Proposal for new Minor in Interdisciplinary Life Sciences

Rationale

Although there are many interesting Science Minors at McGill, there is no existing minor that allows students in the earth, physical, math and computational areas to get a broad introduction to life sciences and associated social science courses. There are several groups of students who could benefit from such a minor, including (1) students who are interested in broadening their education, (2) students who wish to pursue graduate studies in bioinformatics, biostatistics, health geography or other interdisciplinary studies involving the life sciences, or (3) students who would like to pursue post-undergraduate studies in a health-related profession such as Medicine, Dentistry, Nursing or Occupational/Physical Therapy. For students in this third category, many of the courses either required or suggested for application to these professional programs could be included in a well chosen minor program.

The proposed program is intended for students who are majoring in an area other than the basic health or biomedical sciences. The proposed minor will enable students from the earth, physical, math and computational science areas to round out their studies with some basic life sciences, health social science, and empirical or technological science. The basic life science area includes introductory courses, as well as some higher-level courses to allow students to advance in a specific area of interest. The social health sciences area includes a wide variety of courses that apply to the general area of health and which will provide a chance for the science students to broaden their studies into social sciences. The empirical and technological science area includes courses related to statistics and computer science and will allow the student to develop some more expertise these areas which are becoming important in the health professions.

The design of the minor program is intentionally flexible. Breadth is ensured by requiring that all students complete a certain number of credits in each of the three areas. However, 9 credits are left to be freely allocated to any of the areas, so students more interested in one specific area have the opportunity to concentrate more on that area. Depth is ensured by requiring at least 6 credits at the 300-level or above. The program will be administered by the new Science Student Affairs Office and individual programs will be approved by an advisor in that office.

Program Requirements (24 credits)

This program requires 24 credits, with at least 18 new credits that are not used to satisfy any other program. Further, at least 18 credits must by outside of the student’s main discipline. Specific programs must be approved by an adviser in the Science Student Affairs Office. Courses not already listed below may be included in a student’s program, with approval of the minor advisor.

The 24 credits must satisfy the following depth and breadth requirements:

- **Depth Requirement**: at least 6 credits must be at the 300-level or above.
- **Breadth Requirement**: there are three categories, and students must complete at least 9 credits from Basic Life Sciences, at least 3 credits from Health Social sciences and at least 3 credits from Empirical Science and Technology. The remaining 9 credits may be freely selected from any of the areas.
Basic Life Sciences (at least 9 credits)
ANAT/BIOC 212 (3) Molecular Mechanisms of Cell Function
ANAT 214 (3) Systemic Human Anatomy
ANAT 261 (4) Introduction to Dynamic Histology
ANAT 262 (3) Introductory Molecular and Cell Biology
ANAT 321 (3) Circuitry of the Human Brain
ANAT 365 (3) Cellular Trafficking
ANAT 381 (3) Basis of Embryology
BIOL 200 (3) Molecular Biology
BIOL 201 (3) Cell Biology and Metabolism
BIOL 202 (3) Basic Genetics
BIOL 300 (3) Molecular Biology of the Gene
BIOL 301 (4) Cell and Molecular Laboratory
BIOL 303 (3) Developmental Biology
BIOL 306 (3) Neurobiology
BIOL 314 (3) Molecular Biology of Oncogenes
BIOL 370 (3) Human Genetics Applied
BIOC 311 (3) Metabolic Biochemistry
BIOC 450 (3) Protein Structure and Function
BIOC 458 (3) Membranes and Cellular Signaling
CHEM 212 (4) Introductory Organic Chemistry 1
CHEM 222 (4) Introductory Organic Chemistry 2
CHEM 302 (3) Introductory Organic Chemistry 3
CHEM 502 (3) Advanced Bio-Organic Chemistry
CHEM 503 (3) Drug Design and Development 1
CHEM 504 (3) Drug Design and Development 2
EXMD 401 (3) Physiology and Biochemistry Endocrine Systems
MIMM 211 (3) Introductory Microbiology
MIMM 314 (3) Immunology
MIMM 387 (3) Applied Microbiology and Immunology
NUTR 307 (3) Human Nutrition
PATH 300 (3) Human Disease
PHAR 300 (3) Drug Action
PHAR 301 (3) Drugs and Disease
PHAR 303 (3) Principles of Toxicology
PHAR 503 (3) Drug Design and Development 1
PHAR 504 (3) Drug Design and Development 2
PHGY 209 (3) Mammalian Physiology 1
PHGY 210 (3) Mammalian Physiology 2
PHGY 311 (3) Channels, Synapses & Hormones
PHGY 312 (3) Intermediate Physiology 2
PHGY 313 (3) Intermediate Physiology 3
PHGY 314 (3) Integrative Neuroscience
PSYC 211 (3) Introductory Behavioural Neuroscience
PSYC 308(3) Behavioural Neuroscience 1
PSYC 317 (3) Genes and Behaviour
PSYC 318 (3) Behavioural Neuroscience 2
PSYC 311 (3) Human Cognition and the Brain
PSYC 342 (3) Hormones and Behaviour

