McGill

New Program/Major or Minor/Concentration Proposal Form

1.0 Degree Title
Please specify the two degrees for concurrent degree programs

Masters

1.1 Major (Legacy= Subject)(30-char. max.)

Mathematics and Statistics

1.2 Concentration (Legacy = Concentration/Option)
If applicable to Majors only (30 char. max.)

Bioinformatics Option

1.3 Minor (with Concentration, if Applicable) (30 char. max.)

2.0 Administering Faculty/Unit

Graduate and Postdoctoral Studies

Offering Faculty/Department

Mathematics and Statistics

3.0 Effective Term of Implementation
(Ex. Sept. 2004 = 200409)
Term

200601

4.0 Program Information
Please check appropriate box(es)

4.1 Program Type
- ☐ Bachelor's Program
- ☒ Master's
- ☐ M.Sc. (Applied) Program
- ☐ Dual Degree/Concurrent Program
- ☐ Certificate
- ☐ Diploma
- ☐ Graduate Certificate
- ☐ Graduate Diploma
- ☐ Ph.D. Program
- ☐ Doctorate Program
   (Other than Ph.D.)
- ☐ Private Program
- ☐ Off-Campus Program
- ☐ Distance Education Program
   (By Correspondence)
- ☐ Other
   Please specify

4.2 Category
- ☐ Faculty Program (FP)
- ☐ Major
- ☐ Joint Major
- ☐ Major Concentration (CON)
- ☐ Minor
- ☐ Minor Concentration (CON)
- ☐ Honours (HON)
- ☐ Joint Honours Component (HC)
- ☐ Internship/Co-op
- ☒ Thesis (T)
- ☐ Non-Thesis (N)
- ☐ Other
   Please specify

4.3 Level
- ☐ Undergraduate
- ☐ Dentistry/Law/Medicine
- ☐ Continuing Ed (Non-Credit)
- ☐ Collegial
- ☒ Masters & Grad Dips & Certs
- ☐ Doctorate
- ☐ Post-Graduate Medicine/Dentistry
- ☐ Graduate Qualifying
- ☐ Postdoctoral Fellows

5.0 Total Credits

48

6.0 Consultation with Related Units   ☐ Yes   ☒ No

Financial Consult   ☐ Yes   ☒ No

Attach list of consultations.

7.0 Description (Maximum 150 words)

Bioinformatics research lies at the intersection of biological/medical sciences and mathematics/computer science/engineering. The intention of the Bioinformatics Option is to train M.Sc. students to become researchers in this inter-disciplinary field. This includes the development of strategies for experimental design, the construction of tools to analyze datasets, the application of modeling techniques, the creation of tools for manipulating Bioinformatics data, the integration of biological databases and the use of algorithms and statistics. Students successfully completing the Bioinformatics option will be fluent in the concepts, language, approaches and limitations of the field and will have the capability of developing an independent Bioinformatics research program. The option consists of a number of inter-disciplinary courses and a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field.

8.0 List of proposed program for the New Program/Major or Minor/Concentration.

**If new concentration (option) of existing Major/Minor (program), please attach
a program layout (list of all courses) of existing Major/Minor.**

**Proposed program (list courses as follows: Subj Code/Crse Num, Title, Credit weight
under the headings of: Required Courses, Complementary Courses, Elective Courses)**

M.Sc. in Mathematics & Statistics; Bioinformatics (48 credits)

REQUIRED COURSES (27 credits)

MATH 600   Master's Thesis Research 1 (6 credits)
MATH 601   Master's Thesis Research 2 (6 credits)
MATH 604   Master's Thesis Research 3 (6 credits)
MATH 605   Master's Thesis Research 4 (6 credits)

COMP 616   Bioinformatics Seminar (3 credits)

COMPLEMENTARY COURSES (21 credits)

6 credits from the list of courses below:
BINF 621   Bioinformatics: Molecular Biology (3 credits)
COMP 618   Bioinformatics: Functional Genomics (3 credits)
BMDE 652   Proteomics (3 credits)
PHGY 603   Systems Biology and Biophysics (3 credits)

+ 15 credits of approved courses at the 500 or 600 level

Additional courses may be required at the discretion of the candidate's supervisory committee.

9.0 Rationale

There is a significant and growing level of Bioinformatics at McGill distributed across three faculties (Faculty of Agricultural and Environmental Sciences, Science, Medicine). The primary Bioinformatics researchers come from departments such as anatomy and cell biology, biology, plant science, biomedical engineering, computer science, human genetics, mathematics and physiology. This research covers a broad range of sub-fields including the Bioinformatics components of the analysis of molecular sequence data, functional genomics, proteomics, aspects of systems biology and dynamical systems. Our researchers are well-recognized in their fields and are dedicated to building Bioinformatics at McGill. Bioinformatics training is in high demand and the number of established programs Canada-wide is small. Graduate students are attracted to McGill due to its reputation and also for the promise of formal training in Bioinformatics.

Over the past several years, Bioinformatics researchers at McGill have cooperated in an informal way with respect to both research and the training of their graduate students. Our students have attended various courses, seminars and colloquia taught by our researchers and through course projects and lab meetings there has been a steady but ultimately insufficient dissemination of information between our labs. Bioinformatics is truly an inter-disciplinary field that requires advanced knowledge in many different areas. Arguably no single researcher understands all aspects of their field. These informal cooperations are not sufficient to develop rigorous, high quality training programs in Bioinformatics. For instance, it is difficult to establish a common computational platform for our students to train with and we lack a systematic program for teaching.

We propose a Bioinformatics Option at the M.Sc. level. The Bioinformatics Option program will be a truly inter-disciplinary program designed to train our graduate students to become researchers in Bioinformatics and to become fluent in many aspects of this field. The Bioinformatics Option will bring both students and professors from diverse backgrounds into one classroom and lab where it will be possible to develop a sustained dialogue between all sides. This program will be unique in Canada offering more "pure" Bioinformatics courses than any other we know of. It is progressive and feasible. Ultimately, it will provide the framework for a permanent M.Sc. program in Bioinformatics. Please see the attached document (description of the Bioinformatics Option) for additional information.

10.0 Approvals

Routing Sequence	Name	Signature	Date
Department			
Curric/Acad Commitee			
Faculty 1			
Faculty 2			
Faculty 3			
SCTP			
GS			
APPC			
Senate			

Submitted by

Name		**To be completed by ARR:**
Phone		**CIP Code**
Email		
Submission Date		