

Proposal for Accelerated Master of Science Degree Program in Biological Sciences

Department of Biological Sciences

Michigan Technological University

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1 Executive Summary

The Department of Biological Sciences is proposing to initiate an accelerated Master's program to create a fast-track between our Bachelor's and Master's degree programs. The accelerated Master's program will allow our outstanding undergraduate students to continue their studies toward a Master's degree with a goal of improving their career prospects. Students are expected to complete their Bachelor's and Master's requirements typically within five years, gaining a competitive advantage in their career, as well as saving time and expense. Students can apply up to six credits taken as an undergraduate at Michigan Tech toward both the BS and MS degrees. These six credits would typically be earned through electives and taken with the pre-approval of the academic advisor. Students can also apply up to six credits of courses taken under Senior Rule toward their Master's; thus a total of 12 credits earned while an undergraduate could potentially be applied toward the Master's degree. The program will require undergraduate students entering this program to apply for the Master's program in their no later than the second semester of their junior year, and to have a minimum departmental GPA of 3.0. Only highly qualified and motivated students are encouraged to take the accelerated path. The proposed program will enable the department to recruit additional students to the Master's program. Since only highly motivated students with a good academic record will be admitted, the accelerated MS program is also expected enhance the quality of our graduate program.

The description contained within this document is in addition to the regular University and Graduate School policies that all graduate students must adhere to. The description contained in this document is also in addition to the requirements and guidelines articulated in University Senate Policy 413.1 which governs the operation of accelerated master's degree programs at Michigan Tech.

2 General description and rationale

The Accelerated Master's degree program in Biological Sciences is intended to be a five-year program. It is designed to give our best and most motivated students a competitive advantage in the job market by reducing the time to obtain a Master's degree by one year. Eligible students must have a departmental GPA of at least 3.0 at the time of application to the graduate program. If the GPA is less than 3.0, a student may pursue the MS. via the normal pathway, which does not allow the six credits to be double-counted. The program accelerates the Master's degree through the integration of undergraduate and graduate courses by allowing students to double-count up to six undergraduate credits toward both a Bachelor's and a Master's degree in Biological Sciences, as long as they satisfy the requirements for both degrees. These six credits are independent of a minimum of six Senior Rule credits. Senior Rule credits that may additionally count toward the MS; thus a total of 12 credits earned while an undergraduate could be applied toward the Master's degree. The program offers four specialties: Biology, Biochemistry and Molecular Biology, Medical Lab Sciences, and Bioinformatics.

This program will prepare our best students for a variety of careers in biology that require advanced training beyond the Bachelor's degree, such as in industry, teaching, independent research, or continued graduate work.

3 Discussion of related programs within the institution and at other institutions

3.1 Related programs within the institution

The Department of Biological Sciences at Michigan Tech currently offers regular MS degrees in Biological Sciences, Peace Corps Master's International, as well as PhD degrees in Biological Sciences. Students enrolled in any of the regular MS programs are required to spend about two years in order to complete the requirements for the program, whereas students enrolled in PhD are expected to take between three and five years to complete their degree requirements. (<http://www.mtu.edu/biological/graduate/bio-sci/>).

3.1.1 Master's degree (regular) program

The Master's degree program has two options:

Thesis option: This option requires a research thesis prepared under the supervision of the advisor. The thesis describes a research investigation and its results. The scope of the

research topic for the thesis should be defined in such a way that a full-time student could complete the requirements for a Master's degree in twelve months or three semesters following the completion of course work by regularly scheduling graduate research credits.

Minimum Credit Requirements

Course work (minimum)	20 credits
Thesis research	6-10 credits
Total (minimum)	30 credits

Distribution of Course Work Credits

5000-6000 series (minimum)	12 credits
3000-4000 series (maximum)	12 credits

Report option: This option requires a report describing the results of an independent study project. The scope of the research topic should be defined in such a way that a full-time student could complete the requirements for a master's degree in twelve months or three semesters following the completion of course work by regularly scheduling graduate research credits.

Of the minimum total of 30 credits, at least 24 must be earned in course work other than the project:

Minimum Credit Requirements

Course work (minimum)	24 credits
Report research	2-6 credits
Total (minimum)	30 credits

Distribution of Course Work Credits

5000-6000 series (minimum)	12 credits
3000-4000 series (maximum)	12 credits

3.2 Related programs at other institutions

There are several universities offering accelerated Master's programs in Biology including:

- 1) New York University: http://biology.as.nyu.edu/object/biology_graduate_accelerated
- 2) Indiana University of Pennsylvania: <http://www.iup.edu/page.aspx?id=91217>
- 3) George Mason University: http://catalog.gmu.edu/preview_program.php?catoid=25&poid=21997
- 4) Missouri State University: http://www.missouristate.edu/registrar/catalog/dept_bi.html
- 5) University of Massachusetts Amherst: http://www.umass.edu/gradschool/sites/default/files/accelerated_masters_degree_contacts_fall2014.pdf
- 6) Virginia Commonwealth University: http://www.pubapps.vcu.edu/bulletins/prog_search/?did=20105
- 7) University of New Hampshire: <http://www.gradschool.unh.edu/am.php>

4 Projected enrollment and economic impact

The projected enrollment in the proposed Accelerated MS program in Biological Sciences is about 5-7 students initially, which is anticipated to increase to 10-12 students enrolled per year as the program becomes more established.

