

**FACULTY OF ARTS AND SCIENCE**  
**NEW PROGRAMS AND DELETED PROGRAMS FOR 2008-2009**

**NEW PROGRAMS**

**Department of Cell and Systems Biology –**

**Animal Physiology Major**

- Academic Relevance:  
The high-level of current student enrolment in the 2<sup>nd</sup> and 3<sup>rd</sup> year Animal Physiology courses is a strong testament to the student interest in Animal Physiology (see Appendix #1 for current enrolment). This interest is reflective of the value of an education in animal physiology for both the academic and industrial employment sectors. We are coupling this interest and importance of Animal Physiology, with the opportunities available in the new Cell and Systems Biology Department to propose a Major in Animal Physiology.

In the first year of this Major Program students will gain a solid introductory education in biology, chemistry, and math or physics. In the second year they will complete two laboratory-intensive courses: Cell and Molecular Biology (BIO 250) and Animal Physiology (BIO 252). In the third and fourth years we offer a series of courses that provide students with an in depth understanding of the unique aspects of animal physiological systems arising from their adaptation to the environment, which include neurophysiology, respiratory physiology, endocrinology, sleep physiology and comparative cellular physiology. In the last year of study students are encouraged to conduct independent research project courses in the laboratories of Animal Physiologists within the Department of Cell and Systems Biology.

- Learning Outcomes:  
The proposed Major in Animal Physiology will have four main learning outcomes:
  1. Laboratory Experience: Students will have extensive laboratory-based courses in the 1<sup>st</sup> and 2<sup>nd</sup> years of the Program that will provide them with the essential modern laboratory techniques currently used in Animal Physiology Research. In the 4<sup>th</sup> year students who are excelling in the program will greatly benefit from the opportunity to conduct independent research project courses in the laboratories of Animal Physiologists.
  2. Focus on Writing in the Sciences: In the 2<sup>nd</sup> year laboratory courses a large percentage of the grade is composed of written lab reports. We will be incorporating instruction on the essentials of science writing into our courses so that students are well equipped to communicate their scientific ideas upon graduation.
  3. Animal Physiology: Currently the only Major Program in Physiology at the U of T St. George campus is offered by the Department of Physiology in the Faculty of Medicine. This new program in Animal Physiology contrasts with Department of Physiology program in that it takes a comparative animal approach. Comparative animal physiologists compare and contrast the physiological systems of different animal species, or of a single species under difference environmental conditions. By taking a comparative animal approach we can learn more about the physiological systems than by studying human physiology alone.
  4. Cell to System Approach: The proposed Major in Animal Physiology will complement the new Department of Cell and Systems Biology by taking a cells to systems approach to the understanding of Modern Physiology. As noted above, by adapting a systems-level approach, from molecules to organisms, the Animal Physiology program will educate students in understanding how emergent properties arise when physiological components operate as a whole; properties that can not be predicted from knowledge of the individual components alone.

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In summary, students graduating with the Major in Animal Physiology will have a strong academic, laboratory and research training experience in Animal Physiology.

- **Estimated Enrolment:** It is estimated that the yearly enrolment will be approximately 75 students. This estimate is based on both the current enrolment in the 2<sup>nd</sup> and 3<sup>rd</sup> year CSB courses in Animal Physiology, and the current enrolment in the Comparative Animal Physiology Specialist Program.

- **Requirements:** 8 full courses or their equivalent

First Year: BIO 150Y1; CHM (138H1, 139H1)/151Y1; JMB 170Y1/MAT 135Y1/136Y1/137Y1/157Y1/PHY (131H1, 132H1)/(151H1, 152H1)

Higher Years:

1. BIO (240H1, 241H1)/255Y1
2. BIO (270H1, 271H1)
3. 1.5 FCEs from: CSB 325H1, 332H1, 343H1, 346H1, 347H1
4. 1.5 FCE from: BCH 210H1; CSB 299Y1, 325H1, 327H1, 330H1, 331H1, 332H1, 343H1, 344H1, 346H1, 347H1, 352H1, 425H1, 430H1, 445H1, 497H1/498Y1, 499Y1; EEB 263Y1; PSY 397H1; STA 220H1

### **Cell and Molecular Biology Major**

- **Academic Relevance:**  
The enrolment in the Department's cell and molecular biology courses serves as an excellent indicator of the large number of students interested in the fundamentals of biology and the broad dissemination and applications of this knowledge. A comprehension of the scientific concepts and experimental approaches presented in our courses has broad implications towards understanding issues related to human health and our environment, as well as serving as a foundation to make well informed and critical decisions about their future. The introduction of a Major in Cell and Molecular Biology will enhance students' ability to broaden their academic experience by providing them with greater freedom to take courses in other disciplines and gain a better appreciation of the complex multidisciplinary nature of modern scientific research.

