

Request for Calendar Change Form

Tracking No:
(Senate Secretary's Office
use only)

Date:

To	Secretary of Senate	
From	Name(Dean):	Faculty
	<input style="width: 95%;" type="text" value="Dr. A. P. Dean"/>	<input style="width: 95%;" type="text" value="SES"/>
	Department the change relates to	
	<input style="width: 95%;" type="text" value="Bioinformatics"/>	
	Contact Person	
	<input style="width: 95%;" type="text" value="Dr. R. C. Mawhinney"/>	

Is the proposed calendar change Undergraduate

Instructions:

1. In all cases please complete and attach section 1 and 2
2. If the calendar change affect other departments/schools/faculties complete and attach section 3
3. If the answer to any of the questions below is yes, explain. Attach separate sheets with reference to the question

- | | | |
|--|--|---|
| 1. Do the proposed changes affect other departments/ schools/faculties in terms of their calendar change? | Yes
<input checked="" type="checkbox"/> | No
<input type="checkbox"/> |
| 2. Is a transition plan needed for student in progress? | Yes
<input type="checkbox"/> | No
<input checked="" type="checkbox"/> |
| 3. Are the proposed changes likely to affect student enrollment in your department/school/faculty? | Yes
<input checked="" type="checkbox"/> | No
<input type="checkbox"/> |
| 4. Are the proposed changes likely to affect student enrollment in other departments/schools/faculties at Lakehead University? | Yes
<input type="checkbox"/> | No
<input checked="" type="checkbox"/> |
| 5. Will the proposed changes require additional teaching space and/or teaching staff and/or equipment and/or other resources? | Yes
<input type="checkbox"/> | No
<input checked="" type="checkbox"/> |
| 6 Will the proposed changes affect existing teaching loads within your department/school/faculty? | Yes
<input type="checkbox"/> | No
<input checked="" type="checkbox"/> |
| 7. Will the proposed changes increase demand for teaching support services such as the library, computing services and technical staff ? | Yes
<input checked="" type="checkbox"/> | No
<input type="checkbox"/> |
| 8. Will the proposed change require direct or in-kind support from outside the academic unit? | Yes
<input type="checkbox"/> | No
<input checked="" type="checkbox"/> |
| 9. Do the proposed changes include change in course(s) which is/are required core course(s) for a major? | Yes
<input checked="" type="checkbox"/> | No
<input type="checkbox"/> |
| 10. Do the proposed changes include a change in course which is | Yes | No |

- service/required course(s) in another program? Yes No
11. Do the proposed changes include change in course(s) which is/are open elective available to any student in any program? Yes No
12. Do the proposed changes include change in course(s) which is/are elective in a major i.e. restricted to students in a major? Yes No

Signatures:

Date approved by faculty council

13/11/2008

Section 1

Description of the Proposed Calendar Change:

We are introducing a new undergraduate program in bioinformatics. The purpose of this new program is to meet the needs of Northern Ontario Research Development in the 21st century.

Rationale of the Proposed Calendar Change(s):

(Corresponding to Section 2 where required)

Section 2

Existing Calendar Entries:
(Page reference based on hard copy or URL based on electronic version of calendar)

Proposed Calendar Entries/Addition/ Deletion
-If only addition, specify page number and placement in university calendar
-If only deletion, write Deleted

1

This is a new program.

INTERDISCIPLINARY PROGRAMS IN BIOINFORMATICS

Program Coordinator	R. Mawhinney
Program Committee	
(Biology)	R.D. Law
(Biology)	K.T. Leung
(Biology)	H. Schraft
(Biology)	G. Pyle
(Chemistry)	C. Gottardo
(Chemistry)	Z.-H. Jiang
(Chemistry)	W. Floriano
(Chemistry)	R. Mawhinney
(Computer Science)	M.W. Benson
(Computer Science)	S.M.A. Mohammed
(Computer Science)	J. Fiaidhi
(Mathematics)	L. Liu
(Mathematics)	A.P. Dean
(Physics)	A. Linhananta

The degree program in Bioinformatics is an interdisciplinary course of study with emphasis on the integrated use of tools from mathematics, computer science, biology, chemistry and physics to the scientific understanding of biological systems.

ADMISSION REQUIREMENTS

See Requirements for Admission to Undergraduate Degree Programs in the Admission Requirements and Registration section of this Calendar, page 32. In addition to the general requirements (a minimum of six Grade 12U or M courses with a minimum 70% overall average), additional prerequisites for the Bioinformatics program are one credit each in Gr. 12 U English, Gr. 12 U Advanced Functions, Gr. 12 U Chemistry and Gr. 12 U Biology.

ACADEMIC REGULATIONS

See the University Regulations section, page 44, and the Faculty of Science and Environmental Studies Regulations section, page 168, of this

Calendar for conditions to enter, proceed in and graduate from these programs.