5 Curriculum Design:

The Accelerated Master's program will allow students to double-count up to six undergraduate credits toward both a Bachelor's and a Master's degree in Biological Sciences, as long as they satisfy the requirements for both a Bachelor of Science in Biological Sciences and a Master of Science in Biological Sciences with specialties in Biology, Biochemistry and Molecular Biology, Medical Lab Sciences, or Bioinformatics. The program offers a choice between a **thesis** or a **report option**.

5.1 Accelerated Master's Degree Requirements

5.1.1 Admission Criteria

- Undergraduate students must apply for admission to the Accelerated Master's program through the standard Graduate School application process no later than the **second semester** of their junior year.
- The Accelerated Master's program requires the student applicant to be accepted into the Graduate School and to the Master's degree program in Biological Sciences prior to their Bachelor's degree being awarded.
- Only students who will complete both a Bachelor's and a Master's in Biological Sciences at Michigan Tech are eligible to enroll in the accelerated program.
- Students already enrolled in a graduate program may not retroactively enroll in the Accelerated Master's program.

Students must earn 30 credits past the Bachelor of Science in Biological Sciences to complete the requirements for the Master of Science in Biological Sciences; however, up to six credits taken as an undergraduate student can be applied toward both the BS and MS degrees, as long as they are at the 3000 - 5000 level and satisfy the requirements for both degrees. These six credits would typically be earned through electives and are independent of a maximum of six Senior Rule credits that may additionally count toward the MS, thus a total of 12 credits earned while an undergraduate could be applied toward the Master's degree. Graduate School rules on course requirements for Master's degree will apply:

<http://www.mtu.edu/gradschool/administration/academics/requirements/ms/>

5.1.2 GPA

Only students in [good academic standing](#) are eligible to enter the Biological Sciences Accelerated Master's program. A student must maintain a cumulative departmental GPA of at least 3.0 at the time of admission. If the undergraduate departmental GPA is below 3.0, a student may pursue the MS via the normal pathway, which does not allow the six credits to be double-counted.

5.1.3 Courses

The detailed course and course-level requirements for the Thesis Option and Report Option are outlined below

- The Thesis Option requires 20–24 course credits, with at least 12 at the graduate level.
- The Report Option requires 24–28 course credits, with at least 12 at the graduate level.
- To help ensure an accelerated degree schedule, the student should begin conducting degree research with their advisor no later than during the senior year.
- The Biological Sciences Accelerated MS is currently not available with the course work-only option.

5.1.4 Advising

- To help expedite degree completion, a student should ideally begin conducting degree research with a faculty research advisor no later than during the senior year.
- Each student will work with a faculty research advisor who is a member of the Biological Sciences faculty, and a graduate faculty. The advisor's primary responsibility is to supervise the student's research and academic and professional growth, as well as to work with the student to develop an academic plan for enrolling in the appropriate courses.
- The academic plan developed by the student and academic advisor will need written approval from the faculty advisor and the Biological Sciences Graduate Program Director.

5.2 Thesis Option

This plan requires a research thesis prepared under the supervision of the advisor. The thesis describes a research investigation and its results. The scope of the research topic for the thesis should be defined in such a way that a full-time student could complete the requirements for a Master's degree in twelve months or three semesters following the completion of course work by regularly scheduling graduate research credits. The thesis must be prepared following the current [procedures](#).

The minimum requirements are as follows:

Course work (minimum)	20 credits
Thesis research	6 - 10 credits
Total (minimum)	30 credits
Distribution of course work credit	
5000-6000 level (minimum)	12 credits
3000-4000 level (maximum)	12 credits

The above table represents basic requirements from the Graduate School. The Department of Biological Sciences has additional restrictions:

1. Courses with grades less than a B (3.0) will not be counted.
2. Graduate Seminar must be taken once for a total of 1 credit.

5.3 Report Option

This option requires a report describing the results of an independent study project. The scope of the research topic should be defined in such a way that a full-time student could complete the requirements for a Master's degree in twelve months or three semesters following the completion of course work by regularly scheduling graduate research credits. The report must be prepared following the current [procedures](#).

Of the minimum total of 30 credits, at least 24	20 credits
must be earned in course work other than the	
report research credits	
Report research	2-6 credits
Total (minimum)	30 credits
Distribution of course work credit	
5000-6000 level (minimum)	12 credits
3000-4000 level (maximum)	12 credits

The above table represents basic requirements from the Graduate School. The Department of Biological Sciences has additional restrictions:

1. Courses with grades less than a B (3.0) will not be counted.
2. Graduate Seminar must be taken once for a total of 1 credit.