The first year of this Major program will expose students to the fundamental concepts and principles of biology, chemistry, and math or physics. In the second year, they will complete three introductory courses: cell and molecular biology (BIO 250Y1), genetics (BIO 260H1) and biochemistry (BCH 210H1). These introductory courses aim to provide students with the knowledge and critical thinking skills required for higher level courses. The third and fourth years offer a series of courses that will expose students to our understanding of cell behaviours, how cells act in concert to generate tissues and organisms, and the molecular pathomechanisms underlying disease. They will also learn how cell and molecular biology research is conducted, and receive training in advanced microscopy, molecular biology and computer analysis. An opportunity to contribute to the advancement of knowledge will be provided by the offering of independent research project courses (CSB 299Y1, 497H1, 498Y1, 499Y1) in the laboratories of researchers within our Department.

- **Learning Outcomes:**
  1. **Laboratory Experience:** Students will have extensive laboratory-based courses in the 1st and 2nd years of the program that will provide them with the essential skills in modern laboratory techniques currently used in cell and molecular biology research. In the 4th year students who are excelling in the program will greatly benefit from the opportunity to conduct independent research project courses in the laboratories of cell and molecular biologists.

2. Focus on Writing in the Sciences: The 1st and 2nd year laboratory courses will have a large percentage of the grade composed of written lab reports. In our core second year cell and molecular biology courses, students will write project reports that not only emphasize clear and effective writing, but also enhance their creative and critical thinking skills.
  3. Focus on data communication and analysis: Seminar based advanced courses will offer students opportunity to present research data, engage in class discussion, and evaluate the strengths and weaknesses of different experimental approaches. In essence, these courses will offer an opportunity for students to develop communication and analytical skills in small group settings.
  4. Exposure to interdisciplinary research: Cell and molecular biology research is one the most demanding fields in science, requiring the integration of multiple subject areas, experimental skill and creative thinking. The Cell and Molecular Biology Major is aimed at exposing students to the diverse experimental approaches and expertise required to expand our knowledge of cellular and molecular events that regulate normal and pathological development.
  5. Cell to Systems Biology: Advances in high throughput technologies enables researchers to investigate the global response of cells to changes in their microenvironment. Several members of our new Department of Cell and Systems Biology make extensive use of these state-of-the-art technologies in their research and have introduced new courses focused on this rapidly evolving field. These courses and other less specialized courses will expose students to the diagnostic power and limitations of these technologies.
- Estimated Enrolment: The estimated yearly enrolment is approximately 100 students. This estimate is based on both the current enrolment in the 2<sup>nd</sup> and 3<sup>rd</sup> year CSB courses in Cell and Molecular Biology, and the current enrolment in the Cell and Molecular Biology Specialist Program.
  - Requirements: 8 full courses or their equivalent

First Year: BIO 150Y1; CHM (138H1, 139H1)/151Y1; JMB 170Y1/MAT 135Y1/136Y1/137Y1/157Y1/PHY (131H1, 132H1)/(151H1, 152H1)

Higher Years:

1. BIO (240H1, 241H1)/255Y1
2. BIO 260H1/HMB 265H1; BCH 210H1
3. 1.5 FCE from: CSB 327H1, 328H1, 331 H1, 340H1, 349H1
4. 1.5 FCE from: BCH 422H1, 444H1, 445H1, CSB 299Y1, 327H1, 328H1, 330H1, 331H1, 332H1, 340H1, 347H1, 349H1, 350H1, 352 H1, 427H1, 428H1, 429H1, 458H1, 459H1, 460H1, 497H1/498Y1/499Y1. No more than 0.5 FCE in BCH can be used towards this requirement.

### **Department of Chemistry – Nanoscience Minor**

- Academic Relevance:  
Arts and Science currently does not offer a Nanoscience program for students to follow. The minor program is proposed to be jointly offered with the National University of Singapore (NUS): U of T students can attend NUS for one semester and take courses towards a minor program, and vice versa. This initiative will permit talented students who have completed first year studies to spend 5 months at a prestigious institution, taking cutting-edge chemistry and physics courses in an area of science that is currently a very hot topic. Integral to the program is course NUS 398H, a research experience in the laboratory of a nanoscience faculty member. Singapore students will attend U of T to take courses towards an Environmental Chemistry minor program.

