<table>
<thead>
<tr>
<th>1.0 Degree Title</th>
<th>2.0 Administering Faculty/Unit</th>
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<tbody>
<tr>
<td>Specify the two degrees for concurrent degree programs</td>
<td>Science</td>
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<tr>
<td>1.1 Major (Legacy= Subject) (30 char. max.)</td>
<td>Offering Faculty/Department</td>
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<tr>
<td>B.Sc.</td>
<td>Science</td>
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<td>1.2 Concentration (Legacy = Concentration/Option) If applicable (30 char. max.)</td>
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<tr>
<td>1.3 Minor (with Concentration, if applicable) (30 char. max.)</td>
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<td>1.4 Category</td>
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<td>☐ Faculty Program (FP)</td>
<td>☐ Honours (HON)</td>
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<tr>
<td>☐ Major</td>
<td>☐ Joint Honours</td>
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<td>☒ Joint Major</td>
<td>☐ Component (HC)</td>
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<td>☐ Major Concentration (CON)</td>
<td>☐ Internship/Co-op</td>
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<td>☐ Minor</td>
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<td>☐ Minor Concentration (CON)</td>
<td>☐ Non-Thesis (N)</td>
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<tr>
<td>☐ Other</td>
<td>Please specify</td>
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<tr>
<td>☐ Computer Science and Biology</td>
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<tr>
<th>3.0 Effective Term of revision or retirement</th>
<th>6.0 Revised Program Description (Maximum 150 words)</th>
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<tbody>
<tr>
<td>Please give reasons in 5.0 “Rationale” in the case of retirement (Ex. Sept. 2004 = 200409) Retirement</td>
<td>This program will train students in the fundamentals of biology – with a focus on molecular biology – and will give them computational and mathematical skills needed to manage, analyze, and model large biological datasets. <strong>Two integrative features</strong> of the program are a three-credit independent studies courses and a one-credit seminar. Students may complete this program with a maximum of 73 credits or a minimum of 69 credits. This depends upon the student’s choice of required courses and whether or not the student is exempt from taking COMP 202.</td>
</tr>
<tr>
<td>Term: 2011/2012</td>
<td><strong>Advising notes for U0 students</strong></td>
</tr>
<tr>
<td>4.0 Existing Credit Weight</td>
<td>It is highly recommended that freshman BIOL, CHEM, MATH, and PHYS courses be selected with an advisor to ensure they meet the core requirements of the COMP-BIO program.</td>
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<td>Proposed Credit Weight</td>
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<tr>
<td>69-73</td>
<td>69-73</td>
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</table>
### Complementary Courses, Elective Courses

**Required Mathematics & Statistics Courses (6 credits)**
- MATH 222 (3) Calculus 3
- MATH 223 (3) Linear Algebra

**Required Computer Science Courses (12, 15 or 16 credits)**
- COMP 202 (3) Intro to Computing 1 ( *)
- COMP 208 (3) Software Systems
- COMP 250 (3) Intro to Computer Science
- COMP 251 (3) Data Structures and Algorithms
- COMP 462 (3) Computational Biology Methods

**Or**
- COMP 561 (4) Computational Biology Methods and Research

* Students who have sufficient knowledge in a programming language are not required to take COMP 202.

**Required Biology Courses (20 credits)**
- CHEM 212 (4) Organic Chemistry
- BIOL 200 (3) Molecular Biology
- BIOL 201 (3) Cell Biology and Metabolism
- BIOL 202 (3) Basic Genetics
- BIOL 215 (3) Intro to Ecology and Evolution
- BIOL 301 (4) Cell and Molecular Laboratory

**Required Computer Science Courses (12, 15 or 16 credits)**
- MATH 223 (3) Linear Algebra

**Required Joint Courses (7 credits)**
- COMP 401 (3) Project in Biology and Computer Science
- COMP 499 (1) Undergraduate bioinformatics seminar
- BIOL 495 (3) Integrative Computing in Biology

**Required Mathematics & Statistics Courses (6 credits)**
- MATH 323 (3) Probability Theory AND MATH 324 (3) Statistics

**Or**
- MATH 203 (3) Principle of Statistics 1 AND MATH 204 (3) Principle of Statistics 2

**Or**
- BIOL 309 (3) Mathematical Models in Biology AND BIOL 373 (3) Biometry

At least 18 credits from the following lists, with the following two requirements:

1. At least 9 credits from each of the following two blocks
2. At least one course at the 400-level or above from each block.