6 Scheduling plans (Extension, Evening, Regular)

Regular only.

7 Curriculum

All accelerated MS students must enroll in Graduate Seminar (BL5012; once for a total of 1 credit while in the program). All students must also take BL5025. In addition to these courses, **the faculty advisor will designate courses** (worth at least 21 credits for MS report and at least 17 credits for MS thesis), to be taken, that are relevant to the student's interest or research area.

7.1 3000 and 4000 Level Courses in Biological Sciences (12 credits maximum)

BL 3010 - General Entomology

A study of the form, function, and diversity of insects along with their relationship to humans as pests and disease vectors and their role in the natural world.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 1010 or BL 1040

BL 3012 - Essential Cell Biology

This course will provide an understanding of cell structure and function with emphasis on eukaryotic cells. Topics include macromolecules, membranes, organelles, cytoskeleton, division, differentiation, cell-cell interactions, intracellular trafficking, protein sorting, cell signaling, and motility.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Biological Sciences, Biochem & Molec Biology-Bio Sc, Bioinformatics; May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 1020 or BL 1040 and BL 2100

BL 3070 - Biology & Occupational Hygiene

The first third of this course will cover fundamentals of cellular and organismal biology. The remainder of the course covers the toxic effects of occupational chemicals, energy forms and industrial pollutants on human tissue. Emphasizes recognition, evaluation, and control of health hazards in the workplace.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman

BL 3080 - Biological Concepts for Engineers

An introduction to biological principles centered on human and ecological concepts for engineers and scientists. Course topics include chemistry for biologists, cell structure and function, genetics and heredity, human anatomy and physiology, ecology and the environment, and plant biology and toxicology.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Environmental Engineering, Civil Engineering

BL 3190 - Evolution

A study of the patterns and processes of organic evolution. Topics include genetics of populations, mechanisms of deterministic and stochastic genetic change, history of life on earth, biogeography, molecular evolution, units of selection, sexual selection, speciation, and human evolution.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Pre-Requisite(s): BL 1020 or BL 1040

BL 3210 - General Microbiology

Introduction to the general principles and techniques involved in the study of microorganisms, including bacteria, fungi, and viruses. Topics include cell structure and function, growth, metabolism, biodiversity, and interactions.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): (BL 1020 or BL 1040) and (BL 2100 or CH 4710)

BL 3220 - Medical Mycology and Virology

Study of clinically important fungi and viruses.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science, Biological Sciences; May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 3210

BL 3230 - Medical Bacteriology

Study of pathology, identification, isolation and antimicrobial susceptibility testing of clinically important bacteria.

Credits: 4.0

Lec-Rec-Lab: (2-0-5)

Semesters Offered: Spring

Pre-Requisite(s): BL 3210

BL 3300 - Introduction to Genomics

Introduction to Genomics. Genome organization, mapping and characterization from humans and related organisms. Topics include hierarchical arrangement of genes, genome mapping, molecular markers of physical genome maps, genome sequencing, comparative genomics, analysis of important human genes and their products, and ethical and legal aspects of genomics.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall, Summer

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 2200

BL 3400 - Principles of Ecology

Study of both accepted and currently debated principles that describe ecological relationships at the organism, population, community, and ecosystem levels.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall

Pre-Requisite(s): BL 1020 or BL 1040

BL 3640 - General Immunology

Investigates the immune defense system that has evolved to protect vertebrates from invading pathogens and cancer. Covers general principals of innate and acquired immunity, immunodeficiency and autoimmune diseases, as well as transplantation immunology, and the role of apoptosis in lymphocyte maturation.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall, Summer

Restrictions: Must be enrolled in one of the following Major(s): Bioinformatics, Medical Laboratory Science, Pharmaceutical Chemistry, Biochem & Molec Biology-Bio Sc, Biomedical Engineering, Biological Sciences; May not be enrolled in one of the following Class(es):

Freshman, Sophomore

Pre-Requisite(s): BL 1020 or BL 1040 or BL 2020 or BE 2400

BL 3780 - Medical Parasitology Laboratory

Stresses the visual identification of common human parasites.

Credits: 1.0

Lec-Rec-Lab: (0-0-3)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science, Biological Sciences; May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): BL 1710 and BL 2410

BL 3970 - Current Health Issues

Current topics relevant to human health, with emphasis on health maintenance and disease prevention and the role of government in these matters. Topics include: tobacco use and poor diet/physical inactivity, infectious disease, mental and behavioral health, environmental health issues, and health care, including health insurance and models of universal health coverage.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring, Summer

Restrictions: May not be enrolled in one of the following Class(es): Freshman

BL 3990 - Biological Sciences Teaching Experience

Development of teaching skills through assisting in the instruction of a section of biological sciences laboratory. Students gain experience in leadership, group work, organization skills, laboratory preparation, and laboratory instruction.

Credits: variable to 4.0; Repeatable to a Max of 4

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required

BL 4000 - Research in Biology

A literature and laboratory research problem that culminates in a written report on the work performed.