- **Learning Outcomes:**  
Students will get an insight into a cutting-edge chemical/physical topic and will be expected to gain an understanding about the essential concepts/theories behind life in a nano-world. They will be able to think critically and quantitatively about the benefits and drawbacks of nanotechnology and be able to use laboratory skills gained at NUS in a fourth-year scientific research project back at U of T. Students will be excellent problem solvers after being faced with topics and issues they would not encounter at the same level in Toronto.
- **Estimated Enrolment:** 5-10
- **Requirements:**  
This physical science-based Type 3 minor program represents a unique opportunity to study chemistry and physics in a different cultural environment. Students take core subjects at the first-year level in Toronto and spend the spring semester of their second or third year at the National University of Singapore, where they are enrolled in lecture courses and undertake a faculty-supervised research project.

(4 full courses or their equivalent, including at least one full-course equivalent at the 300+ level)

1. CHM 151Y1/139H1, PHY 140Y/(151H, 152H)
2. NUS 227H, 228H, 328H, 398H\*
3. Further CHM courses to make a total of four CHM full course equivalents

\*NUS courses must be taken at the National University of Singapore during **either** the spring semester of second year studies **or** the spring semester of third year studies.

### **Commerce Programs –**

Currently, the B.Com. degree has only one specialist program, the Specialist in Commerce and Finance that all students must complete whether they are interested in Accounting, Finance, Marketing, etc. The program is very broad in order to accommodate the wide variety of student interests.

The Commerce Program underwent a review in Spring 2006 that resulted in a number of recommendations to improve the curriculum. The Commerce Curriculum Committee was formed, with representatives from Rotman and Economics, and Commerce students. The committee recommended that the old Specialist in Commerce and Finance be replaced with 3 new specialists: Accounting, Finance and Economics, and Management. This corresponds to both student and industry demand for programs.

### **Specialist in Accounting**

- **Academic Relevance:**

Program changes common to all 3 specialist programs:

- First year required course is now RSM 100Y – Intro to Management. It replaces MGT 120H-Intro to Financial Accounting, thereby reducing the focus accounting. Students will now take 3.0 required courses in 1<sup>st</sup> year
- Course designator is changing from MGT to RSM (Rotman School of Management)
- Commerce is jointly offered by FAS and Rotman. Each Faculty will teach 50% of the program, 10 FAS courses, 10 RSM courses

- Learning Outcomes:  
The Specialist in Accounting is aimed at students interested in pursuing a career in accounting. The program will build on Rotman's cross-functional expertise and approach to problem solving that considers complex cause and effect relationships between specific functional disciplines. Graduates will have the personal and professional attributes required of professional accountants – demonstrated initiative and leadership, application of strategic thinking, development of innovative ideas, adaption to change and strong communication skills..
- Estimated Enrolment: 650
- Requirements: 15 full courses or their equivalent out of 20 courses, for a B.Com.

First Year:

1. ECO100Y1, RSM100Y1
2. MAT133Y1/(123H1, 124H1)/135Y1/137Y1/157Y1
3. Students are encouraged to take one course towards the Distribution Requirement (above) in First Year.

Second Year:

1. ECO204Y1/206Y1; ECO220Y1/227Y1/(STA257H1, 261H1)
2. RSM220H1, 221H1, 222H1, 225H1
3. 1.0 from : RSM230H1, 250H1, 260H1

Third Year :

4. RSM320H1, 321H1, 322H1, 323H1, 324H1, 332H1, 333H1
5. Any 1.0 300+ ECO except ECO301Y1, 302H1, 303Y1, 307H1, 308H1, 309H1, 321Y1, 342Y1, 353Y1, 354H1, 355H1, 423H1, 429Y1, 435H1

Fourth Year :

6. RSM422H1, 423H1, 424H1, 426H1, 427H1

Note: Students must take a minimum of 10.0 RSM and 10.0 non-RSM courses (See B.Com. degree requirements above).

ECO209Y1 and 374H1 are strongly recommended.

### **Specialist in Management**

- Academic Relevance:  
Program changes common to all 3 specialist programs:
  - First year required course is now RSM 100Y – Intro to Management. It replaces MGT 120H-Intro to Financial Accounting, thereby reducing the focus accounting. Students will now take 3.0 required courses in 1<sup>st</sup> year
  - Course designator is changing from MGT to RSM (Rotman School of Management)
  - Commerce is jointly offered by FAS and Rotman. Each Faculty will teach 50% of the program, 10 FAS courses, 10 RSM courses
- Learning Outcomes:  
The Specialist in Management is aimed at students interested in marketing, organizational behaviour, strategy, operations management. Graduates will have excellent analytical and problem solving abilities and practical real world experience gained through case studies.
- Estimated Enrolment: 350

- Requirements: 12 full courses or their equivalent out of 20 courses, for a B.Com.

First Year:

1. ECO100Y1, RSM100Y1
2. MAT133Y1/(123H1, 124H1)/135Y1/137Y1/157Y1
3. Students are encouraged to take one course towards the Distribution Requirement (above) in First Year.

