



## Program Planning Guide

Current and past Program Planning Guides are available on the UofL website at [www.uleth.ca/ross/ppgs/ppg.html](http://www.uleth.ca/ross/ppgs/ppg.html)

Calendar Year: 2012/2013

Faculty: Arts & Science

### About the Department of Biological Sciences

The Department of Biological Sciences offers a major in Biological Sciences with possible emphasis on one of three general fields: Cellular and Molecular Biology, Organismal Biology, and Ecology and Evolution, and supports courses for a number of pre-professional transfer programs. The Biological Sciences and Chemistry and Biochemistry Departments offer a combined program for a major in Biochemistry. The Biological Sciences and Geography Departments jointly offer a Post-Diploma program with a major in Environmental Science and a 40-course B.Sc. with a multidisciplinary major in Environmental Science. The Departments of Biological Sciences, Chemistry and Biochemistry, and Economics jointly offer a multidisciplinary major in Agricultural Biotechnology. The Department of Biological Sciences also provides instruction leading to the B.Sc. in Agricultural Studies.

### Biological Sciences Majors Emphasizing Cell and Molecular Biology

Students interested in cellular and molecular biology could take Biology 3000 and Biology 3105 in Fall, Year 3. Those considering graduate school in cellular and molecular biology should also take Biology 3210, Biochemistry 3100, and Biochemistry 3300. Note that Chemistry 2410 and Chemistry 2740 are required for Biochemistry 3100 and Biochemistry 3300. In addition, Mathematics 1560 is required for Chemistry 2410, and Mathematics 2560 and Physics 2000 are required for Chemistry 2740.

### Biological Sciences Majors Emphasizing Ecology

Since Biology 2200 is the prerequisite for many senior-level Biology courses, it should be taken in the third semester by students wishing to take these courses. This gives you two years to take the senior-level courses that are offered in alternate years.

### Preparation for Graduate School

The curriculum set for Biological Sciences majors provides excellent background for entrance to graduate school. You should, of course, plan your program so that in your fourth year you will be able to take senior level courses, including Independent Studies in your chosen field of specialization. You should also attempt to develop expertise in important related fields (statistics, chemistry, computing) as you proceed through the program here. If you lack basic courses in these fields you may be required to put in a make-up year before being admitted into graduate school.

### Pre-professional Programs

Pre-professional students should try to follow the Biological Sciences sequence as closely as possible while, at the same time, fulfilling their pre-professional requirements. With the current strong competition and because many schools now accept only degree holders, you are well advised to plan on working towards a B.Sc. degree. Note that although some courses are listed as 'required' for admission to professional schools while others are 'recommended,' it is recommended that students treat all of them as required courses. Students should consult the Program Planning Enclosures, available at the Student Program Services Office (SU060) or at [www.uleth.ca/ross/ppgs/ppg.html](http://www.uleth.ca/ross/ppgs/ppg.html), for more information.

### Research Opportunities

Many opportunities exist for interaction with Faculty members in their research programs through Independent Study and Summer work. All such interactions provide valuable experience and insights into the various fields of biological research. You are encouraged to seek out these opportunities, especially if you are interested in pursuing graduate studies.

### Contact the Department Chair

If you plan to major in Biological Sciences, come and talk about your plans with a Faculty member. You should see the Department Chair, who will assign you to a Faculty member for advising. You should consult an Arts and Science Advisor (Student Program Services Office, SU060) concerning degree requirements for courses outside Biological Sciences.

**Co-operative Education**

A Co-op option, requiring three work terms, is available. Students interested in the Co-operative Education/ Internship program should contact the Coordinator of Co-operative Education in the Career Resources Centre (AH154 | phone: 403-382-7154) for further information.

**High School Courses**

Several university-level science courses have high school-level courses as recommended background or prerequisites. Students are advised to complete recommended background courses before registering in the university-level course; students must have successfully completed prerequisites before they may register in the university-level course. Students pursuing a Biological Sciences major should note the following recommended/ required high school courses.

