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### Biological Sciences

Biological Sciences is an appropriate major for students wishing to pursue a career in secondary-school biology education, a pre-professional human-health curriculum, or an interdisciplinary program in ecology. Students in the major must choose one of these specializations to complete their degree. The Biological Sciences major provides interdisciplinary training for specific career paths in the life sciences. The curriculum is drawn from the resources of four life-science disciplines (Microbiology, Physiology, Plant Biology, and Zoology), each of which has its own undergraduate degree.

Students with a major in Biological Sciences may not select one of the four life-science areas as a minor, and students electing to pursue a double major may not use more than 11 semester hours of biological sciences courses to satisfy the requirements for both majors. In addition to biological sciences courses, students are required to take courses in physical sciences and mathematics.

Students planning a major in Biological Sciences should consult with the Director of the School of Biological Sciences for program information and assignment to a program for faculty mentoring. Students cannot repeat a majors course or its equivalent in which a grade of B or better was earned, without consent of the Director of the School of Biological Sciences.

### Bachelor of Science (B.S.) Biological Sciences (School of Education)

#### Biology Education Specialization

This specialization prepares students for certification as secondary-school biology teachers. Course requirements match content areas specified by the Illinois State Board of Education for teacher licensure in science with a designation in biology. The degree is awarded by the School of Education, but is taught collaboratively between the School of Education and the School of Biological Sciences.

#### B.S. Biological Sciences - Biology Education Specialization Degree Requirements

Degree Requirements	Credit Hours
University Core Curriculum Requirements - To include MATH 109; BIOL 211-advanced UCC Group II Science; CHEM 200/201-advanced UCC Group I Science; PSYC 102-Social Science; EDUC 214-advanced UCC Social Science; EDUC 211-advanced UCC Multicultural; and PHIL 307I-UCC Humanities. <sup>1</sup>	39
Biological Sciences Major Requirements <sup>2</sup>	55-56
Life Science	
BIOL 211, BIOL 213 <sup>3</sup>	5 (+3)

Degree Requirements	Credit Hours
BIOL 304, BIOL 305, BIOL 306, BIOL 307	12
BIOL 202, PH 101, HND 101, KIN 101 or PHSL 201, PHSL 208 <sup>4</sup>	2 (+2)
MICR 301; or PLB 300; or ZOOL 220	4-5
Six hours of 400-level electives in BIOL, MICR, PHSL, PLB, or ZOOL	6
BIOL 485, MICR 495, PHSL 490, PLB 480, or ZOOL 482	1
Mathematics and Statistics	
MATH 109 <sup>5</sup>	(+3)
MATH 282 or PLB 360 or QUAN 402	3
Physical Science	
CHEM 200, CHEM 201, CHEM 202, CHEM 210, CHEM 211, CHEM 212 <sup>6</sup>	7 (+3)
GEOL 220 and GEOL 223, or GEOL 221 and GEOL 224, or GEOL 222 and GEOL 223	4
PHYS 103, PHYS 203A, PHYS 203B, PHYS 253A, PHYS 253B	11
Professional Education Sequence	
EDUC 360, EDUC 468	6
EDUC 301, EDUC 302, EDUC 303, EDUC 308, EDUC 313, EDUC 319, EDUC 401A	24
<b>Total</b>	<b>126-127</b>

<sup>1</sup> ENGL 101 and ENGL 102 with a grade of C or better are required for admission to the Teacher Education Program. PHIL 307I should be taken to satisfy three hours of the Humanities requirement of the University Core Curriculum.

<sup>2</sup> A minimum 2.75 grade point average in all Biological Sciences major courses is required.

<sup>3</sup> Satisfies the Life Science (Group II) requirement of the University Core Curriculum. BIOL 211, BIOL 212, and BIOL 213 with grades of C or better are required for admission to the Teacher Education Program.

<sup>4</sup> Satisfies the Human Health requirement of the University Core Curriculum.

<sup>5</sup> Satisfies the Mathematics requirement of the University Core Curriculum.