PROGRAMS

Four-year HBSc and four-year BSc programs in Bioinformatics are offered. Core courses in the fields of Biology, Chemistry, Mathematics, Physics and Computer Science provide an understanding of the complex interactions in living systems, the physical and chemical nature of the living environment and the impact each have on the other. The first year of the program is an introduction to the science involved in studying Bioinformatics. Each successive year increasingly emphasizes the application of previously learned principles to living systems.

Majors in Bioinformatics are advised to consult with the program coordinator in planning their program. Students entering or proceeding in Honours programs must seek counseling for thesis planning in year three of their program.

HBSc (Bioinformatics)

Four Year program

A student may enter, proceed in and graduate from the Honours BSc program in accordance with stipulations in the University Regulations section, page 44, and Faculty of Science and Environmental Studies Regulations section, page 168, of the Calendar. All course choices in fourth year must be approved by the program coordinator.

In order to remain in the program, students must maintain at least an overall B average in the core courses taken in the program. Students should refer to the Faculty of Sciences and Environmental Studies Regulations, page 168. By March 15 of their third year, students eligible to enter the fourth year of the HBSc program, and who intend to fulfill the thesis requirement in the next academic year must (a) have a faculty advisor, (b) have a topic approved by the advisor, and (c) submit a one page report, outlining the thesis proposal, to the program coordinator.

Year 1

- (a) Biology 1110
- (b) Chemistry 1110, 1130
- (c) Computer Science 1411, 1431
- (d) Mathematics 1180
- (e) Physics 1101
- (f) 0.5 FCE elective in Humanities or Social Sciences (One of English 1011, 1031, 1111, or

1112 recommended)

Year 2

- (a) Biology 2171, 2230, 2711, 2910
- (b) Chemistry 2211, 2231
- (c) Computer Science 2412
- (d) Mathematics 2255
- (e) Physics 2331
- (f) 0.5 FCE elective

Year 3

- (a) Biology 3135
- (b) Chemistry 2411, 3251, 3271, 3xxx(cross-listed as Bioinformatics 3xxx)
- (c) Computer Science 2477
- (d) Mathematics 2111, 2331, 2333
- (e) 0.5 FCE elective

Year 4

- (a) Biology 3330
- (b) Chemistry 4710
- (c) Computer Science 3413, 4411
- (d) Physics 3511 or Chemistry 4xxx(ST)(cross-listed as Bioinformatics 4xxx(ST))
- (e) Bioinformatics 4111, 4901 and 1.0 FCE elective from the List of Recommended Electives or Bioinformatics 4501 and 1.5 FCE elective from the List of Recommended Electives (see Note 1)

Notes:

1. It is strongly recommended that students considering graduate school choose the Bioinformatics 4111, 4901 option.

BSc (Bioinformatics)

Four Year program

This program is designed for students who lack the required B major average to complete the four year HBSc. Students may move to the BSc as early as their Third Year. In order to remain in the program, students must maintain at least an overall C average in the core courses taken in the program. Students should refer to the Faculty of Sciences and Environmental Studies Regulations, page 168.

Year One through Three:

Course requirements for the first three years are the same as for the four year HBSc program.

Year 4

- (a) Biology 3330
- (b) Chemistry 4710
- (c) Computer Science 3413, 4411

- (d) Physics 3511 or Chemistry 4xxx(ST)(cross-listed as Bioinformatics 4xxx(ST))
- (e) Bioinformatics 4501
- (f) 0.5 FCE elective from the List of Recommended Electives
- (g) 1.0 FCE elective

LIST OF RECOMMENDED ELECTIVES

Biology 3138	Molecular
Anthropology I	
Biology 4230	Cancer Biology
Chemistry 3231	Organic Chemistry
III	
Chemistry 3451	Physical Chemistry
III	
Chemistry 4131 (ST)	Special Topic
Computer Science 4471	Computer Graphics
Computer Science 4475	Topics in Artificial
Intelligence	
Computer Science 4478	Object-Oriented
Design and Methodology	
Mathematics 2275	Linear Algebra II
Mathematics 3335	Sample Survey
Methods	
Mathematics 3351	Applied Numerical
Methods	
Mathematics 3371	Computational
Linear Algebra and Numerical Approximation I	
Mathematics 4335	Design of
Experiments	

COURSES

Courses not offered this academic year (fall/winter terms) are indicated by the words "NOT OFFERED THIS YEAR" below the course description. Nevertheless, students should refer to the Timetable as a final check.
(Information about Course Numbering System)

Bioinformatics 3xxx

Bioinformatics

0:0; 2-4

Prerequisite: Chemistry 3251/Biology 3252

Developing practical bioinformatics skills. Some of the topics covered are: introduction to Linux; web databases and resources; overview and use of public and commercial software packages for sequence and structure analysis; examples of applications of everyday bioinformatics.

Bioinformatics 4xxx (ST)

Special Topics in Biological Chemistry

0-0; 3-3

Prerequisite: Chemistry 3251/Biology 3252 and

permission of the Department.