Second Year:

4. ECO204Y1/206Y1; ECO220Y1/227Y1/(STA257H1, 261H1)
5. RSM220H1, 221H1, 250H1, 260H1

Third Year:

6. RSM332H1, 333H1, 370H1, 392H1
7. Any 1.0 300+ ECO except ECO301Y1, 302H1, 303Y1, 307H1, 308H1, 309H1, 321Y1, 342Y1, 353Y1, 354H1, 355H1, 423H1, 429Y1, 435H1

Fourth Year :

8. 1.0 from: ECO364H1, 365H1, 419H1, RSM437H1, 480H1, 490H1
9. 1.0 400-level RSM, in addition to any courses taken in #8 above.

Note: Students must take a minimum of 10.0 RSM and 10.0 non-RSM courses (See B.Com. degree requirements above).

ECO209Y1 and 374H1 are strongly recommended.  
RSM499Y1 is strongly recommended.

### **Specialist in Finance and Economics**

- Academic Relevance:

Program changes common to all 3 specialist programs:

- First year required course is now RSM 100Y – Intro to Management. It replaces MGT 120H-Intro to Financial Accounting, thereby reducing the focus accounting. Students will now take 3.0 required courses in 1<sup>st</sup> year
- Course designator is changing from MGT to RSM (Rotman School of Management)
- Commerce is jointly offered by FAS and Rotman. Each Faculty will teach 50% of the program, 10 FAS courses, 10 RSM courses

- Learning Outcomes:

The Specialist in Finance and Economics is aimed at students interested in pursuing a career in finance, or doing graduate work in finance or economics. Learning outcomes include excellent analytical and problem solving abilities, and sound theoretical background combined with real-world experience which will enable the making of sound business decisions.

- Estimated Enrolment: 550
- Requirements: 14 full courses or their equivalent out of 20 courses, for a B.Com.

First Year:

1. ECO100Y1, RSM100Y1
2. MAT133Y1/(123H1, 124H1)/135Y1/137Y1/157Y1
3. Students are encouraged to take one course towards the Distribution Requirement (above) in First Year.

Second Year:

4. ECO204Y1/206Y1; ECO208Y1, 209Y1; ECO220Y1/227Y1/(STA257H1, 261H1)
5. RSM220H1, 221H1, 222H1, 230H1
6. 0.5 from: RSM225H1, 250H1, 260H1, 324H1

Third Year:

7. RSM330H1, 332H1, 333H1
8. 2.5 300+ ECO of which no more than 1.0 can be from ECO301Y1, 302H1, 303Y1, 307H1, 308H1, 309H1, 321Y1, 342Y1, 353Y1, 354H1, 355H1, 423H1, 429Y1, 435H1

Fourth Year:

9. RSM433H1, 435H1
10. 0.5 from: RSM437H1, 480H1, 490H1

Note: Students must take a minimum of 10.0 RSM and 10.0 non-RSM courses (See B.Com. degree requirements above).  
ECO374H1 is strongly recommended

### **Department of Ecology and Evolutionary Biology – Environmental Biology Minor**

- Academic Relevance:  
Arts and Science currently offers an Environmental Biology Minor program for students to follow, where all courses take place on the St. George campus. The proposed Environmental Biology (National University of Singapore) Minor represents a unique opportunity and is consistent with the Stepping UP plan in terms of providing a forum for significant international experience; students in this program complete 2.0 FCEs at U of T and 2.0 FCEs at the National University of Singapore, including a required field course in Malaysia.
- Learning Outcomes:  
The proposed program mirrors the existing Environmental Biology Minor program, administered by the Department of Ecology & Evolutionary Biology. Students learn principles and concepts of ecology and evolution, at the level of individuals, populations, communities and ecosystems; applications of ecological and evolutionary approaches to behaviour, genomics, evolutionary medicine, global environmental change, and conservation biology; an understanding of past and present environments and how humans are altering the environment, drawing on element in geology, systematics, soil science, and ecology.
- Estimated enrolment: 5 in 2008-2009, 10 in 2009-2010
- Requirements: 4 full courses or their equivalent
  1. 2.0 FCEs (at U of T): BIO150Y1, ENV234Y1
  2. 1.5 FCEs (at National University of Singapore) from: NUS341H0 NUS342H0 NUS344H0 NUS345H0,US346H0(see NUS course offerings in this Calendar)
  3. 0.5 FCE field course: NUS343H0

### **Centre for Environment –**

#### **Environment and Behaviour Minor**

- Academic Relevance:  
The Stepping Up Plan highlighted interdisciplinary environmental initiatives as a priority area. The introduction of this collaborative minor is timely since a necessary condition of addressing current global environmental challenges is a better understanding of how to motivate individuals to modify behavioural changes within their social context. Jointly sponsored by the Centre for Environment and the Department of Psychology, this program will focus on understanding issues of psychological motivation and attitudes that underlie environmental

decision making. Little positive environmental change can occur in the absence of broad-based behaviour changes.

