University of Lethbridge

Name: _____ ID: _____

Program Planning Guide

Current and past Program Planning Guides are available on the UofL website at www.uleth.ca/ross/ppgs/ppg.html

Calendar Year: 2011/2012

Faculty: Arts & Science

Bachelor of Science

Chemistry

About the Chemistry Major

The Department of Chemistry and Biochemistry (www.uleth.ca/fas/chm) offers students the opportunity to obtain a Bachelor of Science (B.Sc.) degree with a major in Chemistry. This is a broadly based program that exposes students to the important subdivisions of organic, inorganic, analytical and physical chemistry along with an optional exposure to biochemistry.

About the Department of Chemistry and Biochemistry

In conjunction with the Department of Biological Sciences, the Department also offers a program leading to a B.Sc. degree with a major in Biochemistry (see the Program Planning Guide for Biochemistry). The Departments of Chemistry and Biochemistry, Biological Sciences, and Economics jointly offer instruction leading to a multidisciplinary major in Agricultural Biotechnology (see the Program Planning Guide for Agricultural Biotechnology).

Research Opportunities

The Faculty members in the Department of Chemistry and Biochemistry are involved in research in the areas of organic, inorganic, theoretical and physical chemistry as well as biochemistry. 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, in the Department of Chemistry and Biochemistry 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 Chemistry 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 Chemistry.

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). The assistantships are generally open to students in a Chemistry or Biochemistry 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.

Canadian Society for Chemistry (CSC)

This program has been accredited by the Canadian Society for Chemistry (CSC) which is the national organization representing chemists and is acceptable for membership in the Association of the Chemical Profession of Alberta (ACPA). Students who complete a B.Sc. degree with the major in Chemistry will have a degree accredited by the CSC.

Course Sequencing and Prerequisites for the Chemistry Major

Chemistry courses are organized in sequences and must be taken in the proper order. In addition, several of the 3000-level courses are offered only in alternate years. For example, Chemistry 3410 and Chemistry 3730 may be offered one year while Chemistry 3830 and Chemistry 3840 are offered the next year. As a result, careful planning of the program for the major in Chemistry is required in order to be in position to take courses when they are offered. Consequently, students who intend to pursue a degree program with a major in Chemistry are advised to seek help in planning their programs from the Department Advisor or from any faculty member in the Department of Chemistry and Biochemistry at an early stage of their studies.

Graduate Studies

Those who plan to pursue graduate studies in Chemistry should take more than the minimum of 18 courses in Chemistry and should obtain advice on their program from the Department. If you decide that you want to major in Chemistry then you should discuss the matter with a Faculty member from the Department of Chemistry and Biochemistry who can advise you how best to structure your program to meet your particular needs.

Pre-Professional Transfer Programs

Students interested in applying to professional programs such as Dentistry, Medicine, and Veterinary Medicine should refer to Pre-Professional Transfer Programs (p. 152 in the 2011/2012 Calendar) for more information. The program information and requirements are updated annually and, along with the program planning guides, may be obtained via the University of Lethbridge website (www.uleth.ca/ross/ppgs/ppg.html). The academic objectives of Dentistry, Medicine, and Veterinary Medicine are affiliated with specific majors (p. 152 of the 2011/2012 Calendar) at the UofL to facilitate registration access. Students in other majors take the pre-professional prerequisite courses as electives. Most successful applicants to these professional programs will have already completed an undergraduate degree, so it is best to register in courses which balance degree program and major requirements with the pre-professional requirements. Assistance with program planning with both goals in mind can be obtained from the Department of Chemistry and Biochemistry as well as from an Advisor in Student Program Services.

Where to Go for More Information

Because students have individual needs and circumstances, every Chemistry student is strongly encouraged to obtain further advice from the Department. Arrangements for obtaining such advice may be made through the Department Secretary. Students are also welcome to directly approach the Department Chair or any other Chemistry and Biochemistry Faculty member.

Note: *Students interested in the Bachelor of Science/Bachelor of Education (B.Sc./B.Ed.) or Bachelor of Science/Bachelor of Management (B.Sc./B.Mgt.) combined degrees programs should refer to the appropriate Program Planning Guide and 2011/2012 University of Lethbridge Calendar section.*

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 Chemistry major should note the following recommended/required high school courses.

UofL Science course		*High School course*
Biology	1010	Biology 30 and Chemistry 30**
Chemistry	1000	Chemistry 30** and Mathematics 30-1 or Pure Mathematics 30* *Recommended: Mathematics 31 and Physics 30*
Mathematics	1410	Mathematics 30-1 or Pure Mathematics 30*
	1560	Mathematics 30-1 or Pure Mathematics 30* *Recommended: Mathematics 31 and a blended grade of at least 75% in Mathematics 30-1 or Pure Mathematics 30**
Physics	1000	Physics 30, and Mathematics 30-1 or Pure Mathematics 30*
	1050	Mathematics 30-1 or Pure Mathematics 30*

** 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 program for the B.Sc. or BASc. degree with a major in Chemistry requires 40 courses, including a minimum of 24 courses in the major (18 courses in Chemistry or Biochemistry plus 6 cognates). A maximum of 20 courses offered by the Department of Chemistry and Biochemistry is allowed. The courses for the major are given below under three lists. List A contains the required core courses; List B contains courses from which six must be selected; List C sets out the required cognates.

