will be a field trip to a tropical location where students will be able to immerse themselves into a tropical environment. Prior to departure students will present and attend seminars on subjects pertinent to the ecology of the tropical field site to be visited. Further, students will design a research project on some aspect of tropical ecology prior to departure to the tropical site, collect data for the project while in the tropics and write a report on the research upon return to Saint Mary's University.

Note: Students are responsible for travel and living costs associated with the course, as well as tuition. Enrolment is limited and admission is by application to the Biology Department, contact the chair for details. This course occurs over a period of 10-12 days and nights at an off-campus location.

4500 Research Thesis
6 credit hours
Prerequisite: honours standing.

Research project carried out by the student under the supervision of a member of the Department. The student will submit a thesis and present it orally.
Lab 6 hrs. a week. 2 semesters.

4549 Honours Seminar
6 credit hours
Prerequisite: honours standing.

Seminars followed by discussions based on recent advances in biology. In consultation with the honours advisor, the honours students will select and prepare the topics for presentation to biology faculty and students.

4876 - 4899 Directed Study in Biology
3 credit hours
Prerequisite: Permission of instructor on a directed studies form available from the Chairperson of Biology.

These courses are intended to supplement the course offerings in biology and allow students to delve deeper into a subject of particular interest to them. Students must show some initiative and be willing to work independently.

Chemistry (CHEM)

Chairperson,	M. Lamoureux,
Professors	R. Singer, K. Vaughan
Associate Professors	J. Clyburne (Canadian Research Chair [Tier II] in Environmental Science & Materials, cross appointed with ENVS), M. Lamoureux, A. Piorko, C. Pye
Assistant Professors	Christa Brosseau, J. Masuda, K. Singfield
Adjunct Professors	D. Gamble, W. Jones, J. MacNeil
Professors Emeriti	J. Murphy, J. Young
Dean Emeritus	W. Bridgeo

Department website:
www.smu.ca/academic/science/chemist/

The program offerings of the Department of Chemistry are designed to meet two main objectives:
a. to provide a rigorous core education in the theory and practice of chemistry for students pursuing a Bachelor of Science degree with Honours, Major, or Concentration in Chemistry;
b. to provide students in other disciplines an introduction to the principles and practices of this central science, contributing to their fundamental understanding and appreciation of the physical world.

Our Bachelor of Science with Major in Chemistry and Bachelor of Science with Honours in Chemistry degrees are **nationally accredited programs by the Canadian Society for Chemistry (CSC) governing board**, ensuring that the program has the potential to prepare graduates to practice their profession in a competent scientific manner. Honours graduates from the program are well prepared to continue their education at the graduate level in related fields of study. Majors graduates are also well equipped to further their education or to enter into the scientific work force, contributing to such areas as research, education, government, and industry at various levels of responsibility.

In addition to having a strong commitment to teaching, the Chemistry Department Faculty members are committed to engaging undergraduate students in their research activities. Opportunities exist for motivated and capable students to enrich their program by contributing to the research work and dissemination of research results through employment as research assistants and participation in research conferences.

Major in Chemistry - Requirements:
The requirements for the degree of Bachelor of Science with Major apply as listed in this Academic Calendar under the heading of Faculty of Science, Bachelor of Science – Major. The specific list of Chemistry courses which satisfies the required minimum forty-two (42) credit hours in the Major subject is as follows:

- CHEM 1210 General Chemistry I
- Three (3) credit hours from: CHEM 1211, 1212 or 1213 General Chemistry II
- CHEM 2312 Physical Chemistry I
- CHEM 2313 Physical Chemistry II