



**STUDENT
HANDBOOK**

2007-2008

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Mission Statement

The Biology Department of Lewis University, in recognition of the long-standing tradition of academic rigor, discipline, and service of Catholic higher education, strives to fulfill the mission of Lewis University by

- developing the understanding and mastery of the concepts of our discipline (Knowledge)
- initiating students into the philosophy, traditions, and practices of the scientific ways of knowing (Fidelity)
- encouraging reflection on biological concepts to increase critical understanding of the discipline and the ability to apply its concepts (Wisdom)
- fostering respect for and recognition of the dignity of all components of the biosphere (Justice)
- promoting collegial learning communities within the department, college, and university (Association)

The Biology department will maintain its tradition of mentoring students in- and outside of classrooms, facilitating frequent and effective personal interaction between students and instructors. Our department will prepare the students we teach to make contributions to their local communities and the world beyond as educators, researchers, professionals, and citizens. These goals will be supported through the incorporation and integration of student-centered instruction utilizing appropriate technological advances in both the classroom and laboratory. The Biology department will continue its commitment to serving the needs of its students and society through the development of appropriate partnerships and associations within the scientific and educational community.



Vision Statement

The Biology Department of Lewis University will be recognized as one of the premier pre-professional, allied health, and environmental science departments in the Midwest. We will also endeavor to provide high quality general education experiences for all Lewis University students in addition to exemplary support courses for multiple programs across the colleges. As a department, we will build upon our current strengths and expertise and, when combined with the addition of highly qualified faculty and the expansion of our facilities, our department will grow to meet the demands and expectations that our institution's unique environment, development, and potential will provide. With the prospective development of a wetlands preserve on campus, coupled with the natural resources at our doorstep, the Lewis University Environmental Science majors will be distinguished from all other regional programs. Graduates of our department will be recognized as excellent scholars and practitioners and we will constantly strive to enhance the placement of our graduates in high-profile, well-respected institutions.



Biology Departmental Pillars

As students in a program devoted to a liberal, broad based educational background, graduates of the Biology Department at Lewis University are trained to be well rounded, articulate individuals who are able to demonstrate their knowledge in a wide variety of manners. This includes but is not limited to foundational skills in writing, reading, speaking, listening, quantitative analysis, critical thinking, and the use of technology. To formally demonstrate an evolution of these core skills while at Lewis University, the Biology Department expects that all its graduates present an electronic portfolio in the final semester prior to graduation. This e-portfolio will include various assignments, documents, or projects related to course work that show evidence that the student has met the expectations of the department as articulated in the following five pillars. The student should also provide documentation that these skills have evolved during their undergraduate career(s). This will be achieved by inclusion of "early" (Fresh/Soph) documents demonstrating the required skill(s) followed by "late" (Jr. /Sr.) documents. Students should also include a written narrative in each section to explain where/why they felt their abilities evolved.

I Written communication skills

Students should demonstrate an ability to demonstrate their knowledge and express ideas, opinions, beliefs, and facts to others effectively in a variety of written formats, ranging from basic essays to professional or research writing. In this writing, they should demonstrate an ability to comprehend, interpret, and analyze. These skills support the departmental mission by initiating students into the philosophy, traditions, and practices of the scientific ways of knowing (FIDELITY) as well as encouraging reflection on biological concepts so as to increase disciplinary understanding and application (WISDOM).

II Oral communication skills

Recognizing that the ability to verbally express oneself is an integral part of any career, students in the Biology department should be able to effectively communicate ideas, beliefs, and facts in both the formal and informal setting(s). This can range from small group discussion in class to question/answer session(s) to formal research presentations. These skills are congruous with the departmental mission in that they recognize the pivotal natures of sharing

information in scientific communities (ASSOCIATION) as well as support the aforementioned pillars of FIDELITY and WISDOM.

III Critical thinking and quantitative skills

Critical thinking is an advanced cognitive process which involves the careful examination of ideas and integration of multiple perspectives/resources in order to clarify, improve, and advance one's understanding of the world around them. Critical thinking may be demonstrated by solving challenging problems (through the use of quantitative skills), synthesizing information to arrive at reasoned conclusions, evaluating the logic, relevance, and validity of data, or using knowledge and understanding to raise new questions. This pillar supports the departmental mission by demonstrating student ability to master discipline specific concepts (KNOWLEDGE) as well as fostering a respect for the multiple components of the discipline (JUSTICE).

IV Intellectual Depth, Breadth, and Adaptiveness

Students in the Biology Department should demonstrate an ability to examine, organize, and apply the disciplinary ways of knowing to specific issues. Intellectual depth is demonstrated generally through knowledge gained in the major, but should be complemented by breadth (e.g., knowledge gained outside the major, but pertinent to more fully addressing the question at hand). The student should also be able to modify his/her approach to a problem/question based upon the requirements of a situation, thereby demonstrating adaptiveness. This pillar also supports the departmental notions of KNOWLEDGE, JUSTICE, and WISDOM as previously outlined. Furthermore, this pillar also recognizes the importance of collegial learning communities (ASSOCIATION).

V Integration and Application of Knowledge

Students demonstrate integration of knowledge when they articulate and apply concepts from two or more disciplinary areas. Application of knowledge, an extension of integration, shows that students are intellectually mature and capable of linking their knowledge so as to advance their own professional goals and the goals of society. Similar to the previous pillar, integration and application of knowledge support the departmental mission in the areas of KNOWLEDGE, JUSTICE, and WISDOM as well as further promotes JUSTICE.