<sup>6</sup> Satisfies the Physical Science (Group I) requirement of the University Core Curriculum.

# Bachelor of Science (B.S.) Biological Sciences (School of Biological Sciences)

## Biomedical Science Specialization

Designed for Biological Sciences majors planning careers as biomedical researchers, chiropractors, dentists, medical doctors, optometrists, pharmacists, physical therapists, physician assistants, or podiatrists. Pre-professional students must register with the College of Agricultural, Life, and Physical Sciences Pre-Health Professions Advisement Office.

## B.S. Biological Sciences - Biomedical Science Specialization Degree Requirements

Degree Requirements	Credit Hours
University Core Curriculum Requirements	39
Biological Sciences Major Requirements	70-72
BIOL 211, BIOL 212, BIOL 213 <sup>1</sup>	9 (+3)
BIOL 305, BIOL 306, BIOL 409 <sup>2</sup>	9
CHEM 200, CHEM 201, CHEM 202, CHEM 210, CHEM 211, CHEM 212, CHEM 340, CHEM 341 <sup>3</sup>	12(+3)
CHEM 442 and CHEM 443, or CHEM 350 and CHEM 351	5
MATH 108 and MATH 109, or MATH 111 or MATH 141 or MATH 150 <sup>4</sup>	1-3(+3)
MATH 282 or QUAN 402 or PLB 360	3
MICR 301, MICR 302 <sup>5</sup>	7
BIOL 485 or MICR 495 or PHSL 490 or PLB 480 or ZOO 482	1
PHSL 310	3(+2)
PHYS 203A, PHYS 203B, PHYS 253A, PHYS 253B	8
Twelve hours of life science electives chosen from the following: BIOL 304, MICR 403, MICR 421, MICR 425, MICR 441, MICR 453, MICR 460, MICR 470, MICR 477, MICR 480, MICR 481; PHSL 301, PHSL 320, PHSL 401A, PHSL 401B, PHSL 410A, PHSL 410B, PHSL 430, PHSL 433, PHSL 450, PHSL 462, PHSL 470, PHSL 492; PLB 317, PLB 419, PLB 425, PLB 427, PLB 438, PLB 471, PLB	12

Degree Requirements	Credit Hours
475; ZOOL 407, ZOOL 426, ZOOL 432, ZOOL 433, ZOOL 438, ZOOL 472	
Additional School of Biological Sciences Academic Requirements:	
Supportive Skills: CS 105 or CS 200B or CS 201 or CS 202; ENGL 290 or ENGL 291 or ENGL 391; or any two-semester sequence of a foreign language. <sup>6</sup>	6
Electives <sup>7</sup>	3-5
Total	120

<sup>1</sup> Students must have a grade point average of 2.0 or better in these biological science requirements. Satisfies the three-hour University Core Curriculum Group II Science requirement.

<sup>2</sup> Students must have a grade point average of 2.0 or better in these biological science requirements.

<sup>3</sup> Satisfies the three-hour University Core Curriculum Group I Science requirement.

<sup>4</sup> Satisfies the three-hour University Core Curriculum Mathematics requirement. Students should consult with the Pre-Health Professions Advisement Office about additional mathematics recommendations for particular programs.

<sup>5</sup> Students must have a grade point average of 2.0 or better in these biological science requirements.

<sup>6</sup> Supportive skills courses are not required for students with three years of foreign language in high school, but computer science and technical writing courses are recommended.

<sup>7</sup> Students are strongly encouraged to obtain research experience under the supervision of a faculty mentor. To prepare for an undergraduate research project, students should consider enrolling in UNIV 301A. Credit for research experience can be obtained by enrolling in MICR 490, PHSL 492, PLB 493A-C, or ZOOL 492.

## Ecology Specialization

Ecology is an important topic for students wishing to pursue careers in any aspect of the natural sciences, including environmental science, ecosystem management, teaching, and basic research. The track in ecology is also appropriate for students planning to pursue graduate studies in the natural sciences. Students pursuing the Ecology track can specialize in Environmental Studies by selecting the corresponding minor.