Credits: variable to 9.0; Repeatable to a Max of 9

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required

BL 4001 - Honors Research in Biology

A laboratory-based research problem that culminates in a written report and a seminar presentation on the work performed. Open only to biological sciences and clinical laboratory sciences majors accepted into the Honors in Biological Sciences program.

Credits: variable to 9.0; Repeatable to a Max of 9

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required; Must be enrolled in one of the following Major(s): Biological Sciences, Medical Laboratory Science, Bioinformatics

BL 4010 - Biochemistry I

Structure, biochemical properties, and function of important biomolecules such as proteins and nucleic acids. Introduces enzyme biochemistry (structure, function, catalysis, kinetics, and inhibition).

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall, Summer

Pre-Requisite(s): (BL 1020 or BL 1040 or BL 2010) and BL 2100 and (CH 2410 or CH 2420)

BL 4020 - Biochemistry II

Dynamic aspects of living systems. Broad exposure to cellular metabolic pathways, intermediary metabolism and its regulation and bioenergetics.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring, Summer

Pre-Requisite(s): BL 4010

BL 4030 - Molecular Biology

Molecular biology of gene structure, expression and regulation. Also topics covering various molecular techniques and applications of these techniques and biotechnology.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall, Summer

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): (BL 1020 or BL 1040) and (BL 2100 or CH 4710)

BL 4033 - Pollination Biology

A study of the coevolutionary relationships of plants and their pollinators. Topics will include floral design and function, floral advertisements and rewards, adaptations of flowers for pollination by animals of different taxa as well as abiotic pollination, floral ecology, and the pollination of crops and the global pollination crisis.

Credits: 3.0

Lec-Rec-Lab: (1-2-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2012-2013 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 1010 or BL 1040 or BL 2160

BL 4034 - Community Ecology and Evolutionary Dynamics

This is an advanced course that looks at the study of ecology and evolutionary biology at the community level: how populations interact with the abiotic environment and each other to determine patterns of diversity, distribution, and abundance of plants and animals.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2014-2015 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 3400 and BL 3190

BL 4035 - Bioimaging

Current concepts in light and electron microscopy and scanning probe techniques. Theory and practice of fluorescence (including confocal and multi-photon), atomic force, scanning and transmission electron, and video microscopy as applied to biological specimens with emphasis on sample preparation. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-4-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: Must be enrolled in one of the following Class(es): Junior, Senior

BL 4036 - Ecology and Evolution of Interactions Between Plants and Insects

Plants and insects have played major roles in influencing each others evolutionary diversification. We will examine the ecology and evolution of plant-insect interactions in basic and applied contexts. A solid foundation of tools in ecology and evolution will be established and class will include lectures and interactive discussions from readings of the primary literature.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2013-2014 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore
Pre-Requisite(s): BL 3400 and BL 3190

BL 4042 - Scanning Electron Microscopy of Biological Specimens

Hands-on training in operation of the scanning electron microscope (SEM). Students prepare biological specimens of their choice for observation. Successful completion of course is prerequisite to becoming a certified SEM operator in the ACMAL. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: Must be enrolled in one of the following Class(es): Junior, Senior
Co-Requisite(s): BL 4035

BL 4052 - Fluorescence and Video Microscopy of Biological Specimens

Hands-on training in fluorescence microscopy and video microscopy. Students prepare biological specimens of their choice for observation. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: Must be enrolled in one of the following Class(es): Junior, Senior
Pre-Requisite(s): BL 4035

BL 4062 - Transmission Electron Microscopy of Biological Specimens

Hands-on training in operation of the transmission electron microscope (TEM). Students prepare biological specimens of their choice for observation. Successful completion of course is prerequisite to becoming a certified TEM operator in ACMAL. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011

academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

Pre-Requisite(s): BL 4035

BL 4090 - Tropical Island Biology

A survey of island biology, including marine and terrestrial habitats. Topics include formation of carbonate islands, geological history of the Bahamas, island plant communities, intertidal, grass bed, mangrove and coral reef communities. Special course fees. Consult department before enrolling. Completion of BL1020 or BL1040 desirable but not necessary.

Credits: 2.0

Lec-Rec-Lab: (0-2-0)

Semesters Offered: Spring

BL 4100 - Special Topics in Biological Sciences

A study of recent developments in the biological sciences.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

BL 4120 - Environmental Remediation and Toxicology

Toxicology of major environmental pollutants, their dose-response relationships and fundamentals of environmental remediation. Topics include physical, chemical, and biological remediation methods and effect of environmental toxins on biological systems. Laboratory will involve the application of chemical and biological remediation techniques.

Credits: 3.0

Lec-Rec-Lab: (2-0-2)

Semesters Offered: Fall - Offered alternate years beginning with the 2011-2012 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 1020 or BL 1040

BL 4134 - Field Methods in Great Lakes Oceanography

Field intensive course held at the University of Michigan Biological Station. Significant time will be spent on a research vessel (R/V Laurentian) where students will use a variety of traditional and state-of-the-art techniques to characterize biological communities and measure important physical and biological processes.