Department Goals

Graduates of the Lewis University Biology department should be able to appreciate

- the scientific method and its applications in research
- that living systems and their subcomponents are interdependent and dependent upon the non-living world understand
- that all organisms share a common biochemistry and physiology
- the diversity of life and the hierarchical levels of organization develop
- communication skills necessary to interact within scientific and professional communities
- critical thinking skills in the forms of analysis, synthesis, and integration



Department Learning Outcomes

Graduates of the Lewis University Biology department should be able to

- acquire and comprehend information from published scientific literature
- test, observe, and succinctly communicate results from scientific endeavors
- provide experiences with multiple methods and techniques applicable to biological sciences
- demonstrate knowledge of universality of chemical and physical principles uniting all life forms
- compare and contrast features of living systems that acknowledge a common origin while recognizing evolutionary differences
- demonstrate knowledge of form, function, and organization across the full range of biology
- communicate knowledge and logical progression of thought both orally and in written form
- demonstrate ability to link classes and sub-disciplines in order to use information for more meaningful comprehension

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B.S. Biology, University of St. Francis

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Departmental Policies

Advanced Placement Credit

The Biology Department will award 3 hours of credit for our general education class 02-100 (Introduction to Biology) when students have received a score of 4 or 5 on AP tests. We do not award any credit for major classes based on AP scores.

Prerequisite Courses

Biology majors must take classes in the appropriate sequence, satisfying all of the prerequisite coursework. Prerequisite coursework not only includes the classes listed in the course catalog but also any required work for those classes. For example, to take 02-224 Microbiology, a student must successfully complete 02-220 Genetics. In order to take Genetics, a student must successfully complete 02-115 General Biology II. Therefore a student must successfully complete **both** Genetics and General Biology II before Microbiology can be taken.

Minimum Grade Requirements

Biology majors must receive a minimum grade of C in all of the Biology classes required for our programs. If the minimum grade of C is not achieved in the first attempt, then the class must be repeated. Students may petition the department chair to be exempted from this requirement but there is no expectation that the exemption will be granted. The petition must be in writing (form available in the Biology office) and must include the reasons as to why the student should be allowed the exception from this policy. This exemption can only be granted once per student.

Students should be aware of the policy of many professional schools to view grades of W (Withdrawal) and N (No grade) as failing grades when applications are evaluated. Every effort should be made on the part of the student to successfully complete their coursework the first time that the class is taken.

Repetition of Courses

Biology majors and minors may take a biology class only two times. If a student has not achieved a minimum of a C after the second attempt, the student may not repeat the class. The inability to complete a biology class with the minimum acceptable grade will require the student to change their major/minor to one outside of the Biology department. Students will receive notification by mail from the department chair when this occurs.

Extended Absence

Biology majors are expected to follow the attendance policy put forth in the syllabus for each course. Students who know that they will be absent for extended periods of time should inform their instructors in advance and should complete a departmental absence form (available in the Biology office).

Grade Appeal

Any student who wishes to appeal a grade in a biology class must fill out a Grade Appeal Form (available in the Biology office) specifically stating why he/she believes that his/her grade is inaccurate. Grade appeals, as indicated in the Lewis University catalog, are only valid in cases of inaccurate calculation of the grade. Once the appeal has been resolved, the student will be required to sign a Grade Appeal Resolution form.

Letters of Recommendation

Students who wish a faculty member to write them a letter of recommendation should provide the faculty member with all of the pertinent information at least one month in advance of the due date. Students should also understand that a faculty member may decline the request for any of a variety of reasons. Students who are applying for professional programs of any type must follow the guidelines for letters of recommendation outlined in the Pre Health Professions Handbook.

Students should also be aware of the distinction between a letter of reference versus a letter of recommendation. Professional and graduate schools require letters of recommendation in which the faculty member must compare the applicant to the standards for acceptance as well to the students who have been successful in gaining acceptance to that particular institution. A letter of reference however does not require such comparison and is simply an indication of the personal qualities of that individual.

It is the policy of the Biology department to support with letters of recommendation for professional school applications, only those students who have achieved a cumulative and science GPA of 3.25 by the time they complete 02-355 Biochemistry I and have no withdrawals in their records. For students applying to graduate schools, the minimum cumulative and science GPA is 3.0 by the time they complete 02-355 Biochemistry I. If there is a required exam for the program to which the student is applying, the student must supply an official copy of the scores to the faculty before letters can be written. In the event that a student has his/her request for letters of recommendation denied, he/she has the right to petition for reconsideration with the understanding that there is no guarantee that the petition will be successful. Acceptance into any professional or graduate school is solely determined by the admission committee of that school. All faculty members have the right to decline a request to write a letter of recommendation for any student.

Academic Dishonesty Policies and Procedures¹

The Department of Biology has a zero tolerance policy for academic dishonesty. Academic dishonesty includes but is not limited to plagiarism, improper citations, collusion, and cheating or fabricating results on any laboratory or lecture assignment, quiz, or examination.

“Plagiarism” is defined to be submitting work as your own that is in reality someone else’s. Plagiarism is also illegal and can be criminally punishable. This behavior includes:

- Copying words verbatim from a book, article, Internet source or any other written document without **properly** acknowledging the true source
- The use of another author’s idea, even when paraphrasing has been done to minimize improper citing

¹ Adapted from “Tools for Teaching” <http://teaching.berkeley.edu/bgd/prevent.html>

- Purchasing an assignment from any source

“Improper citations” is defined as the failure to give appropriate credit to the source of an idea, a quotation, a paraphrase, an opinion, a visual, or a graphic, by properly providing the name, title, and page number(s) of the source of the information. Citations should provide readers with the information necessary to locate the source. The use of three or more words in a line from a source must be quoted, while all quotations must be the author's exact words. In addition, all paraphrases must be in the student's own words and **sentence structure**.

