

## **Ad-hoc B.Sc. Major in Quantitative Biology**

### **Advising notes for U0 students**

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 Quantitative Biology program.

This program is recommended for U1 students achieving a CGPA of 3.2 or better; and entering CEGEP students with a Math/Science R-score of 28.0 or better.

### **Major Program in Quantitative Biology (70-71 credits)**

#### **Quantitative Biology Program Core Requirements (38-42 credits)**

##### **Biology (20 credits):**

BIOL 200	(3)	Molecular biology
BIOL 201	(3)	Cell biology and metabolism
BIOL 202	(3)	Basic genetics
BIOL 205	(3)	Biology of organisms
BIOL 215	(3)	Introduction to ecology and evolution
BIOL 466	(3)	Independent Study Project
*BIOL 395	(1)	Quantitative Biology seminar I
*BIOL 495	(1)	Quantitative Biology seminar II

\*see new course and revised course proposal

##### **Chemistry (4 credits)**

CHEM 212\* (4) Introductory organic chemistry

\*Students who have taken the equivalent of CHEM 212 **can make up the credits** with a complementary CHEM course in consultation with a stream advisor.

##### **Computer Science (6 Credits)**

COMP 202\* (3) Introduction to computing

COMP 250 (3) Introduction to computer science

\*Students who have taken COMP 202 or have sufficient programming experience **can make up the credits** with a complementary COMP course in consultation with a stream advisor.

We strongly recommend COMP 364.

##### **Math (9 credits)**

MATH 222 (3) Calculus 3 (*not required for students who have taken MATH 150 and MATH 151*)

MATH 223 (3) Linear algebra

MATH 315 (3) Ordinary differential equations

##### **Physics (3 credits)**

PHYS 230 (3) Dynamics of Simple Systems

## **Stream 1: Theoretical ecology and evolutionary biology (21 credits)**

### **Biology Required Courses (9 credits)**

BIOL 206	(3)	Methods in Biology of Organisms
BIOL 304	(3)	Evolution
BIOL 308	(3)	Ecological Dynamics

### **Biology Complementary Courses**

**Field Courses (3 credits from the following list or any other field course with permission):**

BIOL 240	(3)	Monteregian Flora
BIOL 331	(3)	Ecology/Behaviour field course
BIOL 334	(3)	Applied Tropical Ecology
BIOL 432	(3)	Limnology

**9 credits chosen from the following list, of which 6 credits must be at the 400-level or above:**

BIOL 310	(3)	Biodiversity and ecosystems
BIOL 373	(3)	Biometry
BIOL 324	(3)	Ecological Genetics
BIOL 434	(3)	Theoretical Ecology
BIOL 435	(3)	Natural Selection
BIOL 590	(3)	Linking Community and Ecosystem Ecology
BIOL 594	(3)	Evolutionary Ecology

## **Stream 2: Physical biology (20-21 credits)**

### **Required courses; 8 - 9 credits:**

BIOL 301	(4)	Cell and Molecular Biology Lab
CHEM 223	(2)	Physical Chem I
PHYS 232	(3)	Heat and Waves
or PHYS 242*	(2)	Electricity and Magnetism

\*required for PHYS 342 and PHYS 434

### **Biology Complementary Courses**

**6 credits from the following list:**

BIOL 309	(3)	Mathematical models in biology
BIOL 300	(3)	Molecular biology of the gene
BIOL 303	(3)	Developmental biology
BIOL 306	(3)	Neural basis of behavior
BIOL 313	(3)	Cell biology
PHYS 319	(3)	Biophysics

**6 credits from the following list:**

BIOL 518	(3)	Advanced topics in cell biology
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BIOL 520	(3)	Gene activity in development
BIOL 524	(3)	Topics in molecular biology
BIOL 530	(3)	Advances in neuroethology
BIOL 551	(3)	Cell cycle control
BIOL 588	(3)	Advances in Molecular/Cellular Neurobiology