Health Social Science (at least 3 credits)
ANTH 204 (3) Anthropology of Meaning (this is a prereq for ANTH 314)
ANTH 227 (3) Medical Anthropology
ANTH 302 (3) New Horizons in Medical Anthropology
ANTH 314 (3) Psychological Anthropology
ECON 440 (3) Health Economics
GEOG 221 (3) Environment and Health
GEOG 303 (3) Health Geography
HSEL 308 (3) Issues in Women’s Health
HSEL 309 (3) Women’s Reproductive Health
HIST 212 (3) Science and Medicine in Canada
HIST 249 (3) Health and the Healer in Western History
HIST 381 (3) Colonial Africa: Health/Disease
HIST 396 (3) Disease in Africa Since 1960
HIST 424 (3) Gender, Sexuality & Medicine
PHIL 237 (3) Contemporary Moral Issues
PHIL 343 (3) Biomedical Ethics
PHIL 443 (3) Topics in Biomedical Ethics
POLI 417 (3) Health Care in Canada
PSYC 215 (3) Social Psychology
PSYC 304 (3) Child Development
PSYC 333 (3) Personality and Social Psychology
PSYC 412 (3) Deviations: Child Development
PSYC 413 (3) Cognitive Development
PSYC 414 (3) Social Development
SOCI 309 (3) Health and Illness
SOCI 365 (3) Health and Development
SOCI 225 (3) Medicine and Health in Modern Society
SOCI 310 (3) Sociology of Mental Disorder
SOCI 390 (3) Gender and Health
SOCI 422 (3) Health Care Providers

**Empirical Science and Technology (at least 3 credits)**
BIOL 309 (3) Mathematical Models of Biology
COMP 202 (3) Introduction to Computing 1
COMP 364 (3) Computer Tools for Life Sciences
COMP 462 (3) Computational Biology Methods
At most one of:
   GEOG 202 (3) Statistics and Spatial Analysis
   MATH 203 (3) Principles of Statistics 1
   PSYC 204 (3) Introduction to Psychological Statistics
   BIOL 373 (3) Biometry
At most one of:
   MATH 204 (3) Principles of Statistics 2
   PSYC 305 (3) Statistics for Experimental Design
   MATH 323 (3) Probability
   MATH 324 (3) Statistics*

* Students who have already received credit for MATH 324 will NOT receive credit for GEOG 202, MATH 203, PSYC 204, BIOL 373, MATH 204 or BIOL 373.

**Restrictions**

1. This minor is not open to students with majors in Anatomy&Cell Biology, Biochemistry, Physiology or Microbiology&Immunology. Students in those majors already cover the basic life sciences and empirical science and technology areas and should instead take a minor in a different discipline. Some possible choices include a minor in another science area (including all the basic sciences, Mathematics and Computer Science, plus interdisciplinary minors such as Environment, Neuroscience, Pharmacology and Computational Molecular Biology); or an Arts
Minor Concentration from a social science area (there are many choices including areas such as Sociology and the Social Studies of Medicine).

2. This minor may have restricted enrollment. Applications and advising for the program is available in the Science Student Affairs Office.

Notes (for review information only, not for inclusion in the calendar)

1. This minor could (with approval of Arts) be available to students in Arts who have enough basic science courses to allow them to take the courses in the minor.

2. This minor could (with approval of the B.A.&Sc. PAC) be available to B.A.&Sc. students in the Interfaculty or Honours programs in Environment or Cognitive Science. The minor does not necessarily make sense for students in the B.A.&Sc. multi-track programs, since they must take a minor that is either in Arts or in Science, and this one spans the two faculties.

3. Some of the courses in the lists require prerequisites from outside of the minor. Depending on a student’s major, a student may or may not be able to take these courses. However, there are quite a few courses for which most Science students will have the appropriate prerequisites.

4. A web page will be created with further advising advice and specific information for how to apply for the minor and how to have an individual program approved. The mode of applying for the minor will be worked out with the Faculty of Science SAO. One possible approach would be to automatically allow all students who have completed at least one full-time term at McGill, who have completed sufficient freshman science and and who have a GPA of at least 3.3, plus allow other students by special permission.