“Cheating” is defined as obtaining unauthorized help on an assignment, quiz or examination. This includes:

- Giving *or* receiving answers on an assignment, quiz or examination during the examination
- Giving *or* receiving answers on an assignment, quiz or examination *after* the examination. **This particularly applies to students that are in different sections of the same class.**
- Looking at another student’s answers during an examination or quiz.
- Using unauthorized sources (books, articles, notes, the internet, **any electronic devices**) on an assignment, quiz or an examination
- Obtaining quizzes or examinations illegally before the testing date. This includes stealing an examination as well as any other method that will allow you to obtain an examination prior to its official administration.
- Distributing an examination or quiz to others prior to its administration
- Changing assignment, quiz or examination answers after it has been graded and returned
- Retaining or photocopying previously administered examinations or quizzes when it has been clearly stated that such materials must be returned to the professor

“Fabrication²” is defined as generating data without experimentation. This includes:

- Falsifying or inventing any information, data or citation
- Presenting data that were collected in an unorthodox or questionable manner
- Failing to include an accurate account of the method by which the data were gathered or collected

How do you prevent academic dishonesty?

1. Follow the guides set forth by your professor. If group projects are permissible for a given assignment, she will clearly inform you of this.
2. If you copy an author’s words exactly, treat the passage as a quotation by putting quotation marks around the passage and then reference the source.
3. If you use someone else's ideas, even if you paraphrase the wording, appropriate credit should be given to the original author. This is a gray zone that may leave the student perplexed. If that occurs, cite. Better to be safe than sorry.
4. Ask your professor if certain assignments, for example laboratory assignments, can be done as a group.

² “Definitions of Academic Dishonesty” <http://www.northwestern.edu/uacc/defines.html>

Examples

Consider the following text:

In response to adverse environmental conditions, the Gram + soil bacterium *Bacillus subtilis* will undergo an alternative developmental pathway called sporulation. This process results in a highly resistant cell type called a spore, which is capable of withstanding extreme temperatures, chemicals and even UV light. These amazing resistance properties are due primarily to two structures, the spore coat and the spore cortex. The spore coat is comprised of several layers of tightly cross-linked proteins that act as a physical barrier against noxious agents. The cortex acts to keep the core of the spore dehydrated and thus dormant.

This following rephrasing is considered plagiarism!

Bacillus subtilis, which is a Gram + soil bacterium; will undergo a process called sporulation in response to adverse environmental conditions. This results in a cell called a spore, which can survive extreme situations like temperatures, chemicals and UV light. The two structures of the spore that allow for these resistances are called the coat and the cortex. The coat, which is made up of proteins, acts as a barrier to prevent things from entering the cell. The cortex dehydrates the cell.

How do you get around this? Cite. Cite the original source **after every sentence** that has three or more words in common with your source. You may think that this may get cumbersome when discussing background information like in the introduction of a scientific paper. However, that is what is done because there are only so many ways to restate the same set of facts in an efficient manner.

Here is a paraphrase that is not plagiarism:

Sporulation is process certain bacteria undergo when environmental conditions become less than favorable that results in a cell type able to withstand most environmental stressors. This cell, called a spore, has two structures that are integral for these resistance properties. The first structure, the spore coat, is protein based, and serves to prevent the entry of chemicals and solvents into the cell. The second structure, the cortex, is involved in removing water from the interior of the spore, which allows the spore to remain dormant.

This paraphrase doesn't really flow as well as the original; that is why people often choose to cite sentences that have been finely drafted and work well.

Remember that it is perfectly okay to use the author's exact words as long as you put quotations marks around the sentence or passage and then cite. Failure to do this is considered a miss-citation and may land you in trouble.

The Biology Department is grateful to Dr. Francesca Catalano who wrote the original draft of this policy and to Dr. Christopher Wielgos who edited this policy for us.

Department Organizations

Omega Omicron Chapter of the Beta Beta Beta Biological Honor Society

Beta Beta Beta (Tri-Beta) is a society for students, particularly undergraduates, dedicated to improving the understanding and appreciation of biological study and extending boundaries of human knowledge through scientific research. Since its founding in 1922, more than 175,000 persons have been accepted into lifetime membership, and more than 430 chapters have been established throughout the United States and Puerto Rico.

Tri-Beta was founded in 1922 at Oklahoma City University--the Alpha Chapter--by Dr. Frank G. Brooks and a group of his students. The idea of an honor and professional society for biology students spread rapidly and by 1925, the society was a national organization. Biennial national conventions of student and faculty members began in that year and in 1930 the society journal, BIOS, began publication of student research, articles of interest to biologists, and society news.

The Omega Omicron Chapter of Tri-Beta was established at Lewis University in the fall of 1999. Since its inception, members of the Omega Omicron chapter have been involved in a wide variety of scientific and research oriented activities. These range from summer research programs at area medical centers to organization of an annual 10K walk whose proceeds benefit research in the area of Cystic Fibrosis. Students organize alumni and health professions speaker series each year, have established numerous charitable drives (beneficiaries include Ronald McDonald House and Chicago Public Schools), and are extremely visible in all aspects of academic and student life across the university.

Acceptance to full membership in Tri-Beta requires that the student meet the following criteria:

1. Declare a major in Biology
2. Attend Lewis University for 3 semesters (with coursework in the major)
3. Have a 3.0 GPA in the major (with no less than a "C" in all courses)

Tri-Beta also offers Associate membership to anyone who is interested in participating in group activities and promoting scientific scholarship and literacy. Both the full and associate members are inducted to the society in a ceremony that occurs each spring on campus.

