



## 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: 2011/2012

Faculty: Arts & Science

### About the Biochemistry Major

The Biochemistry major is a multidisciplinary program offered primarily by the Department of Biological Sciences and the Department of Chemistry and Biochemistry. The program provides background for a wide range of careers in science. It also provides excellent preparation for graduate study in the life sciences and for professional programs in Medicine and Veterinary Medicine.

### Opportunities for Pre-professional and Graduate Programs

It is possible for students to simultaneously complete the requirements for the Biochemistry major and the requirements for entering a professional program in Medicine or Veterinary Science. Most students who enter one of these professional programs have completed an undergraduate degree program. Students interested in Medicine (University of Alberta or University of Calgary) or Veterinary Medicine (University of Saskatchewan) should consult the appropriate Program Planning Enclosure, available online at [www.uleth.ca/ross/ppgs/ppg.html](http://www.uleth.ca/ross/ppgs/ppg.html).

### Preparing for Pre-professional and Graduate Programs

Entrance to either a professional program or graduate studies in the life sciences is highly competitive. Generally, one of the factors that is considered for entrance is the ability of a student to handle a full load of academic courses. Specifically, it is expected that one has taken a full load of five academic courses during each Fall and Spring semester. This is an important consideration both for entrance into such programs and in competition for scholarships. Thus, it is not advisable during regular semesters to take a reduced load of three or four courses, for example, in order to try to improve one's grades.

### Research Opportunities

Faculty members in the Departments of Biological Sciences, and Chemistry and Biochemistry are involved in research in the areas of biotechnology, cell and molecular biology, genetics, microbiology, health sciences, organic chemistry, inorganic chemistry, theoretical chemistry, and physical chemistry, all of which complement the Biochemistry major. Students have three avenues by which they can become involved in this research.

### Independent Study Opportunities

The first is the Independent Study course option in which a student receives course credit for carrying out a research project under the supervision of a Faculty member. Although the research project can take many forms, it generally involves a small experimental project that is related to a Faculty member's own research. The Independent Study is completed with a report.

### Undergraduate Thesis

The second avenue is to enrol in Biochemistry 4995 (Undergraduate Thesis). Usually taken in the final year of studies, this elective course is highly recommended for any student planning to pursue graduate studies in Biochemistry.

### Research Assistant Opportunities

The third avenue for research involvement is as a research assistant to a Faculty member, primarily during the summer. Research assistantships provide a modest salary and may be funded from a variety of sources including the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Alberta Heritage Foundation for Medical Research (AHFMR). The assistantships are generally open to students in a science program who have completed at least one year of study and are awarded primarily on the basis of academic merit. One of the major factors considered during award competitions is a student's proven ability to handle a full load of academic courses. Therefore, students interested in research assistantships or future professional or graduate school training are strongly advised to take a full course load whenever possible. In many instances a student's contribution to a Faculty member's research program leads to inclusion of the student as a co-author when the results are published in a research journal.

# Bachelor of Science Biochemistry

## 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 Biochemistry 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)
Chemistry	1000	Chemistry 30** and Mathematics 30-1 or Pure Mathematics 30*
		<i>Recommended: Mathematics 31 and Physics 30</i>
Mathematics	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	Mathematics 30-1 or Pure Mathematics 30*
		<i>Recommended: One course in the physical sciences at the 20 level or above</i>

*\* Instead of Mathematics 30-1, Mathematics 30-2, or Pure Mathematics 30, students may use UofL's Mathematics 0500, or both Applied Mathematics 30 and a minimum grade of 75% in Athabasca University's Mathematics 101.*

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

## Program Requirements

The B.Sc. degree with a multidisciplinary major in Biochemistry requires 40 semester courses, including 24 courses in the major.

## 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, 3400. 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 2000 is required in your program, you could not use Biology (2000 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. Biochemistry 2000 - Introductory Biochemistry
- \_\_\_\_\_ 2. Biochemistry 3100 - Proteins, Enzymes and Nucleic Acids
- \_\_\_\_\_ 3. Biochemistry 3300 - Bioenergetics and Metabolism
- \_\_\_\_\_ 4. Biology 1010 - Cellular Basis of Life
- \_\_\_\_\_ 5. Biology 1020 - Diversity of Life
- \_\_\_\_\_ 6. Biology 2000 - Principles of Genetics
- \_\_\_\_\_ 7. Biology 3000 - Gene Expression and Regulation
- \_\_\_\_\_ 8. Biology 3105 - Signal Transduction
- \_\_\_\_\_ 9. Biology 3210 - Experimental Methods in Molecular and Cellular Biology
- \_\_\_\_\_ 10. Biology 3400 - Principles of Microbiology