- **Learning Outcomes:**  
By the end of this program, students will understand the determinants of human behaviour in a multi-leveled, systemic way, and will have put into practice a variety of behaviour change methods and approaches. The systemic nature of behaviour reflects that human behaviour patterns are multiply determined; they are affected by a broad assortment of factors at multiple levels of analysis (e.g., individual, small group, community). As a result, students will be exposed to multiple perspectives on the question of human behaviour, and will learn a variety of practical methods for shaping behaviour patterns in the direction of ecological sustainability.

Students will also come to understand the many ways in which humans are affected by the physical environment itself, such as how the environment affects our behaviour patterns, and well-being, and the quality of our communities and social relations. Understanding the relationship between people and the environment, and being empowered with practical tools and methods for altering behaviour patterns, will give students the grounding to be effective advocates for social change to promote ecological sustainability.

- **Estimated Enrolment:** 20
- **Requirements:** 4 full courses or their equivalent; must include at least one full course equivalent at the 300+-level.  
Enrolment in the Minor program is limited to students also enrolled in the Psychology Minor/Major/Specialist.)
  1. JGE221Y1; PSY220H1, PSY335H1
  2. One FCE from ENV 332H1, 333H1, 335H1, 424H1; SOC 385H1
  3. One FCE from PSY 320H1, 321H1, 327H1, 336H1

### **Environment and Energy Minor**

- **Academic Relevance:**  
Energy use and supply, and its environmental implications such as climate change, is one of the most important issues facing society. While courses and programs exist to address specific, disciplinary issues related to energy use and supply, there are no undergraduate programs at the University where students can address energy and environment in an interdisciplinary way that brings together the scientific, technological, environmental and social factors that need to be considered. Jointly sponsored by the Centre for Environment and the Department of Geography, this interdisciplinary program addresses the scientific, technological, environmental and policy aspects of energy use and supply, with a focus on the reduction of environmental impacts.
- **Learning Outcomes:**  
Understanding of the following concepts and how to integrate them to address energy issues and problems: sustainable development; technical, scientific, environmental, economic and political factors related to energy use and supply. An ability to critically and quantitatively assess and think about the interconnected impacts of energy use, and solutions to these problems from technical, social, economic and policy perspectives.
- **Estimated Enrolment:** 20
- **Requirements:** 4 full courses or their equivalent; must include at least one full-course equivalent at the 300+-level)

Required Preparation: CHM (138H1, 139H1)/151Y1; MAT135Y1/MAT137Y1; PHY(131H1, 132H1)/(151H1,152H1)



Program Requirements:

1. JGE221Y
2. ENV346H1, 350H1, 450H1
3. JGE347H1, 348H1
4. 0.5 FCE from one of the following:  
CHM310H/CHM415H/ENV235Y/GGR203H/GGR314H/GGR303H/GGR330H/GGR403H/H  
PS313H / PHY238Y/PHY251H/PHY315H

**Faculty of Forestry – Forest Biomaterials Science Major and Minor**

- Academic Relevance:  
The Faculty of Forestry has expertise and research capacity in the areas of value added wood products, advanced wood composites, bioenergy and biorefinery. As such, we deliver a number of graduate courses relevant to these topics and wish to expand our exposure to undergraduate students to allow them to develop a background in these topics and to develop an interest in pursuing graduate degrees in these areas. Also, analyses of the Canadian wood products industry, suggest that there is a shortage of highly trained professionals in this economically important industry, and to this end, the Ontario Ministry of Natural Resources is supporting courses of study in these fields at U of T and Lakehead University. This program will integrate well into the Stepping UP goal of enhancing students' co-curricular and support experience. It will provide opportunities for collaboration with other departments including the Centre for the Environment, Chemical Engineering and Applied Chemistry, Mechanical and Industrial Engineering, Materials Science, Building Science and Architecture. It will enhance “experiential” learning through research projects and the availability of our state-of-the-art research facilities, interaction with industry, and small class sizes. It will also promote direct interaction between the students and participating wood products companies through field trips to their facilities, support of student projects based on industry issues, and job fairs to promote summer employment of students in industry.
- Learning Outcomes:
  1. Problem solving skills through applied problem sets and laboratory exercises;
  2. Hands-on experience with laboratory testing and analytical and pilot plant equipment through laboratory exercises and projects;
  3. Ability to communicate effectively, both orally and in written form enhanced by in class presentations, written research reports and essays;
  4. Understanding of the important economic, environmental and technological issues of the forest products industry through industry involvement in summer jobs, guest lectures and plant tours;
  5. Appreciation for the materials science of wood and its anatomical, chemical, physical and environmental attributes as it relates to its suitability for building materials, value added products, renewable fuels and chemical feedstock.
- Estimated Enrolment: The total enrolment in the Forest Conservation undergraduate teaching has increased steadily to an estimated 270 students in 2007-8. Based on this level of demand and interest and interest expressed in this proposed program we anticipate about 10 students per academic year in this new program.
- Requirements:  
Major program: 8 full courses or their equivalent, including at least 2.0 FCE 300+series courses and 2.0 FCE 400-series courses; other equivalent and approved courses offered by other Faculties may be eligible for inclusion.
  1. BIO150Y; One FCE (MSE 101H, ECO 100Y/ECO 105Y, CHM 138 H, CHM 139H, ARC 132H recommended)
  2. FOR 200H; 1.5 FCE from CHM 220H, ENV 234Y, MSE 207H, BCH 210H, STA 220H, STA 221H/EEB 225H
  3. FOR 300H; FOR 310H, 1.0 FCE (FOR 302H, FOR305H, ENV 315H, ENV 350H, MSE