Matriculation Data

Professional Schools

Professional schools publish the **MINIMUM** requirements for acceptance into their programs. The reality is that successful applicants far exceed these minimum requirements. The following is provided as a means of allowing students the ability to gauge the chance of their successful application into the professional program of their choice.

Medical School

| | <u>Overall Mean GPA</u> | <u>Science Mean GPA</u> | <u>Mean MCAT Scores</u> | |
|------------------------|-------------------------|-------------------------|-------------------------|------|
| Loyola- Stritch | 3.69 | 3.54 | Verbal | 9.5 |
| | | | Physical Sci | 9.9 |
| | | | Biology | 10.2 |
| Rush Medical College | 3.7 | 3.6 | Verbal | 9.8 |
| | | | Physical Sci | 10.3 |
| | | | Biology | 10.3 |
| University of Illinois | 3.5 | 3.4 | Verbal | 10 |
| | | | Physical Sci | 10 |
| | | | Biology | 10 |
| Northwestern | 3.7 | 3.7 | Verbal | 10.7 |
| | | | Physical Sci | 11.6 |
| | | | Biology | 11.5 |

Osteopathic Medicine

| | <u>Overall Mean GPA</u> | <u>Science Mean GPA</u> | <u>Mean MCAT Scores</u> | |
|-----------------|-------------------------|-------------------------|-------------------------|--|
| Chicago College | 3.5 | 3.5 | 26 (Total) | |

Dental School

| | | | <u>Mean DAT Score</u> | |
|--------------------------|-----|-----|-----------------------|------|
| Southern Ill. University | 3.5 | 3.5 | Academic | 18.4 |
| | | | Percept. Abil. | 17.5 |

Optometry

| | | <u>Mean OATS</u> |
|---------------------------|-----|------------------|
| Ill. College of Optometry | 3.3 | 326 |

Physician's Assistant

| | | <u>Mean Percentile GRE</u> |
|-----------------------|-----|----------------------------|
| Midwestern University | 3.4 | ~60th |

Physical Therapy

| | <u>Overall Mean GPA</u> | <u>Science Mean GPA</u> | <u>Mean Percentile GRE</u> |
|------------------|-------------------------|-------------------------|----------------------------|
| Midwestern Univ. | 3.21 | 2.89 | ~45 th |

Veterinary Medicine

| | <u>Overall Mean GPA</u> | <u>Mean Percentile GRE</u> |
|--------------------|-------------------------|----------------------------|
| University of Ill. | 3.53 | |

Pharmacy

| | <u>Overall Mean GPA</u> | <u>Mean Percent. PCAT</u> |
|------------|-------------------------|---------------------------|
| Midwestern | 3.4 | 77 th |

Allied Health

| | <u>Overall Mean GPA</u> | <u>Science Mean GPA</u> |
|---|-------------------------|-------------------------|
| Nuclear Medicine Technology Northwestern Memorial Hospital | 3.31 | 3.17 |
| Radiation Therapy Northwestern Memorial Hospital | 3.41 | 3.15 |
| Diagnostic Medical Sonography Northwestern Memorial Hospital | 3.22 | 3.39 |

Graduate Placement

A. Professional Schools

| <u>Program</u> | <u>Student</u> | <u>Institution</u> |
|----------------|-------------------------------|------------------------------|
| Medical | Donald Laasch | University of Illinois |
| | Edward Logman | University of Illinois |
| | Michael Bonin | Marquette University |
| | Charles Slack | University of Illinois |
| | Robert Schuster | Loyola University |
| | John Danielson | University of Illinois |
| | Ted Dastych | University of Illinois |
| | Joseph Nemeth | Indiana University |
| | Stuart Gifford | University of Illinois |
| | Lisa Pocius | Loyola University |
| | Mark Drendel | Rosalind Franklin |
| | Sunette Varnardo | University of Illinois |
| | Scott Sorensen | Rush University |
| | Jeanette Kososki | University of Illinois |
| | John Ngwe | Loyola University |
| | Mark Snyder | University of Illinois |
| | Robin Robertson | Rush University |
| | Anna Kilboy | Rush University |
| | Inez Brown Kelleher | Georgetown University |
| | Matthew Christophersen | Southern Illinois University |
| Michael Heniff | Rush University | |
| Joseph Shega | Northwestern University | |
| Winnie Adams | Stanford University | |
| Todd Mitchell | Pennsylvania State University | |
| Okey Enyia | Southern Illinois University | |
| Osteopathic | William Long | Midwestern University |
| | Karla Shively | Midwestern University |
| | Gregory Miller | Midwestern University |
| | John Havlick | Midwestern University |
| | Jeremy Lott | Midwestern University |
| Dental | Norbert Bora | Loyola University |
| | Terry Kavanaugh | Loyola University |
| | Rich Pellegrini | Loyola University |
| | Nick Meyer | Loyola University |
| | Sam Cicarelli | Loyola University |
| | Emil Verban | Loyola University |
| | Steve Sewall | Loyola University |
| | Dawn Swenson | Loyola University |
| | Bob McGonicle | Loyola University |
| | John Mantanez | Loyola University |