Credits: 2.0

Lec-Rec-Lab: (1-0-3)

Semesters Offered: Summer

Restrictions: Permission of instructor required

BL 4140 - Plant Physiology

Physiology and biochemistry of plants. Emphasizes photosynthesis, plant hormones, water and nutrient relations, and light-regulated development.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2005-2006 academic year

Pre-Requisite(s): BL 2160 and CH 2420

BL 4145 - Plant-Microbe Interactions

Interactions between plants and microorganisms in the environment. Topics include microbial virulence, signaling, gene expression, beneficial interactions and disease resistance in plants. Laboratory will focus on plant biochemical and microbiological methods as they relate to environmental problems.

Credits: 3.0

Lec-Rec-Lab: (2-0-2)

Semesters Offered: Fall - Offered alternate years beginning with the 2012-2013 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 2200

BL 4220 -Industrial Microbiology

Discussion of microbial involvement in areas such as industrial production processes, biodeterioration, and organic and inorganic waste treatment. Also reviews current literature in these areas.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2001-2002 academic year

Pre-Requisite(s): BL 3210 or BL 3310

BL 4370 - Cell Biology

Celebration of the commonalities of life as exhibited in the basic building block of organisms - the cell. Course topics include details of basic genetic mechanisms, cell structure and function, and an examination of cells in their social context.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring

Pre-Requisite(s): BL 2200 and CH 2420

BL 4380 - Cardiopulmonary Physiology

Using a problem-based learning approach, course examines the physiology of the human body. In-class case-study analyses provide in-depth learning about the cardiovascular and pulmonary systems and their relationship with other organ systems. Promotes development of problem-solving skills.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall

Pre-Requisite(s): BL 2020

BL 4442 - Lake Ecology and Fish Biology

Field course combining lake ecosystem and foodweb study with fishes in lake systems. Students will be exposed to research methods used in lakes for comprehensive abiotic and biotic understanding.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall - Offered alternate years beginning with the 2014-2015 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 1010 or BL 1040 or BL 3400

BL 4447 - Stream Ecology and Fish Biology

Field course combining river and stream ecosystem and foodweb study with fishes in lake systems. Students will be exposed to research methods used in lakes for comprehensive abiotic and biotic understanding.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall - Offered alternate years beginning with the 2015-2016 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 1010 or BL 1040 or BL 3400

BL 4461 - Ecosystem Ecology

Study of processes in aquatic and terrestrial ecosystems, including energy flow, ecosystem production, and nutrient cycling. We will explore these processes through a historical overview of influential research programs and regional to global case studies.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2011-2012 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 3400 and CH 1122 or (CH 1160 and CH 1161)

BL 4465 - Biological Oceanography

An overview of ocean environments and marine life. Topics include: trophic level interactions, nutrient cycling, ecology of plankton, invertebrates, fish, mammal and bird resources, and human influences on marine ecosystems. Will cover basic water chemistry and light in oceans.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BL 1010 or BL 1040 or BL 3070

BL 4510 - Senior Capstone Experience

Reading, interpreting, and integrating information from the primary literature of biological sciences. Emphasizes oral and written presentation skills.

Credits: 2.0

Lec-Rec-Lab: (0-2-0)

Semesters Offered: Fall, Spring

Restrictions: Must be enrolled in one of the following Major(s): Biological Sciences, Biochem & Molec Biology-Bio Sc, Bioinformatics; May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

BL 4530 - Senior Research Capstone Experience

Reading, interpreting, and integrating information from the primary literature and research project data. Emphasizes oral and written presentations as well as peer review.

Credits: 1.0

Lec-Rec-Lab: (0-1-0)

Semesters Offered: Fall, Spring

Restrictions: Must be enrolled in one of the following Major(s): Biological Sciences, Biochem & Molec Biology-Bio Sc, Bioinformatics; Must be enrolled in one of the following Class(es): Senior

Pre-Requisite(s): BL 4000(C) or BL 4001(C) or BL 4995(C)

BL 4550 - Clinical Chemistry

A study of clinical biochemistry of the human body. Theory and practical applications used in routine analysis of body fluids. Includes the study of electrolyte balance, acid base balance, and the functions of major organs and systems.

Credits: 3.0

Lec-Rec-Lab: (2-0-3)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Clinical Laboratory Science, Medical Laboratory Science, Biological Sciences; May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 2020 and BL 3640

BL 4610 - Medical Laboratory Science Medical Practicum I

Practical and didactic training in clinical chemistry, immunopathology, and medical microbiology under the direction of National Accrediting Agency for the Clinical Laboratory Sciences (NAACLS)-approved/accredited hospital internship program personnel.

Credits: 15.0

Lec-Rec-Lab: (15-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science

BL 4611 - Medical Laboratory Science Medical Practicum II

Practical and didactic training in hematology, urinalysis, and immunohematology under the direction of National Accrediting Agency for the Clinical Laboratory Sciences(NAACLS)-approved/accredited hospital internship program personnel.