Selected topics in biological chemistry such as: computational tools in the discovery of medicinal drugs; biologically active inorganic compounds; drug design.

Bioinformatics 4111

Research Seminars

Seminars scheduled over fall and winter terms

Co-requisite: Bioinformatics 4901

Course content is variable but closely related to the research project undertaken in Bioinformatics 4901. Students are required to present their research to the Department on a regular basis and to attend all seminars sponsored by the Department.

Bioinformatics 4501

Senior Project

Under the supervision of participating Bioinformatics Science faculty members, students complete a research project culminating in a report.

Bioinformatics 4901

Honours Thesis

Co-requisite: Bioinformatics 4111

A research project and the accompanying written thesis concerning the research investigation which has been undertaken will be submitted to the Department.

Section 3

The Faculty(ies) affected by the proposed calendar change

SES

I have been consulted regarding the attached calendar change and understand the academic and budgetary implication on my Dept./School/Faculty.

I agree to this calendar change proposal

Yes

No

Name:

Faculty:

Date:

Signature of Dean

Response to the Strategic Plan – New Program Approval

The Faculty of Science and Environmental Studies is proposing to introduce two new four-year programs: HBSc (Bioinformatics) and BSc (Bioinformatics). These new programs are in line with the Principles Informing the Culture of Lakehead University in its role of serving the population of Thunder Bay and Northwestern Ontario. The study of bioinformatics is fundamental to the future knowledge economy. It is the foundation for generating working models of biological regulation, development and physiology, hypothesis for drug action, models for combating infectious disease and destructive insects and developments in crop hardiness and enhancement. Bioinformatics can rapidly deliver to the laboratory bench to promote the diagnosis and treatment of disease, stimulate our pharmaceutical and agricultural economies and improve the well-being of Canadians.

Four-year BSc (Bioinformatics) and HBSc (Bioinformatics)

The two new programs are designed to have similar outcomes. The significant difference is that students with a 70% average entering the fourth year will have the option of participating in the HBSc program. Those opting for the HBSc will be encouraged to participate in an Honours Thesis project.

Learner outcome:

- Increased knowledge of chemistry, biology, mathematics, computer science and physics as applied to living systems at a more advanced level.

Assessment of outcome: Students will be graded on all aspects of the course material. The grading will be composed of a variety of methods including: tests, assignments, formal reports, seminars and practical exercises.

Learner outcome:

- Practice in communicating science. The majority of the fourth year courses require seminars and papers, requirements not seen in the lower year levels.

Assessment of outcome: Students will be required in the majority of courses to present a research paper and seminar on the same topic. They will be graded by their instructor who will also provide them with the appropriate guidance to improve their presentations. The ability to communicate is necessary for success in all areas (employment, professional school, graduate school).

Learner outcome:

- Analyze material presented in the relevant literature. The majority of the fourth year courses require the presentation and preparation of seminars and papers based on the literature, requirements not seen in the lower year levels.
- Evaluate material from the literature. Students will be asked to critique the literature with an eye to determining whether or not some of the claims being presented are reasonable.

Assessment of outcome: Students will be required in the majority of courses to present a research paper and seminar on the same topic usually based on information available in the current literature. Many of the assignments given in class will be based on issues that are presented in the literature. We will ask our students to critically evaluate the material read and question the validity of the claims made as part of the research.

Learner Outcome:

- Synthesis of material. In the third and fourth year students begin to recognize the connections between the disciplines and will often be asked to combine the information from a variety of courses as they solve problems.

Assessment of outcome: In exams, tests and assignments our students will consistently be asked to combine their knowledge of chemistry, biology, mathematics, computer science and physics before arriving at a solution. This method is most successful in the fourth year when they have a combination of both breadth and depth in the disciplines.

A licensure examination is not required for these degrees.

The members of the Departments of Biology, Chemistry, Computer Science, Mathematical Sciences and Physics are continuously involved in assessing their teaching through evaluations (university-wide and peer) and participation in workshops (example for Chemistry: W.E. Harris Teaching workshop, University of Alberta). The information gathered allows our membership to determine the local success of our students and ensure that our curriculum is in step with the national curriculum. We will continue to track our students' successes post graduation by remaining in contact with a large majority of the students who have continued on to professional school and graduate research degrees. By understanding where our students go in their careers and their successes we will be able to determine if they have met the program requirements: understanding the science and communicating their understanding.

A number of undergraduate students will be involved in science clubs (e.g., Biology Club or Chemistry Club). The purpose of these clubs is to provide a peer support system and the clubs have been involved in promoting science to the community (Superior Science, National Chemistry Week). The senior students tend to mentor the junior ones and, with the fourth year cohort, we will begin to see more of this mentoring activity.

As noted above we have no four year degree in this new and emerging field that will play a significant role in the future of the knowledge economy. With these new programs we will finally offer students an option that is relatively unique, offered only at a few select universities, but important to our local industry, research priorities and the advancement of science world-wide.