| | | |
|---------------------|---|---|
| | Brian Habas Ted Hughes Jesse Zavala | Southern Illinois University Southern Illinois University Southern Illinois University |
| Optometry | Becky Baker Joe Ashenbrenner Deborah DiAgostini Lisa Wilson Joanna Kawecka Elizabeth Shelus | Illinois College of Optometry Illinois College of Optometry Illinois College of Optometry Illinois College of Optometry Illinois College of Optometry State University New York |
| Physician Assistant | Amy Weierman Jeremy Lott Carolyn Valois Rita Hegazin | Midwestern University Midwestern University St. Francis (Indiana) Midwestern University |
| Chiropractic | Larry Hopkins Dominic Anco Matt Schultz Angelika Wujcik Keith Engler Deborah Johnson | National College National College Logan College Palmer College Logan College Cleveland College |
| Physical Therapy | Sarunas Skadas Katie Stanley Sarah Whiteside Tammie Ostrowski Kimberly Adelsbach Brian Schumann Jaimee Balskus Abby Kirschner Ryan Holehan Mary Moskal Melanie Limanowski | Midwestern University Midwestern University Midwestern University Midwestern University Midwestern University Midwestern University Midwestern University Indiana University Midwestern University Univ. Ill at Chicago Midwestern University |
| Veterinary Medicine | Michael Miller Steve Boroviak Elizabeth Curry Pamela Means Melissa Stefanski Erica Shulha Jane Lazzara | University of Illinois University of Illinois University of Illinois University of Illinois University of Michigan University of Illinois Ross University |

| | | |
|----------|---|--|
| Pharmacy | Linda Ngwe Danielle Winchester Sara Morfoot Erin Watterson Medha Patel Jimica Hedge Melinda Kendric Lina Shlikas Tim Cole Brian French Mary Beth Tinsley Lamar Quinn Hari Patel | Midwestern University Midwestern University Midwestern University Butler University Shenandoah University Midwestern University University of Illinois-Chicago Midwestern University Midwestern University Midwestern University Midwestern University Univ. Illinois - Chicago Univ. Illinois - Chicago |
| Podiatry | Maureen Spinler Nancy Jagodinski Anthony Easley Mike Wynn Richard Adams Laura Ritter Dennis McGrath Tim Pyzik Cathy Feuerstein Allyson Berglund | Scholl Scholl Scholl Cleveland College Scholl Scholl Barry Scholl Scholl Scholl |

B. Allied Health Program

| | <u>Student</u> | <u>Institution</u> |
|--------------------------------------|--|--|
| Nuclear Med Tech | Danielle Sproch Stephanie Haddad Jessica Rawlins Jeff Mann Elizabeth Hogan Barbara Lazar Brian Vlasisovich Pradip Patel Bradley Nicholas | Northwestern Mem. Hospital Northwestern Mem. Hospital Hines Hospital Northwestern Mem. Hospital Northwestern Mem. Hospital Northwestern Mem. Hospital Northwestern Mem. Hospital College of DuPage College of DuPage |
| Radiation Therapy | Kristen Hink Jessica Rauch | Northwestern Mem. Hospital Northwestern Mem. Hospital |
| Diagnostic Medical Sonography | Erika Rocha | Northwestern Mem. Hospital |

C. Graduate School**Program****Student****Institution**

Doctoral

| | |
|-------------------|----------------------------------|
| Bob Gaugush | Kent State University |
| Mike Dzusvardis | Loyola University |
| Jack Pyne | Western Illinois University |
| Lawrence Misialek | Southern Illinois University |
| Sandy Morzarotti | University of Indiana |
| John Balloy | University of Illinois - Chicago |
| Michael Bannon | Yale |
| Sandra Szegedi | Southern Illinois University |
| James Rago | University of Minnesota |
| Todd Mitchell | Wayne State University |
| Amanda Persons | Loyola Univ. Medical Center |
| Elisa Bott | University of Wisc.- Madison |
| Kari Wong | University of Chicago |
| Mike Bradaric | Rush Univ. Medical Center |
| Colleen Kuemmel | State University New York |
| Mark Zilch | Rush Univ. Medical Center |
| Stephanie Haddad | Rosalind Franklin University |

Masters

| | |
|----------------|------------------------------|
| Joe Bajt | Western Illinois University |
| Jim Riley | Southern Illinois University |
| Kim Stamitti | University of Ill at Chicago |
| Debra Spezio | University of Ill at Chicago |
| Walter Pascale | University of Indiana |
| Tammy Rabenda | Lewis University |
| Steve Barger | Southern Illinois University |
| Lisa Ramos | Michigan State |
| Carla Morandi | Lewis University |
| Jim Fazekas | Lewis University |
| Jeff Czaja | Lewis University |
| Lauren Sick | Lewis University |
| Tess Hilton | Lewis University |
| Myra Perez | Lewis University |
| Daniel Anco | Ohio State University |

Paradigm for a Bachelor of Science (B.S.) in Biology – Servicing those students interested in pre-health science areas such as allopathic/osteopathic medicine, dentistry, podiatry, optometry, chiropractic, PT/OT, veterinary medicine, and Physician Assistant programs. This would also include all persons interested in pursuing a career in scientific research.

FRESHMAN YEAR

| FALL | SPRING |
|--|---|
| General Biology I (02-110), Lab (02-111) | General Biology II (02-115), Lab (02-116) |
| General Chemistry I (03-110), Lab (03-111) | General Chemistry II (03-115), Lab (03-116) |
| Calculus I (13-200) | |

SOPHOMORE YEAR

| FALL | SPRING |
|---------------------------------------|--|
| Genetics (02-220), Lab (02-221) | Microbiology (02-224), Lab (02-226) |
| Organic Chem I (03-220), Lab (03-221) | Organic Chem II (03-225), Lab (03-226) |

JUNIOR YEAR

| FALL | SPRING |
|---------------------------------------|-----------------------------------|
| Biochemistry I (02-335), Lab (02-356) | Biology Elective |
| Physics I (17-200), Lab (17-201) | Physics II (17-205), Lab (17-206) |

SENIOR YEAR

| FALL | SPRING |
|--|---------------------------------|
| Biometry (02-320) | Molecular Cell Biology (02-305) |
| Ecology (02-315), Lab (02-316) | Biology Elective |
| Research Methods (02-496) – fall or spring | Biology Elective |

Biology Electives Include:

Biochemistry II: Biochemistry of Nutrition (02-357) and lab (02-358), Invertebrate Zoology (02-405), Advanced Human Anatomy and Physiology (02-335), Case Studies in Human Physiology (02-336), Medical Microbiology (02-425), Immunology (02-426), Scientific Ethics (02-435), Botany (02-420) and lab (02-422), Special Topics (02-497).