<i>UofL Science course</i>		<i>High School course</i>
Biology	1010	Biology 30 and Chemistry 30**
	1020	<i>Recommended: Biology 30</i>
	2000	Mathematics 30-1 or Pure Mathematics 30* (and Biology 1010 and Biology 1020)
	2200	Mathematics 30-1 or Pure Mathematics 30* (and Biology 1010 and Biology 1020)
Chemistry	1000	Chemistry 30** and Mathematics 30-1 or Pure Mathematics 30*
		<i>Recommended: Mathematics 31 and Physics 30</i>
Mathematics	1410	Mathematics 30-1 or Pure Mathematics 30*
	1560	Mathematics 30-1 or Pure Mathematics 30*
		<i>Recommended: Mathematics 31 and a blended grade of at least 75% in Mathematics 30-1 or Pure Mathematics 30*</i>
Physics	1000	Physics 30, and Mathematics 30-1 or Pure Mathematics 30*
	1050	<i>Corequisite: Mathematics 1560</i>
		Mathematics 30-1 or Pure Mathematics 30*
		<i>Recommended: One course in the physical sciences at the 20 level or above</i>
Statistics	1770	Mathematics 30-1, Mathematics 30-2, or Pure Mathematics 30*

\* Instead of Mathematics 30-1, Mathematics 30-2, or Pure Mathematics 30, students may use UofL's Mathematics 0500.

\*\* Instead of Chemistry 30, students may use UofL's Chemistry 0500.

**Program Requirements**

The B.Sc. degree with a major in Biological Sciences requires 40 semester courses, including a minimum of 20 courses in the major (12 courses in Biological Sciences plus eight cognates). A maximum of 20 courses in Biological Sciences is allowed.

**Transfer Credit**

Remember that you may use both University of Lethbridge credit and credit transferred from another college or university to meet degree and major requirements. Transfer credit may be either specified or unspecified. Specified credit is indicated on your transcript by the subject name and the specific number of the course, e.g., Biology 1010, Biology 3300, etc. Unspecified credit (1XXX, 3XXX, etc.) is indicated by the subject name and level of the course in parentheses, e.g., Biology (1000 level), Biology (3000 level), etc.

**Unspecified Course Credit**

Unspecified course credit means that the University of Lethbridge does not offer the same course you transferred in, but we recognize it and treat it as a regular course. An unspecified course would count as one of your maximum of 20 from one department, but it could not meet a specific course requirement. For example, if Biology 3300 is required in your program, you could not use Biology (3000 level) to fulfill that requirement. Students with unspecified transfer credit need to consult an Academic Advisor to establish how the transfer credit fits in the degree program. This should be done as soon as possible after transfer credit is awarded.

**Program Worksheet**

Name : \_\_\_\_\_ ID : \_\_\_\_\_

**Required courses:**

- \_\_\_\_\_ 1. Biology 1010 - Cellular Basis of Life
- \_\_\_\_\_ 2. Biology 1020 - Diversity of Life
- \_\_\_\_\_ 3. Biology 2000 - Principles of Genetics
- \_\_\_\_\_ 4. Biology 2200 - Principles of Ecology
- \_\_\_\_\_ 5. Biology 3300 - Evolution
- \_\_\_\_\_ 6. Biology 4500 - Seminars in Biological Sciences

\_\_\_\_\_ 7-12. A minimum of two 3000- or 4000-level courses from each of the following subfields: Cellular and Molecular Biology, Organismal Biology, and Ecology and Evolutionary Biology. **Courses cross-listed with another Faculty are not eligible to be counted as required courses.**

List 1: Cellular and Molecular Biology (Biology 3000, 3005, 3105, 3115, 3210, 4100, 4110, 4130, 4140, 4170, 4200, 4230)

1. \_\_\_\_\_
2. \_\_\_\_\_

List 2: Organismal Biology (Biology 3310, 3400, 3420, 3460, 3505, 3520, 3530, 3560, 4420, 4440, 4560)

1. \_\_\_\_\_
2. \_\_\_\_\_

List 3: Ecology and Evolutionary Biology (Biology 3605, 3610\*, 3630, 3700, 3710, 3800, 4700, 4710, 4800)

1. \_\_\_\_\_
2. \_\_\_\_\_

*\*Prerequisite required: Environmental Science 2000.*

\_\_\_\_\_ Of the six courses listed in requirements 7-12, above, at least one must be at the 4000 level:

\_\_\_\_\_

**Note:** *Applied Studies (3980-3985, 4980-4985), Independent Studies (Biology 3990, 4990) and courses cross-listed with another Faculty cannot be used to fulfill list requirements for the major.*

**Required cognates:**

In addition to the 12 courses in Biology, majors must also complete eight courses in cognate disciplines as follows:

- \_\_\_\_\_ 13. Biochemistry 2000 - Introductory Biochemistry
- \_\_\_\_\_ 14. Chemistry 1000 - General Chemistry I
- \_\_\_\_\_ 15. Chemistry 2000 - General Chemistry II
- \_\_\_\_\_ 16. Chemistry 2500 - Organic Chemistry I
- \_\_\_\_\_ 17. Chemistry 2600 - Organic Chemistry II
- \_\_\_\_\_ 18. One of:
  - \_\_\_\_\_ Mathematics 1410 - Elementary Linear Algebra
  - \_\_\_\_\_ Mathematics 1560 - Calculus I
- \_\_\_\_\_ 19. One of:
  - \_\_\_\_\_ Physics 1000 - Introduction to Physics I
  - \_\_\_\_\_ Physics 1050 - Introduction to Biophysics (preferred)
- \_\_\_\_\_ 20. One of:
  - \_\_\_\_\_ One course (3.0 credit hours) in English (at the 1000 level or higher)
  - \_\_\_\_\_ Writing 1000 - Introduction to Academic Writing

It is strongly recommended that students take Statistics 1770 - Introduction to Probability and Statistics as part of their degree program.

## Sample Sequencing Plan

Shown below is a sample sequence of courses for your degree. If you follow this plan, you should be able to graduate in four years, provided you complete five courses per semester. This is just one example of how you could complete your major and degree requirements; you may find that a different sequence works as well as this one.

<p><b>Year 1, Fall</b>            Biology 1010            Chemistry 1000 (<i>required cognate</i>)            Mathematics 1410 or            Mathematics 1560 (<i>required cognate</i>)            English 1900 or Writing 1000 (<i>required cognate</i>)            GLER course</p> <p><b>Year 2, Fall</b>            Biology 2000 or science elective<sup>1</sup>            Biology 2200            Chemistry 2500 (<i>required cognate</i>)            Statistics 1770 (<i>recommended</i>)            GLER course</p> <p><b>Year 3, Fall</b>            Biology 3000/4000 level            Biology 3000/4000 level            GLER course            GLER course            Elective</p> <p><b>Year 4, Fall</b>            Biology 3000/4000 level            Biology 4000 level            Elective 3000/4000 level            Science elective            Elective</p>	<p><b>Year 1, Spring</b>            Biology 1020            Chemistry 2000 (<i>required cognate</i>)            Physics 1050 or Physics 1000 (<i>required cognate</i>)            GLER course            GLER course</p> <p><b>Year 2, Spring</b>            Biochemistry 2000 (<i>required cognate</i>)            Biology 2000 or science elective<sup>1</sup>            Biology 3000/4000 level            Chemistry 2600 (<i>required cognate</i>)            GLER course</p> <p><b>Year 3, Spring</b>            Biology 3300            Biology 3000/4000 level            Science elective            Science elective            Elective</p> <p><b>Year 4, Spring</b>            Biology 4500            Elective 3000/4000 level            Science elective            Elective            Elective</p>
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<sup>1</sup> Biology 2000 may be completed in Fall or Spring. Students may select a science elective in the semester when Biology 2000 is not chosen.

If you have questions regarding the Biological Sciences major, please contact one of the Department Advisors.

**Note:** 3000- and 4000-level Biology courses are not typically offered every semester. Please use the following guidelines when planning your schedule:

Courses typically offered in the Fall Semester  
 Biology 3005, 3210, 3420, 3505, 3605, 3700, 3710, 4110, 4130, 4200, 4560, 4700

Courses typically offered in the Spring Semester  
 Biology 3115, 3310, 3400, 3460, 3800, 4100, 4170, 4230

Courses typically offered in alternate years  
 Biology 3520, 3530, 3560, 3610, 3630, 4140, 4420, 4440, 4710, 4800

### Terms Used

**GLER course:** A course that could count toward the General Liberal Education Requirement. You may use courses in your major towards this 12-course requirement. See the 2012/2013 University of Lethbridge Calendar, Part 4 - Academic Regulations (p. 90) for complete information.

The Faculty of Arts and Science offers Liberal Education 1000 and 2000, specifically designed to introduce first-year students to the wide scope of human knowledge and teach essential university success skills, critical thinking, and integrative thinking (see the 2012/2013 University of Lethbridge Calendar, Part 14 - Courses, p. 327). LBED 1000 and 2000 may be used toward satisfying the GLER.

**Elective:** A course that you may choose freely from all those available and applicable to your program. Use courses inside or outside your major, bearing in mind any restrictions that may apply (e.g., a maximum of 20 courses from any one department).

**Cognate:** A course from a related discipline deemed to complement the chosen area of study and to encompass knowledge and skills essential to that area.