330H, MSE 316H, FOR 305H, ARC 341H, ARC 342H, BCH 370H recommended).

4. FOR 401H; FOR 410H; one FCE from FOR 403H, FOR 405H, FOR 420H, FOR 423H, CHE 575H

Minor Program: 4 full courses or their equivalent, including at least 1.5 FCE 300+series course and one FCE 400-series courses

1. 1.5 FCE from BIO 150Y, MSE 101H, ECO 105Y, CHM 138H, CHM 139H, ARC 132H, FOR 200H, CHM 220H, ENV 234Y, MSE 207H, MGT 201H
2. FOR 300H; FOR 310H; 0.5 FCE from ENV 315H, ENV 350H, MSE 330H, MSE 316H, FOR 305H, ARC 341H, ARC 342H, BCH 370H
3. 1.0 FCE from FOR 401H, FOR 405H, FOR 410H, FOR 423H

### **Department of Physics – Molecular Biophysics Specialist**

- **Academic Relevance:**  
The complete sequencing of the human genome has generated a vast array of information about the genes that code for the biological molecules that carry out cellular function. An understanding of how these molecules function, however, requires detailed studies that make use of ideas and concepts in the physical sciences. We believe that a thorough interdisciplinary program that focuses on math, chemistry and physics while at the same time introducing students to the molecules of life through training in biochemistry will prove a rigorous foundation for research in this exciting area. Indeed many of the important advances in biotechnology and medicine are occurring at the intersection of the subjects that are emphasized in this program. Molecular Biophysics is the application of physics and physical chemistry to biological problems at the molecular level. Ideas, instrumentation and computational models of physics and chemistry are used to understand the molecules of life. Of course many of the answers to these questions will have profound implications for human health. The Molecular Biophysics Program combines mathematics, physics, chemistry and biochemistry in an unusual and exciting opportunity for undergraduates that includes undergraduate research in some of the finest laboratories in the world.
- **Learning Outcomes:**  
On completion of the program, students will have the ability to apply advanced quantitative analysis to biological systems at the molecular level. They will have:
  - A firm grounding in the physics, biochemistry, physical chemistry, and mathematics necessary to understand the function and operation of biological molecules.
  - Extensive laboratory experience and knowledge of laboratory techniques and analysis methods in physical chemistry, biochemistry, and physics. Students will experience in independent thinking and will have good quantitative problem solving skills allowing them to tackle both theoretical and practical issues in bioscience and biotechnology.
  - Good oral and written communication skills, honed by doing formal reports and oral presentations in the required laboratory based courses.
  - Experience in research in molecular biophysics or cognate areas of physics, chemistry, and biochemistry.
- **Estimated Enrolment:** 5-10
- **Requirements:** 16.0 full courses of their equivalent, including at least one 400-series course

First Year (3.0 FCE):

CHM (138H, 139H)/151Y; MAT 135Y/137Y/157Y; PHY151H/131H, 152H/132H; (CHM 151Y, PHY151H, 152H recommended)

First or second year (0.5 FCE):

MAT 223H/240H

Second Year (3.5 FCE):  
BCH 210H; CHM (220H, 221H)/225Y; MAT 235Y/237Y; PHY251H, 252H