Notes:

In the event that FOUR YEARS of high school mathematics were NOT taken (including pre-calculus), **Math Analysis (13-120)** must be taken concurrently with **General Chemistry I (03-110)**. Similarly, if testing indicates the need to enroll in **The Sentence and Paragraph (06-102)**, or **The Essay (06-103)**, this class must be taken during the first semester.

Paradigm for a Bachelor of Arts (B.A.) in Biology**FRESHMAN YEAR**

FALL
General Biology I (02-110), Lab (02-111)
General Chemistry I (03-110), Lab (03-111)

SPRING
General Biology II (02-115), Lab (02-116)
General Chemistry II (03-115), Lab (03-116)

SOPHOMORE YEAR

FALL
Genetics (02-220), Lab (02-221)
Organic Chem I (03-220), Lab (03-221)

SPRING
Microbiology (02-224), Lab (02-226)
Organic Chem II (03-225), Lab (03-226)

JUNIOR YEAR

FALL
Biology Elective

SPRING
Molecular Cell Biology (02-305)

SENIOR YEAR

FALL
Ecology (02-315), Lab (02-316)

SPRING
Biology Elective

Biology Electives: Same as Bachelor of Science

Notes: Same as Bachelor of Science

Paradigm for B. S. in Nuclear Medicine Technology/ Northwestern Memorial Hospital**First Year**

| First Semester | Hours | Second Semester | Hours |
|---------------------------|--------------|--------------------------|--------------|
| General Biology I & Lab | 5 | General Biology II & Lab | 5 |
| General Chemistry I & Lab | 5 | Gen Chemistry II & Lab | 5 |
| Math Analysis or Calc I | 4 | Calc I or Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | | |
| Total | 17 | Total | 16 |

Second Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|------------------------|--------------|
| Genetics & Lab | 5 | Microbiology & Lab | 5 |
| Organic Chem I & Lab | 5 | Organic Chem II & Lab | 5 |
| Gen Ed | 3 | Journal Club | 1 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | | |
| Total | 16 | Total | 17 |

Third Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|----------------------------|--------------|
| Biochemistry I & Lab | 4 | Adv. Human A & P | 3 |
| Gen Ed | 3 | Case Studies | 1 |
| Physics I & Lab | 5 | Immunology | 3 |
| Gen Ed | 3 | Res. Methods-Allied Health | 2 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | | |
| Total | 18 | | 18 |

Fourth Year (At Northwestern Memorial Hospital)

| First Semester | Hours | Second Semester | Hours |
|---------------------------------|--------------|----------------------------------|--------------|
| Mgmt/Mthds Patient Care I | 2 | Mgmt/Mthds Patient Care II | 2 |
| Radtn Safety /Protection | 2 | Radtn Detection/Protection | 2 |
| Clin Nclr Imaging Proc I | 2 | Clin Nclr Imaging Proc II | 2 |
| Nuclear Physics/Instrumentation | 2 | Diagn. Nclr Imaging Practicum II | 4 |
| Computer Applications | 2 | Quality Control | 2 |
| Applied Basic Math | 1 | RadioChem/RadioPharm | 3 |
| Diagn. Nclr Imaging Practicum I | 4 | Clinical Correlations | 2 |
| | | Radiation Biology | 2 |
| | | | |
| Total | 15 | | 19 |

This paradigm requires that students take 1 general education requirement during a summer session.

Paradigm for B. S. in Biology, Certificate in Nuclear Medicine Technology/ College of DuPage**First Year**

| First Semester | Hours | Second Semester | Hours |
|---------------------------|--------------|--------------------------|--------------|
| General Biology I & Lab | 5 | General Biology II & Lab | 5 |
| General Chemistry I & Lab | 5 | Gen Chemistry II & Lab | 5 |
| Math Analysis or Calc I | 4 | Calc I or Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | | |
| Total | 17 | Total | 16 |

Second Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|------------------------|--------------|
| Genetics & Lab | 5 | Microbiology & Lab | 5 |
| Organic Chem I & Lab | 5 | Organic Chem II & Lab | 5 |
| Gen Ed | 3 | Journal Club | 1 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | | |
| Total | 16 | Total | 17 |

Third Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|----------------------------|--------------|
| Biochemistry I & Lab | 4 | Adv. Human A & P | 3 |
| Gen Ed | 3 | Case Studies | 1 |
| Physics I & Lab | 5 | Immunology | 3 |
| Gen Ed | 3 | Res. Methods-Allied Health | 2 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | | |
| Total | 18 | Total | 18 |

Fourth Year (15 month program at College of DuPage)

| First Semester | Hours | Second Semester | Hours |
|---------------------------------|--------------|----------------------------------|--------------|
| Mgmt/Mthds Patient Care I | 2 | Mgmt/Mthds Patient Care II | 2 |
| Radtn Safety /Protection | 2 | Radtn Detection/Protection | 2 |
| Clin Nclr Imaging Proc I | 2 | Clin Nclr Imaging Proc II | 2 |
| Nuclear Physics/Instrumentation | 2 | Diagn. Nclr Imaging Practicum II | 4 |
| Computer Applications | 2 | Quality Control | 2 |
| Applied Basic Math | 1 | RadioChem/RadioPharm | 3 |
| Diagn. Nclr Imaging Practicum I | 4 | Clinical Correlations | 2 |
| | | Radiation Biology | 2 |
| | | | |
| Total | 15 | Total | 19 |

This paradigm requires that students take 1 general education requirement during a summer session.