**Computer Science Block**
- MATH 240 (3) Discrete Structures 1
- COMP 273 (3) Introduction to Computer Systems
- COMP 302 (3) Programming Languages and Paradigm
- COMP 303 (3) Software Development
- COMP 304 (3) Object Oriented Software Design
- COMP 310 (3) Operating Systems
- COMP 330 (3) Theoretical Aspects: Computer Science
- COMP 335 (3) Software Engineering Methods
- COMP 350 (3) Numerical Computing
- COMP 360 (3) Algorithm Design Techniques

All COMP courses at the 400-level (except 401,499, and 462) and all courses at the 500-level (except 561).

**Biology Block**
- BIOL 300 (3) Molecular Biology of the Gene
- BIOL 309 (3) Mathematical Models in Biology
- BIOL 310 (3) Large Scale Ecology
- BIOL 313 (3) Eukaryotic Cell Biology
- BIOL 435 (3) Natural Selection
- BIOL 518 (3) Advanced Topics in Cell Biology
- BIOL 568 (3) Topics on the Human Genome
- BIOL 569 (3) Developmental Evolution
- BIOL 572 (3) Molecular Evolution
- BIOL 593 (3) Advanced Biometry

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

**Required Mathematics & Statistics Courses (6 credits)**
- MATH 222 (3) Calculus 3
- MATH 223 (3) Linear Algebra

**Required Computer Science Courses (12, 15 or 16 credits)**
- COMP 202 (3) Intro to Computing 1 ( *)
- COMP 208 (3) Software Systems
- COMP 250 (3) Intro to Computer Science
- COMP 251 (3) Data Structures and Algorithms
- COMP 462 (3) Computational Biology Methods

**Or**
- COMP 561 (4) Computational Biology Methods and Research

* Students who have sufficient knowledge in a programming language are not required to take COMP 202.

**Required Biology Courses (20 credits)**
- CHEM 212 (4) Organic Chemistry
- BIOL 200 (3) Molecular Biology
- BIOL 201 (3) Cell Biology and Metabolism
- BIOL 202 (3) Basic Genetics
- BIOL 215 (3) Intro to Ecology and Evolution
- BIOL 301 (4) Cell and Molecular Laboratory

**Required Computer Science Courses (12, 15 or 16 credits)**
- MATH 223 (3) Linear Algebra

**Required Joint Courses (7 credits)**
- COMP 401 (3) Project in Biology and Computer Science
- COMP 499 (1) Undergraduate bioinformatics seminar
- BIOL 495 (3) Integrative Computing in Biology

**Required Mathematics & Statistics Courses (6 credits)**
- MATH 323 (3) Probability Theory AND MATH 324 (3) Statistics

**Or**
- MATH 203 (3) Principle of Statistics 1 AND MATH 204 (3) Principle of Statistics 2

**Or**
- BIOL 309 (3) Mathematical Models in Biology AND BIOL 373 (3) Biometry

At least 18 credits from the following lists, with the following two requirements:

1. At least 9 credits from each of the following two blocks
2. At least 3 credits at the 400-level or above from each block.

**Computer Science Block**
- MATH 240 (3) Discrete Structures 1
- COMP 273 (3) Introduction to Computer Systems
- COMP 302 (3) Programming Languages and Paradigm
- COMP 303 (3) Software Development
- COMP 304 (3) Object Oriented Software Design
- COMP 310 (3) Operating Systems
- COMP 330 (3) Theoretical Aspects: Computer Science
- COMP 335 (3) Software Engineering Methods
- COMP 350 (3) Numerical Computing
- COMP 360 (3) Algorithm Design Techniques

All COMP courses at the 400-level (except 401,499, and 462) and all courses at the 500-level (except 561).

**Biology Block**
- BIOL 300 (3) Molecular Biology of the Gene
- BIOL 309 (3) Mathematical Models in Biology
- BIOL 310 (3) Large Scale Ecology
- BIOL 313 (3) Eukaryotic Cell Biology
- BIOL 395 (1) Quantitative Biology seminar I
- BIOL 435 (3) Natural Selection
- BIOL 495 (1) Quantitative Biology seminar II
- BIOL 518 (3) Advanced Topics in Cell Biology
- BIOL 593 (3) Advanced Biometry

Program/Major or Minor/ Concentration Revision Form P2-2
8.0 Consultation with Related Units

- [ ] Yes  - [ ] No

- [ ] Yes  - [ ] No

- Attach list of consultations

9. Approvals

### Routing Sequence

<table>
<thead>
<tr>
<th>Department</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>Curric/Acad Committee</td>
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<td>Faculty 1</td>
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<tr>
<td>Senate</td>
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Submitted by

- Name
- Phone
- Email
- Submission Date

To be completed by ARR:

- CIP Code