Credits: 15.0

Lec-Rec-Lab: (15-0-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science

Pre-Requisite(s): BL 4610

BL 4630 - Cytotechnology Practicum I

Practical and didactic training in recognition of normal cells and cellular changes, particularly malignant, in the female reproductive tract, respiratory tract, and gastrointestinal tract under the direction of Committee on Accreditation of Allied Health Education Programs (CAAHEP)-approved/accredited hospital internship program personnel. Acceptance by a CAAHEP-approved/accredited cytotechnology hospital internship program required.

Credits: 14.0

Lec-Rec-Lab: (14-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science

BL 4631 - Cytotechnology Practicum II

Practical and didactic training in normal cell identification and recognition of cellular changes with emphasis on the diagnosis of cancer in the urinary, excretory, and neurological systems under the direction of Committee on Accreditation of Allied Health Education Programs (CAAHEP)-approved/accredited hospital internship program personnel.

Credits: 14.0

Lec-Rec-Lab: (14-0-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science

Pre-Requisite(s): BL 4630

BL 4640 - Clinical Immunology & Serology

Integrates basic and clinical immunological principles as well as outlines the diagnosis and evaluation of immune disorders and selected infectious diseases.

Credits: 2.0

Lec-Rec-Lab: (2-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science, Biological Sciences; May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 2410 and BL 3640

BL 4660 - Current Topics in Medical Laboratory Science

Recent developments in Clinical Laboratory Science.

Credits: variable to 4.0; Repeatable to a Max of 6

Semesters Offered: Fall, Spring

Restrictions: Permission of instructor required

BL 4720 - Hematology and Hemostasis

Theory and laboratory applications. Emphasis will be placed on hematopoiesis, normal and disease states affecting blood cells and coagulation processes. The lab will focus on cell morphology and practical testing applications.

Credits: 3.0

Lec-Rec-Lab: (2-0-3)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science, Biological Sciences; Must be enrolled in one of the following Class(es): Junior, Senior

Pre-Requisite(s): BL 4730(C)

BL 4730 - Immunohematology Techniques

Theory and practical applications. Emphasis will be placed on blood antigens and antibodies, compatibility testing techniques, blood component therapy and safety issues.

Credits: 1.0

Lec-Rec-Lab: (0-0-3)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science, Biological Sciences; Must be enrolled in one of the following Class(es): Junior, Senior

Pre-Requisite(s): BL 4720(C)

BL 4750 - Medical Laboratory Instrumentation

An overview of the principles, applications, and selection of instruments used in medical laboratory. Lab work includes operation, maintenance, and trouble shooting to obtain experience working with power supplies, centrifuges, spectrophotometers, pH meters, osmometers, radiation counters, and chemistry analyzers, blood cell counters, and other instruments commonly used in a diagnostic laboratory.

Credits: 2.0

Lec-Rec-Lab: (0-1-3)

Semesters Offered: Spring

BL 4820 - Biochemical Laboratory Techniques I

Laboratory techniques basic to biochemistry and molecular biology with emphasis on protein isolation, characterization and kinetics.

Credits: 2.0

Lec-Rec-Lab: (0-1-3)

Semesters Offered: Spring, Summer

Pre-Requisite(s): BL 4010(C) or CH 4710(C)

BL 4840 - Molecular Biology Techniques

Laboratory techniques in molecular biology, including methods of recombinant DNA technology for identification, cloning, and characterization of genes.

Credits: 3.0

Lec-Rec-Lab: (1-0-4)

Semesters Offered: Fall, Summer

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): (BL 2100 or CH 4710) and BL 2200 and BL 4030(C)

BL 4980 - Medical Laboratory Science Core Concept Integration and Application

SML Program Capstone Course. Review, and subsequently learn to integrate and apply, clinical core course material. Assignments include collaborative exercises involving development, peer

review, and presentation of worksheets, case studies, and instrument evaluations, as well as other interactive learning activities.

Credits: 2.0

Lec-Rec-Lab: (0-2-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Major(s): Medical Laboratory Science;

May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 3230(C) and BL 4550(C) and BL 4640 and BL 4720 and BL 4730

BL 4995 - Research in Biochemistry

A literature and laboratory research problem in biochemistry that culminates in a written report on the work performed.

Credits: variable to 6.0; Repeatable to a Max of 9

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required; Must be enrolled in one of the following

Major(s): Medical Laboratory Science, Chemistry, Biochem & Molec Biology-Bio Sc,

Bioinformatics, Biological Sciences; May not be enrolled in one of the following Class(es):

Freshman

6.4. 5000 Level Courses in Biological Sciences (12 credits minimum)

BL 5025 - The Scientific Profession

The practice of sciences for graduate students, including how to plan a research project, grantsmanship, publication, navigating the job market, and timely issues (e.g. ethical conduct, diversity and bias, etc.).