## B.S. Biological Sciences - Ecology Specialization Degree Requirements

Degree Requirements	Credit Hours
University Core Curriculum Requirements	39
Biological Sciences Major Requirements	72
BIOL 211, BIOL 212, BIOL 213 <sup>1</sup>	9 (+3)

Degree Requirements	Credit Hours
BIOL 304, BIOL 305, BIOL 307 <sup>2</sup>	9
CHEM 200, CHEM 201, CHEM 202, CHEM 210, CHEM 211, CHEM 212, CHEM 340, CHEM 341, CHEM 350 <sup>3</sup>	15(+3)
MATH 141 <sup>4</sup>	1(+3)
MATH 282 or PLB 360 or QUAN 402	3
MICR 301 <sup>5</sup>	4
PHSL 310	3(+2)
PHYS 203A and PHYS 253A, or PHYS 205A and PHYS 255A	4
PLB 300	4
ZOOL 220	5
Life Science electives: At least seven hours of Microbiology, Plant Biology or Zoology 400-level courses, including one of: MICR 423, MICR 454, MICR 470, MICR 477; PHSL 433; PLB 416, PLB 435, PLB 440, PLB 443, PLB 444, PLB 445, PLB 451, PLB 452; ZOOL 410, ZOOL 411, ZOOL 415, ZOOL 435, ZOOL 440, ZOOL 443, ZOOL 444, ZOOL 445, ZOOL 458, ZOOL 468, ZOOL 469, ZOOL 471, ZOOL 490	7
Ecology electives: at least five credits chosen from the following (including at least one lab course): ANTH 410K; FOR 331, FOR 402, FOR 406, FOR 415, FOR 452, FOR 454A-D; GEOG 439; GEOL 425, GEOL 428; PLB 351; CSEM 240, CSEM 370, CSEM 441; ZOOL 351	5
MICR 490 or PLB 492 or PLB 493A or ZOOL 491 or ZOOL 492 or ZOOL 493 or ZOOL 496 or ZOOL 497	3
Additional School of Biological Sciences Academic Requirements:	
Supportive Skills: at least six credit hours chosen from CS 105 or CS 200B or CS 201 or CS 202; ENGL 290, ENGL 291 or ENGL 391; or any two semester sequence of a foreign language <sup>6</sup>	6
Electives	3
Total	120

<sup>1</sup> Students must have a grade point average of 2.0 or better in these requirements for biological sciences. Satisfies the three-hour University Core Curriculum Group II Science requirement.

<sup>2</sup> Satisfies the three-hour University Core Curriculum Group II Science requirement.

<sup>3</sup> Satisfies the three-hour University Core Curriculum Group I Science requirement.

<sup>4</sup> Satisfies the three-hour University Core Curriculum Mathematics requirement.

<sup>5</sup> Students must have a grade point average of 2.0 or better in these requirements for biological sciences.

<sup>6</sup> The supportive skills requirement may also be met by one of the following: (a) completing three years of one language in high school with a grade of C or better; or (b) earning eight credit hours of 100-level course in one language by proficiency examination.

## Biological Sciences Minor

A minor in Biological Sciences consists of a minimum of 21 credit hours and must include BIOL 211, BIOL 212, BIOL 213 (12 credit hours), and nine credit hours of BIOL 304, BIOL 305, BIOL 306, BIOL 307, BIOL 409 or BIOL 415. A student with a major in one of the four life sciences may not take a minor in Biological Sciences. Program must approve all minors.

## Technology Fee

The College of Agricultural, Life, and Physical Sciences assesses undergraduate majors a technology fee of \$4.58 per credit hour up to 12 credit hours. The fee is charged Fall and Spring semester.