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., Chemistry 1000, 2410, etc. Unspecified credit (1XXX, 2XXX, etc.) is indicated by the subject name and level of the course in parentheses, e.g., Chemistry (1000 level), Chemistry (2000 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 Chemistry 2000 is required in your program, you could not use Chemistry (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:** _____

List A - Required Core Courses

The following 12 courses must be taken:

_____ 1. Biochemistry 2000 - Introductory Biochemistry

_____ 2. Chemistry 1000 - General Chemistry I

_____ 3. Chemistry 2000 - General Chemistry II

_____ 4. Chemistry 2410 - Analytical Chemistry I

_____ 5. Chemistry 2500 - Organic Chemistry I

_____ 6. Chemistry 2600 - Organic Chemistry II

_____ 7. Chemistry 2740 - Physical Chemistry

_____ 8. Chemistry 3250 - Contemporary Chemistry

_____ 9. Chemistry 3410 - Analytical Chemistry II

_____ 10. Chemistry 3730 - Advanced Physical Chemistry

_____ 11. Chemistry 3830 - Inorganic Chemistry I

_____ 12. Chemistry 3840 - Inorganic Chemistry II

List B - Six Elective Courses

Six additional courses (18.0 credit hours) in Chemistry or Biochemistry of which at least two must be offerings of Chemistry 4000 and the remainder must be chosen from the list in 15-18 below.

_____ 13-14. Chemistry 4000 - Advanced Chemistry (Series)

_____

_____

_____ 15-18. Four of:

_____ Additional offerings of Chemistry 4000 - Advanced Chemistry (Series)

_____ Biochemistry 3100 - Proteins, Enzymes and Nucleic Acids

_____ Biochemistry 3300 - Bioenergetics and Metabolism

_____ Chemistry 3990 - Independent Study

_____ Chemistry 4990 - Independent Study

_____ Chemistry 4995 - Undergraduate Thesis (6.0 credit hours)

Note: *At least two offerings of Chemistry 4000 - Advanced Chemistry (Series) must be completed. The content, as identified by the title, must be different in the two offerings. These courses are usually offered each semester and offerings will normally not be repeated within a two-year cycle.*

List C - Required Cognate Courses

A total of six courses in Biology, Mathematics, and Physics must be taken for the major in Chemistry:

_____ 19. Biology 1010 - Cellular Basis of Life

_____ 20. Mathematics 1410 - Elementary Linear Algebra

_____ 21. Mathematics 1560 - Calculus I

_____ 22. Mathematics 2560 - Calculus II

_____ 23. One of:

_____ Physics 1000 - Introduction to Physics I (recommended)

_____ Physics 1050 - Introduction to Biophysics

_____ *Engineering 2060 - Engineering Mechanics

_____ 24. Physics 2000 - Introduction to Physics II

**Has prerequisites: Engineering 2000 and Mathematics 1560.*

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.

Year 1, Fall	***Year 1, Spring***
Chemistry 1000	Biology 1010 *(required cognate)*
Mathematics 1410 *(required cognate)*	Chemistry 2000
Mathematics 1560 *(required cognate)*	Mathematics 2560 *(required cognate)*
Physics 1000 *(required cognate)*	Physics 2000 *(required cognate)*
GLER course	GLER course
Year 2, Fall	***Year 2, Spring***
Chemistry 2410	Chemistry 2600
Chemistry 2500	Chemistry 2740
GLER course	GLER course
GLER course	GLER course
GLER course	GLER course
Year 3, Fall	***Year 3, Spring***
Chemistry 3730 or Chemistry 3830	Biochemistry 2000[1]
List B elective	Chemistry 3410 or Chemistry 3840
List B elective	Chemistry 3250 or List B elective
Science elective	Elective
Elective	Elective
Year 4, Fall	***Year 4, Spring***
Chemistry 3830 or Chemistry 3730	Chemistry 3840 or Chemistry 3410
List B elective	List B elective or Chemistry 3250
Chemistry 4000	Chemistry 4000
Elective	Elective
Elective	Elective

[1] *Chemistry Majors should normally take Biochemistry 2000 in Year Three (in any semester that it is offered). This will allow the substitution of higher-level biochemistry courses for up to two offerings of Chemistry 4000. Remember: Biochemistry 2000 is a prerequisite for Biochemistry 3100 and Biochemistry 3300, so plan sequencing accordingly.*

Note: *Students must complete all 1000/2000-level Chemistry courses in the required core as well as all the required cognates in Years 1 and 2. Given the prerequisites, students must follow the above sequencing for Years 1 and 2.*

Students are strongly advised to consult with the Department of Chemistry and Biochemistry regarding the sequencing of the above courses for Years 3 and 4. Many 3000-level courses are offered in alternate years.

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).

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.