**Common Complementary Courses; streams 1 and 2**  
**At least 9 credits from the following courses**

**Recommendations for *either* Eco-Evo or Physical streams**

CHEM 365	(2)	Statistical Thermodynamics
or PHYS 333	(3)	Thermal and statistical physics
COMP-206	(3)	Introduction to software systems
COMP 251	(3)	data structures and algorithms
COMP-350	(3)	Numerical computing
or MATH 317	(3)	Numerical analysis
COMP 364	(3)	Computer tools for life scientists *see revised course proposal
MATH 314	(3)	Advanced Calculus
MATH 319	(3)	Partial Differential Equations
MATH 327	(3)	Matrix numerical analysis
MATH 323	(3)	Probability
MATH 326	(3)	Nonlinear Dynamics and Chaos
MATH 348	(3)	Topics in geometry
MATH 437	(3)	Mathematical Methods in Biology
MATH 447	(3)	Stochastic Processes

**Recommendations for Physical stream**

CHEM 222	(4)	Organic chemistry II
CHEM 243	(2)	Physical Chem 2
CHEM 253	(1)	Physical Chem 2 Laboratory
CHEM 345	(3)	Molecular properties and structure I
CHEM 355	(3)	Molecular properties and structure II
CHEM 514	(3)	Biophysical chemistry
PHYS 342	(3)	EM waves
PHYS 434	(3)	Optics
PHYS 534	(3)	Nanotechnology

**Recommendations for Eco-Evo stream**

MATH 204	(3)	Principles of Statistics 2
MATH 242	(3)	Analysis 1
MATH 324	(3)	Statistics
MATH 340	(3)	Discrete Structures 2
MATH 423	(3)	Regression and Analysis of Variance
MATH 524	(4)	Nonparametric Statistics
MATH 525	(4)	Sampling Theory and Applications

November 12, 2010

Nicole Allard

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Dear Nicole Allard,

I have heard about this new program that is going to be offered by the Faculty of Science called Quantitative Biology. I would like to be able to graduate in an ad hoc program this academic year. If I were allowed to graduate on time, I would be able to begin my master's in the Fall '11, otherwise I would require an extra semester and would only be able to graduate in Fall '11.

These are the courses that I have completed as part of the core courses for the quantitative biology program:

- Biology : 200, 201, 202, 215, 377 (instead of 466); ( 15 credits )
- Comp 250, 251( instead of 202); ( 6 credits )
- Math 223, 315; ( 6 credits )
- Phys 251 instead of Phys 230 (honours equivalent). ( 3 credits )
- Chem 204 (instead of 223 ) ( 3 credits )

I have also completed **Chem 212** and **Math 222** in CEGEP, which will be substituted by Biol 206 and Math 235 respectively, with approval from both Nancy Nelson and Jackie Vogel. ( 6 credits )

( 39 core credits )

Furthermore, I have completed some courses for **STREAM 2: Physical biology**

- Phys 232 ( 3 credits )
- Biol 300 (currently enrolled). ( 3 credits )

As for my complementary courses, I have completed

- Comp 206 ( 3 credits )
- Math 248 (instead of 314: honours equivalent) 323, 326. ( 9 credits )

I am missing

Biol 205 from my core courses. ( 3 credits )

- Biol 301, 313 , 551 and Chem 514 (as the second 500 level course) for my stream courses.

( 13 credits )

( 34 stream credits )

( 73 total credits )

These 5 courses can be taken during the Winter '11, and without course conflicts. All these biology courses, with the exception of Biol 205, would have been taken as part of my joint major program.

Of course I am missing the two QB seminar courses (3/495). This has been waived for me by Jackie Vogel. She has agreed to it because during the two and a half years that I have been here so far, I have been continuously attending seminars, including those from the weekly physics colloquia, the molecular seminar series in the department of biology students and some other ones here and there.

As an additional note, Biol 377 is an independent reading project while 466 is a research project. This may be a concern, but I have had a USRA ( NSERC Summer '10 ).

Lastly, I will drop my two minors (math and physics) if I am able to complete an ad hoc QB program.