## Biological Sciences Courses

**BIOL202 - Human Genetics and Human Health** (University Core Curriculum) Acquaints the student with the role played by genetic information in human development and disease. Discussion topics will include genetics and human diversity, the interaction of genetic information and the environment, the concept of genetic disease, the mechanisms and ethics of gene therapy, and the possibilities of manipulating the genetic material. Credit Hours: 2

**BIOL211 - Introductory Cell Biology and Genetics** [IAI Course: BIO 910] (University Core Curriculum course) Introductory biology for life science majors covering core topics in biological chemistry, cell structure and function, genetics, and development. Two lectures, one workshop, and one laboratory per week. Restricted to majors in Animal Science, Biological Sciences, Biomedical Engineering, Chemistry, Fermentation Science, Forestry, Microbiology, Physiology, Plant Biology, Zoology, pre-health. Lab/workshop fee: \$55. Credit Hours: 4. Credit Hours: 4

**BIOL212 - Introductory Evolution and Ecology** [IAI Course: BIO 910] (University Core Curriculum course) Introductory biology for life science majors covering foundational topics in evolutionary patterns and processes, biological diversity, and ecology. Two lectures, one workshop, and one laboratory per week. Restricted to majors in Animal Science, Biological Sciences, Chemistry, Fermentation Science, Forestry, Microbiology, Physiology, Plant Biology, Zoology, pre-health. Lab/workshop fee: \$55. Credit Hours: 4. Credit Hours: 4

**BIOL213 - Introductory Organismal Form and Function** [IAI Course: BIO 910] (University Core Curriculum course) Introductory biology for life science majors covering foundational topics in plant and animal anatomy and physiology. Two lectures, one workshop, and one laboratory per week. Restricted to majors in Animal Science, Biological Sciences, Chemistry, Forestry, Microbiology, Physiology, Plant Biology, Zoology, pre-dentistry, pre-medicine, pre-optometry, pre-physician assistant, pre-physical therapy, pre-podiatry, pre-veterinary medicine. Lab/workshop fee: \$55. Credit Hours: 4

**BIOL304 - Evolution** An introductory survey of evolutionary biology emphasizing basic principles, including historical development of evolutionary theory, the genetic mechanisms of evolution, the processes of adaptation and diversification, and the origin and history of major groups of organisms.

Prerequisites: BIOL 200A and BIOL 200B; or BIOL 211 and BIOL 212 with grades of C- or better. Credit Hours: 3

**BIOL305 - Principles of Genetics** Principles of genetics including Mendelism, chromosome behavior, genetic mapping, mutation and allelism, replication, transcription, translation, gene function and regulation, polygenic systems, population genetics and evolution, and genetic applications. Prerequisite: BIOL 200A or BIOL 211; BIOL 200B or BIOL 212 or BIOL 213; CHEM 140A or CHEM 200 or CHEM 200H and CHEM 201; with grades of C- or better. Credit Hours: 3

**BIOL306 - Cell Biology** The basic functions of the cell are considered. The biochemical basis and mechanisms of cellular processes, functions of the subcellular structures, and their ramifications will be explored in the context of plant and animal cells. Prerequisites: BIOL 200A or BIOL 211; BIOL 200B or BIOL 212 or BIOL 213; CHEM 140A or CHEM 200 and CHEM 201; with grades of C- or better. Credit Hours: 3

**BIOL307 - Principles of Ecology** Introduction to the study of interactions between organisms and their environment at the organismal, population, community, and ecosystem levels. Includes discussion of global ecology, biodiversity, and conservation. Prerequisites: BIOL 200A and BIOL 200B, or BIOL 212 and BIOL 213, or PLB 200; CHEM 140A or CHEM 200, and CHEM 201; MATH 106 or 108; with grade of C- or better. Credit Hours: 3

**BIOL409 - Developmental Biology** Basic principles and processes of embryonic development including contemporary research on molecular, cellular and genetic mechanisms of differentiation and morphogenesis; selected plants and invertebrate and vertebrate animals will be considered. Prerequisite: BIOL 305 with a grade of C- or better. Credit Hours: 3