- \_\_\_\_\_ 11. Chemistry 1000 - General Chemistry I
- \_\_\_\_\_ 12. Chemistry 2000 - General Chemistry II
- \_\_\_\_\_ 13. Chemistry 2410 - Analytical Chemistry I
- \_\_\_\_\_ 14. Chemistry 2500 - Organic Chemistry I
- \_\_\_\_\_ 15. Chemistry 2600 - Organic Chemistry II
- \_\_\_\_\_ 16. Chemistry 2740 - Physical Chemistry
- \_\_\_\_\_ 17. Mathematics 1560 - Calculus I
- \_\_\_\_\_ 18. Mathematics 2560 - Calculus II
- \_\_\_\_\_ 19. Physics 2000 - Introduction to Physics II
- \_\_\_\_\_ 20-21. \*Two of:
  - \_\_\_\_\_ Biology 3005 - Genome Maintenance
  - \_\_\_\_\_ Biology 3115 - Principles of Cell Growth
  - \_\_\_\_\_ Biology 3310 - Developmental Biology
  - \_\_\_\_\_ Biology 3420 - Animal Physiology
  - \_\_\_\_\_ Biology 3460 - Plant Physiology
  - \_\_\_\_\_ Chemistry 3410 - Analytical Chemistry II
  - \_\_\_\_\_ \*\*Chemistry 3730 - Advanced Physical Chemistry
  - \_\_\_\_\_ Chemistry 3830 - Inorganic Chemistry I
  - \_\_\_\_\_ Chemistry 3840 - Inorganic Chemistry II
- \_\_\_\_\_ 22. One of the following:
  - \_\_\_\_\_ Physics 1000 - Introduction to Physics I (recommended)
  - \_\_\_\_\_ Physics 1050 - Introduction to Biophysics
  - \_\_\_\_\_ \*\*\*Engineering 2060 - Engineering Mechanics
- \_\_\_\_\_ 23-24. Two courses (6.0 credit hours) at the 4000 level in Biochemistry or Biology:
  - 1. \_\_\_\_\_
  - 2. \_\_\_\_\_

*\*Students should choose appropriate 3000-level Biology or Chemistry courses to meet prerequisites for 4000-level courses in Biochemistry and/or Biology.*

*\*\*Prerequisite required: Mathematics 1410.*

*\*\*\*Prerequisites required: Engineering 2000 and Mathematics 1560.*

The B.Sc. degree program requires a minimum of 25 science courses. There are a number of appropriate course offerings in the sciences which may be used to fulfill these program requirements. Students are encouraged to give their selections careful consideration and to ask faculty members for advice.

It is strongly recommended that students who are planning to pursue graduate studies in Biochemistry consider the undergraduate thesis option during the final two semesters of their fourth year. Students interested in this option should consult potential supervisors at an early stage to discuss their background preparation.

## 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 1020 Chemistry 1000 Mathematics 1560 Physics 1000 GLER course</p> <p><b>Year 2, Fall</b> Biology 2000 Chemistry 2410 Chemistry 2500 GLER course GLER course</p> <p><b>Year 3, Fall</b> Biochemistry 3100 Biology 3000 Biology 3210 GLER course GLER course</p> <p><b>Year 4, Fall</b> 3000-level Biology or Chemistry 4000-level Biochemistry or Biology Elective Elective Elective</p>	<p><b>Year 1, Spring</b> Biology 1010 Chemistry 2000 Mathematics 2560 Physics 2000 GLER course</p> <p><b>Year 2, Spring</b> Biochemistry 2000 Biology 3400 Chemistry 2600 Chemistry 2740 GLER course</p> <p><b>Year 3, Spring</b> Biochemistry 3300 Biology 3105 3000-level Biology or Chemistry GLER course Science elective</p> <p><b>Year 4, Spring</b> 4000-level Biochemistry or Biology Elective Elective Elective Elective</p>
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**Note:** Students are strongly advised to consult with the Department of Biological Sciences and the Department of Chemistry and Biochemistry regarding the sequencing of the above courses. In particular, students attending on a part-time basis should consult with the Coordinator of Biochemistry.

### 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 2011/2012 University of Lethbridge Calendar, Part 4 - Academic Regulations (p. 85) 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 2011/2012 University of Lethbridge Calendar, Part 14 - Courses, p. 306). 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).