Second or Third Year (2.0 FCE):  
MAT 244H; PHY225H, 255H; CHM 247H/249H

Third Year (3.0 FCE):  
BCH 335H/311H, BCH 340H; CHM 326H/PHY355H, CHM 327H, PHY 346H, 352H

Third or Fourth Year (0.5 FCE):  
APM346H

Fourth Year (3.5 FCE)  
BCH 427H; CHM 328H, CHM423H/PHY457H; PHY307H, 351H/353H,  
PHY479Y/CHM499Y/BCH473Y

### **Department and Centre for the Study of Religion – Islamic Studies Major**

- **Academic Relevance:**  
The proposed Islamic Studies program is in keeping with the Stepping UP Plan in its international focus, including courses on Islam in its origins, migration, and global reach. It is thus consistent in its emphasis on diversification, as well as its interdisciplinary approach. Core faculty involved use variously historical, anthropological, and gender analysis methodologies in their approaches to Islam.
- **Learning Outcomes:**  
On completion of the program, students will have gained a firm grounding in the historical origins and classical texts of Islam and its development in the present, in part through the lenses of contemporary approaches to its interpretation in order to articulate orally and in writing the role of Islam in contemporary society.  
  
Students will develop critical thinking skills, hone the ability to communicate clearly and effectively in oral and written form, to construct a logical argument, and gain familiarity with standard conventions of style for scholarly writing in order to articulate their knowledge of Islamic beliefs, practice, and culture in its wide-ranging geo-political settings.
- **Estimated Enrolment:** 20
- **Requirements:**
  1. RLG100Y World Religions or RLG280Y World Religions.
  2. RLG204Y Islamic Religious Tradition.
  3. RLG250H Islam in the Modern World or NMC381H Modern Islamic Thought
  4. One full course from the following: RLG200Y, RLG210Y, RLG211Y or RLG212Y.
  5. 3.5 full courses from the following list. 3 FCEs must be 300+ courses: RLG251H, RLG351H, RLG352H, RLG353H, RLG350H, RLG354H, RLG355H, PHL336H, NMC381H, NMC387H, NMC388H, NMC389H, RLG456H, RLG457H, RLG459H, or RLG461H.

### **University College –**

#### **Cognitive Science and Artificial Intelligence Major**

- **Academic Relevance:**  
Currently the Cognitive Science Major (Arts Program) corresponds only to the Cognitive Science Specialist (Arts Program) in that it reflects the needs of the students wishing to take

Cognitive Science who are not interested in pursuing extensive studies in Computer Science and Artificial Intelligence (Science Program). Those interested in Cognitive Science and Artificial Intelligence must take the Cognitive Science and Artificial Intelligence Specialist program. However, many students who have expressed a desire to pursue Cognitive Science and Artificial Intelligence are nonetheless not able to pursue the Specialist program. The new major in Cognitive Science and Artificial Intelligence meets the needs of the those students wishing to study Cognitive Science and Artificial Intelligence as a major in combination with a major in another area of interest, specifically a Computer Science Major.

- Learning Outcomes:  
Students taking the Major Program in Cognitive Science and Artificial Intelligence will:
  - Develop strong skills of intertheoretic integration between psychology, philosophy, linguistics, computer science and neuroscience.
  - Develop skills of artificial intelligence and robotic modelling.
  - Develop good skills of empirical and theoretical research in those disciplines relevant to understanding the nature of cognition.
- Estimated enrolment: 50 (this is the number of students expected to enroll in the existing Cognitive Science Major each year)
- Requirements: 8 full courses or their equivalent  
Admission in this program requires:
  1. 63% or better in CSC148H1/CSC150H1/UNI250Y1/PSY100H1,
  2. GPA of 2.0, and
  3. Enrolment in the Major or Specialist program in Computer Science.

NOTE: In order to enroll in the Cognitive Science and Artificial Intelligence Major Program you will be required to register also for a Computer Science Major. (The latter is a restricted enrolment program and has certain admission requirements; please see the Computer Science program description.)

Students enrolled in this program who have taken UNI250Y1 are permitted to take the PSY courses listed in the program without taking PSY100H1.

First Year: UNI250Y1, PHY110Y1/138Y1/140Y1/BIO150Y1/(CHM138H1, 139H1)/151Y

Second & Higher Years: HPS250H1, UNI301H1, 302H1, CSC321H, 384H1, UNI402H1, 403H1

At least 2 FCEs covering at least 2 of the following disciplines, chosen from:

Psychology:

PSY201H1/STA220H1/248H1/250H1, PSY202H1/STA221H1/250H1, 210H1, 220H1, 230H1, 260H1, 270H1, 280H1, 290H1, 300H1, 303H1, 304H1, 305H1, 309H1, 314H1, 316H1, 319H1, 325H1, 330H1, 331H1, 362H1, 369H1, 370H1, 371H1, 372H1, 375H1, 378H1, 379H1, 380H1, 389H1, 390H1, 392H1, 393H1, 394H1, 396H1, 397H1, 399H1