Credits: 2.0

Lec-Rec-Lab: (0-2-0)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

BL 5030 - Molecular Biology

Molecular biology of gene structure, expression and regulation. Molecular techniques and their application to biotechnology and genomes are covered.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5034 - Community Ecology and Evolutionary Dynamics

This is an advanced course that looks at the study of ecology and evolutionary biology at the community level: how populations interact with the abiotic environment and each other to determine patterns of diversity, distribution, and abundance of plants and animals.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2014-2015 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3400 and BL 3190

BL 5035 - Bioimaging

Current concepts in light and electron microscopy and scanning probe techniques. Theory and practice of fluorescence (including confocal and multi-photon), atomic force, scanning and transmission electron, and video microscopy as applied to biological specimens with an emphasis on sample preparation. Emphasis will be placed on application of advanced techniques. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-4-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

BL 5036 - Ecology and Evolution of Interactions Between Plants and Insects

Plants and insects have played major roles in influencing each others evolutionary diversification. We will examine the ecology and evolution of plant-insect interactions in basic and applied contexts. A solid foundation of tools in ecology and evolution will be established and class will include lectures and interactive discussions from readings of the primary literature.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2013-2014 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3400 and BL 3190

BL 5038 - Epigenetics

An introduction to the fundamentals of epigenetic control that is not encoded by genomic DNA sequences of an organism. Topics include major regulatory mechanisms including DNA methylation, histone modification, and non-coding RNA (ncRNA) mediated gene regulation.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3300 or BL 4030

BL 5042 - Scanning Electron Microscopy of Biological Specimens

Hands-on training in operation of the scanning electron microscope (SEM). Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Successful completion of course is prerequisite to becoming a certified SEM operator in the ACMAL. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

Co-Requisite(s): BL 5035

BL 5052 - Fluorescence and Video Microscopy of Biological Sciences

Hands-on training in fluorescence microscopy and video microscopy. Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

Pre-Requisite(s): BL 5035

BL 5062 - Transmission Electron Microscopy of Biological Specimens

Hands-on training in operation of the transmission electron microscope (TEM). Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Successful completion of course is prerequisite to becoming a certified TEM operator in the ACMAL. Half semester course.

Credits: 2.0

Lec-Rec-Lab: (0-2-6)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

Pre-Requisite(s): BL 5035

BL 5120 - Environmental Remediation and Toxicology

Toxicology of major environmental pollutants, their dose-response relationships and fundamentals of environmental remediation. Topics include physical, chemical, and biological remediation methods and effect of environmental toxins on biological systems. Laboratory will involve the application of chemical and biological remediation techniques.

Credits: 3.0

Lec-Rec-Lab: (2-0-2)

Semesters Offered: Fall - Offered alternate years beginning with the 2011-2012 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Pre-Requisite(s): BL 1020 or BL 1040

BL 5145 - Plant-Microbe Interactions

Interactions between plants and microorganisms in the environment. Topics include microbial virulence, signaling, gene expression, beneficial interactions and disease resistance in plants. Laboratory will focus on plant biochemical and microbiological methods as they relate to environmental problems.

Credits: 3.0

Lec-Rec-Lab: (2-0-2)

Semesters Offered: Fall - Offered alternate years beginning with the 2012-2013 academic year

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

BL 5200 - Microbial Physiology

Structure and function of microorganisms, with emphasis on mechanisms for responding to changing environmental and nutritional conditions.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall - Offered alternate years beginning with the 2000-2001 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3210 or BL 3310

BL 5340 - Special Topics in Biology

A discussion of recent developments in the biological sciences. Recent offerings have included population genetics, taxonomy of aquatic insects, herpetology, bryology, fungi, and lichens.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5350 - Special Topics in Physiology

A discussion of recent developments in physiology. Recent offerings have included respiratory physiology, renal physiology, clinical cardiology, and neurophysiology.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5360 - Special Topics in Biochemistry

A discussion of recent developments in the field of biochemistry. Topics taught recently include steroid biochemistry, immunology, and metabolic control theory.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5370 - Special Topics in Microbiology

A discussion of recent developments in the field of microbiology. Topics taught recently include bacterial genetics, industrial microbiology, and advanced microbial ecology.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5380 - Special Topics in Ecology

A discussion of recent developments in the field of ecology. Topics taught recently include systems ecology, ecology of Great Lakes fisheries, ecology of algae, aquatic macrophytes, and world ecosystems.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5390 - Special Topics in Clinical Laboratory Science

A discussion of recent developments in clinical laboratory science.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5400 - Special Topics in Plant Sciences

A discussion of recent developments in plant science. Topics may include biotechnology, physiology, systematics, phylogenetics, biochemistry, and molecular genetics.

Credits: variable to 10.0; Repeatable to a Max of 10

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5421 - Lake Superior Exploration

Field intensive course with significant time spent on a research vessel (R/V Agassiz or some other) where students will learn the use of a variety of state-of-the-art techniques to characterize biological communities and measure important physical and biological processes.