**BIOL415 - History of Biology** An historical overview of the development of biological knowledge. Prerequisites: BIOL 200A and BIOL 200B, or BIOL 211 and BIOL 212, or BIOL 211 and BIOL 213, or BIOL 212 and BIOL 213 with grades of C- or better. Credit Hours: 2

**BIOL434 - Environmental Physiology** Physiological adaptations to environmental conditions in animals and humans. Lab/lecture course explores molecular, hormonal, immunological, developmental, and phenotypic processes mediating responses to factors such as stress, temperature, disease, contaminants, nutrition, and life history trade-offs. Prerequisite: BIOL 307 or PHSL 310 or ZOOL 433 with a grade of C- or better. Credit Hours: 3

**BIOL450 - Biomedical Genetics** The basic principles of human genetics, from detailed treatment of DNA structure and function to an overview of the human genome and cancer genetics will be covered with emphasis on implications to medical practice. Other major topics include genetic variation, patterns of inheritance, the human genome, genetic screening and risk assessment, and treatment of genetic disorders. Prerequisite: BIOL 305 with a grade of C- or better. Credit Hours: 3

**BIOL460 - Study Abroad: Biology, Culture, & History of the Yucatan, MX** Course Period: Intersession Study Abroad Course, 9 days (Approx. last two weeks of May). Objective: The objectives of this faculty-led global seminar are to explore the biology, culture, and history of the Yucatan Peninsula of Mexico. Biological exploration will include snorkeling tours of near shore reef diversity, and on land tours of reptile and avian diversity. Exploration of the culture and history of the Yucatan will include tours of Mayan ruins, regional markets, and culinary tours. Credit Hours: 3

**BIOL485 - Senior Seminar in Biology** Readings, writings, presentations, and discussions of current topics in biological science. One hour per week. Not for graduate credit. Restricted to senior standing in Biological Sciences. Credit Hours: 1. Credit Hours: 1

**BIOL491 - Internship in Biology** Supervised training in a formalized program with an institution or agency that conducts biology research or related work. May not be used for minor in Biological Sciences. For internships outside the School of Biological Sciences (SBS), a prospectus from the sponsoring agency with duties and duration of internship must be approved by a SBS faculty supervisor and the Director of Undergraduate Studies before registration. No more than three hours per semester may be taken if student is on-campus. Mandatory Pass/Fail. Not for graduate credit. Prerequisite: BIOL 304 or BIOL 305 or BIOL 306 or BIOL 307 with a grade of C- or better and School approval. Specific internships

have specific selection criteria. Of all credits that a student completes for BIOL 491, 492, and 492H, a maximum of three hours may count toward the major. Credit Hours: 1-3

**BIOL492 - Individual Research in Biology** Supervised individual research in biological sciences. May not be used for a minor in Biological Sciences. Some costs may be borne by student. A proposal describing the research project must be approved by a School of Biological Sciences faculty supervisor and the Director of Undergraduate Studies before registration. Not for graduate credit. Prerequisite: BIOL 304 or BIOL 305 or BIOL 306 or BIOL 307 with a grade of C- or better, and minimum of 2.75 GPA (A=4.0). Of all credits that a student completes for BIOL 491, 492, and 492H, a maximum of three hours may be counted toward the major. Restricted to junior or senior standing. Special approval needed from the School. Credit Hours: 1-3. Credit Hours: 1-3

**BIOL492H - Honors Research in Biology** Supervised individual research in biological sciences. May not be used for minor in Biological Sciences. A proposal describing the research project must be approved by a School of Biological Sciences faculty supervisor and the Director of Undergraduate Studies before registration. Not for graduate credit. Prerequisite: BIOL 304 or BIOL 305 or BIOL 306 or BIOL 307 with a grade of C- or better, and minimum 3.0 cumulative GPA (A=4.00), participation in the University Honors Program, and approval from the School. Of all credits that a student completes for BIOL 491, 492, and 492H, a maximum of three hours may count toward the major. Restricted to junior or senior standing. Credit Hours: 1-3. Credit Hours: 1-3

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