Philosophy:

PHL210Y1, 217H1, 232H1, 240H1, 244H1, 245H1, 246H1, 310H1, 311H1, 312H1, 315H1, 319H1, 320H1, 321H1, 322H1, 325H1, 326H1, 331H1, 332H1, 340H1, 341H1, 342H1, 344H1, 345H1, 346H1, 347H1, 349H1, 351H1, 355H1, 356H1, 357H1, 405H1; HPS350H1

Linguistics:

LIN100H1, 228H1, 229H1, 232H1, 241H1, 305H1, 306H1, 322H1, 323H1, 331H1, 333H1, 341H1, 351H1, 356H1, 362H1, 398H0, 399Y0, 495Y1, 496H1, 497Y1, 498H1, 499H1; JLP315H1, 374H1, 471H1; JAL328H1; JLS474H1

Human Biology, Biology & Physiology:

BIO250Y1/BIO255Y1/PSL201Y1/(PSL300H1, PSL301H1), HMB204H1, 265H1, 300H1, 305H1, 320H1, 420H1

Third or Fourth Year: UNI401H1

### **Sexual Diversity Studies Specialist**

- **Academic Relevance:**  
The creation of a Specialist program is the next logical step for the Bonham Centre, and the spread of course offerings on sexuality across the University provides a solid foundation for it. The major and minor programs have substantial enrolments, and we know that there is significant demand for a Specialist. The program will allow students to focus on questions of sexual identity, difference, and dissidence across disciplinary lines and cultural frameworks. These foundations, available at no other Canadian university, will develop in them the kind of complex understanding that sexuality issues demand. This is a rapidly growing field, and the course options reflect a significant expansion of discipline-based courses on sexuality. Students will be able to shape their overall undergraduate course selection around this vital interdisciplinary field.
- **Learning Outcomes:**  
The Specialist program will provide a firm grounding in the dominant theoretical approaches to the study of sexual diversity, and familiarity with key texts widely cited in the scholarly exploration of sexuality. It will ensure students' knowledge of variations in social, cultural, political, and legal understanding of such diversity across cultures, and across time within any particular society. The program will alert students, analytically, to the wide range of experiences across various sexual minorities within any one setting and time, and to the importance of taking account of such factors as gender, ethnicity, race, culture, and gender identity. Students will have knowledge of both social science and humanities approaches to understanding sexuality. All this will provide them with a critical set of lenses through which to explore current controversies over sexuality.
- **Estimated Enrolment:** 20
- **Requirements:** Completion of 4 courses is required for enrolment in the Sexual Diversity Studies program.

Ten full course equivalents, including:

1. UNI255H, UNI256H
2. .5 FCE in theory at the 300+ level: UNI 354H, UNI355H, or another upper-level theory course approved by the Program Director.
3. At least 4 FCEs from Group A
4. Remaining course requirements may be drawn from Group A or B.
5. At least one FCE in the area of sexual diversity must be at the fourth-year level (these need not be SDS courses\*)

N.B. No GPA minimum is being established at this time.

In conjunction with the Specialist program, SDS is introducing a fourth-year option for a research essay course, restricted to Specialist students. A half course and full course option are being submitted.

Additional courses may be approved by the Program Director on an individual basis.

## **DELETED PROGRAMS**

### **Department of Cell and Systems Biology –**

#### **Comparative Animal Physiology Specialist**

This program cannot be supported at this time due to an insufficient number of physiology professors within Cell and Systems Biology to teach the requisite number of courses. A Major program in Animal Physiology is proposed which will allow more students to enroll in this field of study.

#### **Molecular Plant Biology Specialist**

This program had a very small enrolment and, so, it has been assimilated into the Cell and Molecular Specialist Program.

### **Department of Chemistry – Chemistry and Geology Specialist**

Very low enrolment numbers in the program during the last decade.

### **Commerce Programs – Specialist in Commerce and Finance AND Specialist in Economics (Commerce and Finance)**

Curriculum changes as a result of the external review and the work of the Commerce Curriculum Committee. It is proposed that students will now choose one of 3 specialist programs in a given area. Teaching requirement is split evenly between Rotman and FAS, students in the Specialist programs will take a minimum of 10 RSM and 10 FAS (including ECO) courses.

### **Department of Economics - Specialist in Economic History & Economics**

The number of Economic History courses offered has been decreasing as a result of retirements and most courses offered (all of them this year) are taught by professor emeriti and sessionals. This trend will continue in the next few years and the Department will not be able to offer enough choices to allow students to complete this program. The Department will continue offering a major and a minor in Economic History in the foreseeable future.