Paradigm for B. S. in Radiation Therapy/ Northwestern Memorial Hospital**First Year**

| First Semester | Hours | Second Semester | Hours |
|---------------------------|--------------|--------------------------|-----------------|
| General Biology I & Lab | 5 | General Biology II & Lab | 5 |
| General Chemistry I & Lab | 5 | Gen Chemistry II & Lab | 5 |
| Math Analysis or Calc I | 4 | Calc I or Gen Ed | 4 or 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| Intro to College Exp. | 1 | | |
| | | | |
| Total | 18 | Total | 16 or 17 |

Second Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|------------------------|--------------|
| Genetics & Lab | 5 | Microbiology & Lab | 5 |
| Organic Chem I & Lab | 5 | Organic Chem II & Lab | 5 |
| Gen Ed | 3 | Journal Club | 1 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | | |
| Total | 16 | Total | 17 |

Third Year

| First Semester | Hours | Second Semester | Hours |
|-------------------------|--------------|------------------------------|--------------|
| Biochemistry I & Lab | 4 | Adv. Human A & P | 3 |
| College Physics I & Lab | 5 | Case Studies | 1 |
| Gen Ed | 3 | Immunology | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Gen Ed | 3 |
| | | Res. Methods – Allied Health | 2 |
| | | | |
| Total | 18 | | 18 |

Fourth Year (At Northwestern Memorial Hospital)

| First Semester | Hours | Second Semester | Hours |
|------------------------------|--------------|-------------------------------|--------------|
| Clinical Practicum I | 3 | Clinical Practicum II | 3 |
| Path/Sectional Anatomy | 2 | Treatment Planning | 2 |
| Radiation Safety/Protection | 2 | Quality Management | 2 |
| Principles/Practices of RT I | 3 | Radiation Therapy Physics | 2 |
| Med. Imaging/Processing | 2 | Principles/Practices of RT II | 3 |
| Mgmt/Meth. Patient Care I | 2 | Operational Issues in RT | 2 |
| Radiation Physics | 2 | Mgmt/Meth. Patient Care II | 2 |
| | | Radiation Biology | 2 |
| | | | |
| Total | 16 | | 18 |

This paradigm requires that students take 1 - 2 general education requirements during summer sessions.

Paradigm for B. S. in Diagnostic Medical Sonography/ Northwestern Memorial Hospital**First Year**

| First Semester | Hours | Second Semester | Hours |
|---------------------------|--------------|--------------------------|--------------|
| General Biology I & Lab | 5 | General Biology II & Lab | 5 |
| General Chemistry I & Lab | 5 | Gen Chemistry II & Lab | 5 |
| Calculus I | 4 | Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| Intro to College Exp. | 1 | | |
| | | | |
| Total | 18 | Total | 16 |

Summer Session (2 Gen Eds)**Second Year**

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|------------------------|--------------|
| Genetics & Lab | 5 | Microbiology & Lab | 5 |
| Organic Chem I & Lab | 5 | Organic Chem II & Lab | 5 |
| Gen Ed | 3 | Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | | |
| Total | 16 | Total | 16 |

Third Year

| First Semester | Hours | Second Semester | Hours |
|-----------------------|--------------|------------------------|--------------|
| Biochem I & Lab | 4 | Adv. Human A & P | 3 |
| Journal Club | 1 | Case Studies | 1 |
| Physics | 4 | Gen Ed | 3 |
| Physics Lab | 1 | Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| Gen Ed | 3 | Gen Ed | 3 |
| | | Research Methods | 2 |
| | | | |
| Total | 16 | | 18 |

Summer Session (At Northwestern Memorial Hospital)

| Course | Hours |
|----------------------------|--------------|
| Fundamentals of Sonography | 3 |

Fourth Year (At Northwestern Memorial Hospital)

| First Semester | Hours | Second Semester | Hours |
|--------------------------|--------------|-----------------------------|--------------|
| Mngmt & Mthds Pt. Care | 1 | Medical Terminology | 2 |
| Cellular Pathophysiology | 2 | Princ. Ultrasound Physics I | 3 |
| Abdml. Sonography & Lab | 4 | OB-GYN Pathology | 4 |
| Sectnl. Imaging Anatomy | 2 | Abdominal Pathology | 3 |
| OB-GYN Sono & Embryol | 3 | Clinical Education II | 3 |
| Clinical Education I | 2 | | |
| Total | 14 | Total | 15 |

Fifth Year

| First Semester | Hours |
|------------------------------|--------------|
| Princ. Ultrasound Physics II | 2 |
| Ultrasound Image Critique | 1 |
| Clinical Education III | 3 |
| Intro Ped & Vasc. Imaging | 1 |
| Specialty Sonography | 2 |
| Clinical Education IV | 4 |
| Registry Review | 2 |
| Total | 15 |

Paradigm for B.S. in Vascular Ultrasound Technology/Rush University Medical Center