Credits: 3.0

Lec-Rec-Lab: (4-0-6)

Semesters Offered: Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5442 - Lake Ecology and Fish Biology

Field course combining lake ecosystem and foodweb study with fishes in lake systems. Students will be exposed to research methods used in lakes for comprehensive abiotic and biotic understanding.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall - Offered alternate years beginning with the 2014-2015 academic year

BL 5447 - Stream Ecology & Fish Biology

Field course combining river and stream ecosystem and foodweb study with fishes in lake systems. Students will be exposed to research methods used in lakes for comprehensive abiotic and biotic understanding.

Credits: 4.0

Lec-Rec-Lab: (3-0-3)

Semesters Offered: Fall - Offered alternate years beginning with the 2015-2016 academic year

BL 5451 - Advanced Aquatic Ecology

This course will provide advanced coverage of ecological pattern, science, and theory focused on aquatic systems. Topics will range from populations to landscapes and interactions between terrestrial and aquatic systems. Lectures and discussions guided by published literature.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2012-2013 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5455 - Graduate Research Methods in Aquatic Ecology

Guided by ecological, physiological, and evolutionary theory, we will explore and quantitatively sample flora and fauna, ecosystem processes, and habitat in streams and lakes using traditional and current techniques. Students will collect, analyze, and interpret data collected during class.

Credits: 2.0

Lec-Rec-Lab: (0-2-4)

Semesters Offered: Fall - Offered alternate years beginning with the 2011-2012 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Co-Requisite(s): BL 4450

BL 5461 - Ecosystem Ecology

History, key concepts, and practice of ecosystem ecology in aquatic and terrestrial environments. Emphasizes inter-connectedness of energy and nutrient flows globally and in regional case studies.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2011-2012 academic year

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3400 and CH 1122 or (CH 1160 and CH 1161)

BL 5500 - Graduate Seminar in Biological Sciences

Analysis, evaluation, and synthesis of primary scientific literature on a specific topic in recitation/discussion format.

Credits: 1.0; Repeatable to a Max of 4

Lec-Rec-Lab: (0-1-0)

Semesters Offered: Fall, Spring

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5501 - Graduate Research Seminar Ecology/Environmental

Seminar is designed to facilitate critical discussions of student research projects at various stages of their development. The presenter will provide an overview or seminar on their project and research goals, which will establish the foundation for the discussion thereafter.

Credits: 1.0; May be repeated

Lec-Rec-Lab: (0-1-0)

Semesters Offered: Spring

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior BL

5503 - Graduate Research Seminar Biomolecular

Seminar is designed to facilitate critical discussions of student research projects at various stages of their development. The presenter will provide an overview or seminar on their project and research goals, which will establish the foundation for the discussion thereafter.

Credits: 1.0; May be repeated

Lec-Rec-Lab: (0-1-0)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior BL

5678 - Biological Sciences Field Service

This course provides a supervised field experience in biological sciences, natural resources, and community development.

Credits: 1.0; May be repeated

Lec-Rec-Lab: (0-0-3)

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required; Must be enrolled in one of the following Level(s): Graduate; Must be enrolled in one of the following Major(s): Biological Sciences

5752 – Cancer Biology

Emphasis on characteristic genetic, molecular, and cellular changes leading to cancer. Topics will include the role of tumor viruses, oncogenes, tumor suppressors, immortalization, apoptosis, and angiogenesis in cancer initiation, and/or progression. Consideration of current therapies and future directions for treatment.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Restrictions: Must be enrolled in one of the following Level(s): Graduate

Pre-Requisite(s): BL 3012 or BL 4370 or BE 2400

BL 5975 - Full Time Master's Research

Open to students who have successfully completed all the required courses as well as the required number of credits for the Master's degree. Students in this course are involved in full-time research. Tuition for this course is charged at the graduate full-time research rate.

Credits: 9.0; May be repeated; Graded Pass/Fail Only

Lec-Rec-Lab: (0-9-0)

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of department required; Must be enrolled in one of the following Level(s): Graduate

BL 5990 - Masters Research in Biological Sciences

An original investigation in biology that culminates in a thesis.

Credits: variable to 15.0; Repeatable to a Max of 15; Graded Pass/Fail Only

Semesters Offered: Fall, Spring, Summer

Restrictions: Must be enrolled in one of the following Level(s): Graduate

BL 5994 - International Biological Sciences Practicum

Thesis or project work conducted by graduate students enrolled in the Peace Corps Master's International Program in Biological Sciences.

Credits: 1.0; Repeatable to a Max of 18

Lec-Rec-Lab: (0-0-1)

Semesters Offered: Fall, Spring, Summer

Restrictions: Permission of instructor required; Must be enrolled in one of the following

Level(s): Graduate; Must be enrolled in one of the following Major(s): Biological Sciences

*5000 or 6000 courses from other departments such as Chemistry, Forestry, or Mathematical Sciences can be taken with approval from the advisor.

1. Resources

The program will utilize existing resources already available such as library facilities, teaching and research laboratories, computer facilities and student office space in the department. No new resources are required.

2. Program Costs

No new resources are requested. Costs associated with recruiting, program administration and facilities will be handled through the Graduate School and the Department of Biological Sciences.