First Year

| Fall Semester | Hours | Spring Semester | Hours |
|-------------------------|--------------|--------------------------|--------------|
| General Biology I / Lab | 5 | General Biology II & Lab | 5 |
| General Chemistry I/Lab | 5 | General Chemistry II/Lab | 5 |
| College Writing I | 3 | College Writing II | 3 |
| Calculus I | 4 | Human Communications | 3 |
| ICE | 1 | General Psychology | 3 |
| | | | |
| | | | |
| Total Hours | 18 | Total Hours | 19* |

Second Year

| Fall Semester | Hours | Spring Semester | Hours |
|----------------------|--------------|------------------------|--------------|
| Anatomy | 3 | Adv. Anatomy & Physio. | 3 |
| Physics I/Lab | 5 | Case Studies | 1 |
| Cultural Diversity | 3 | Biometry | 3 |
| Macroeconomics | 3 | Physics II/Lab | 5 |
| Mission/Humanities** | 3 | Ethics | 3 |
| | | Cult & Civ | 3 |
| | | | |
| Total Hours | 17 | Total Hours | 18 |

* Since 19 hours exceeds the hours allowed under block tuition, the student may either take course(s) (up to 3) at Lewis University in the summer session between the first and second year OR may pay for the extra hours during this semester.

** Mission/Humanities options are limited to Faith and the Arts OR The Bible as Literature. The student should be aware of when these courses become available to ensure that they are taken prior to matriculation to Rush University.

**Paradigm for a Bachelor of Science (B.S.) in Environmental Science – Ecology Track
FRESHMAN YEAR**

FALL

General Biology I (02-110), Lab (02-111)
General Chemistry I (03-110), Lab (03-111)
Calculus I (13-200)

SPRING

General Biology II (02-115), Lab (02-116)
General Chemistry II (03-115), Lab (03-116)

SOPHOMORE YEAR

FALL

Genetics (02-220), Lab (02-221)
Earth Science (02-222)
Fundamentals of Organic Chemistry (03-120)

SPRING

Microbiology (02-224), Lab (02-226)
Principles of Environmental Science (02-233)

JUNIOR YEAR

FALL

Issues of Environmental Science (02-375)
Ecology (02-315), Lab (02-316)

SPRING

Ecology Journal Club (02-383)
Ecology Elective
Ecology Elective

SENIOR YEAR

FALL

Biometry (02-320)
Field Biology (02-498)

SPRING

Research Methods in Ecology and
Environmental Science (02-498) – fall or
spring
Ecology Elective

Ecology Electives Include:

Introduction to Geographic Information Systems (02-260), Invertebrate Zoology (02-405), Conservation Biology (02-416) and lab (02-417), Limnology (02-419) and lab (02-419), Botany (02-421) and lab (02-421).

Notes:

In the event that FOUR YEARS of high school mathematics were NOT taken (including pre-calculus), **Math Analysis (13-120)** must be taken concurrently with **General Chemistry I (03-110)**. Similarly, if testing indicates the need to enroll in **The Sentence and Paragraph (06-102)**, or **The Essay (06-103)**, this class must be taken during the first semester.

Paradigm for a Bachelor of Science (B.S.) in Environmental Science – Chemistry Track

FRESHMAN YEAR

FALL

General Biology I (02-110), Lab (02-111)
 General Chemistry I (03-110), Lab (03-111)
 Mathematical Analysis (13-120)

SPRING

General Biology II (02-115), Lab (02-116)
 General Chemistry II (03-115), Lab (03-116)

SOPHOMORE YEAR

FALL

Earth Science (02-222)
 Fundamentals of Organic Chemistry (03-120)

SPRING

Principles of Environmental Science (02-233)

JUNIOR YEAR

FALL

Issues of Environmental Science (02-375)
 Analytical Chemistry I (03-320), Lab (03-321)

SPRING

Instrumental Analysis (03-325) and Lab (03-326)

SENIOR YEAR

FALL

Environmental Chemistry I (03-340)
 and Lab (03-341)
 Biometry (02-320)
 Research (03-450) – fall or spring

SPRING

Environmental Chemistry II (03-342)
 and Lab (03-343)

Notes:

If testing indicates the need to enroll in **The Sentence and Paragraph (06-102)**, or **The Essay (06-103)**, this class must be taken during the first semester.

Paradigm for a Bachelor of Arts (B.A.) in Environmental Science

FRESHMAN YEAR

FALL

General Biology I (02-110), Lab (02-111)
General Chemistry I (03-110), Lab (03-111)

SPRING

General Biology II (02-115), Lab (02-116)
General Chemistry II (03-115), Lab (03-116)

SOPHOMORE YEAR

FALL

Genetics (02-220), Lab (02-221)
Earth Science (02-222)

SPRING

Microbiology (02-224), Lab (02-226)
Principles of Environmental Science (02-233)

JUNIOR YEAR

FALL

Issues of Environmental Science (02-375)
Ecology (02-315), Lab (02-316)

SPRING

Ecology Elective

SENIOR YEAR

FALL

Research Methods in Ecology and
Environmental Science (02-498) – fall or spring
Field Biology (02-498)

SPRING

Ecology Elective
Ecology Elective

Ecology Electives Include:

Introduction to Geographic Information Systems (02-260), Invertebrate Zoology (02-405), Conservation Biology (02-416) and lab (02-417), Limnology (02-419) and lab (02-419), Botany (02-421) and lab (02-421).

Notes:

In the event that FOUR YEARS of high school mathematics were NOT taken (including pre-calculus), **Math Analysis (13-120)** must be taken concurrently with **General Chemistry I (03-110)**. Similarly, if testing indicates the need to enroll in **The Sentence and Paragraph (06-102)**, or **The Essay (06-103)**, this class must be taken during the first semester.