
60 / Art, Biology

Art 321 (F and/or S) 3 hrs. cr.
Advanced Sculpture
Extension of Beginning Sculpture with introduction to the lost wax technique of casting bronze sculpture. Each student is permitted to cast one piece per semester. Six studio hours per week. Lab fee required. May be repeated for a total of 6 credit hours Prerequisite: Art 211.

Art 322 (F and/or S) 3 hrs. cr.
Advanced Sculpture
Continuation of Art 321. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours

Art 325 (F) 3 hrs. cr.
Graphic Communications I
Introduction to commercial art with an emphasis on the recognition, duplication, function and aesthetic use of typography/pictorial images as a visual language. Includes lettering, layout and type/image relationships. Six studio hours per week. Lab fee required. Prerequisite: Art 101, Art 105 Art 130, Art 215, Art 315, and Art 240.

Art 330 (F and/or S) 3 hrs. cr.
Advanced Jewelry Design/Metalsmithing
Exploration of advanced methods and techniques of complex forms for jewelry and metalsmithing design. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours Prerequisite: Art 205 or approval of instructor.

Art 350 (S) 3 hrs. cr.
Graphic Communications II
Continued study of Graphic Communications I with an emphasis on the design and preparation of two-dimensional projects for printing and/or video reproduction. Includes an introduction to the development of an individual portfolio. Six studio hours per week. Lab fee required. Prerequisite: Art 325.

Art 401 (F and/or S) 3 hrs. cr.
Advanced Painting
Students select an individual problem for self-development using a variety of media. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours. Prerequisite: Art 232.

Art 407 (F and/or S) 3 hrs. cr.
Advanced Ceramics
Advanced methods, techniques and procedures of pottery making and design in clay. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours. Prerequisite: Art 120 or approval of instructor.

Art 420 (F and/or S) 3 hrs. cr.
Special Projects in Art I
Advanced studio survey selected by the student in a particular area of art. Students attend a regularly scheduled course of related content but complete an independent special project approved by the instructor. Requirements: (1) an exhibit of the special project two weeks before the end of the semester and (2) a formal paper documenting the special project(s). Prerequisite: Completion of 2 advanced courses in the same area of concentration and approval of instructor and department head. Lab fee required. May be repeated for a total of 6 credit hours.

Art 421 (F and/or S) 3 hrs. cr.
Life Drawing
Drawing and/or painting the human figure with emphasis on anatomy, structure and form. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours. Prerequisites: Art 101, Art 105 and Art 130.

Art 425 (F) 3 hrs. cr.
Graphic Communications III
Continued study of Graphic Communications II with an emphasis on the design and preparation of two and three-dimensional projects for printing and/or video reproduction. Includes an introduction to computer-aided graphic techniques and equipment. Six studio hours per week. Lab fee required. Prerequisite: Art 350.

Art 430 (F and/or S) 3 hrs. cr.
Advanced Printmaking
Stencils (silkscreen), lithographic, advanced intaglio, relief, and monoprint processes. Advanced studio methods for color registration and mixed media procedures. Emphasis on design, drawing concept, technical proficiency, and presentation. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours. Prerequisite: Art 312 or approval of instructor.

Art 440 (F and/or S) 3 hrs. cr.
Special Projects in Art II
Same as Art 420. May be repeated for a total six credit hours. Lab fee may be required.

Art 450 (S) 3 hrs. cr.
Graphic Communications IV
Advance study of graphic design layout, production, and/or video reproduction. Includes advanced projects with computer-aided graphic techniques and equipment. Completion of an individual portfolio is required. Six studio hours per week. Lab fee required. May be repeated for a total of six credit hours. Prerequisite: Art 425.

Art 475 (Demand) 1-8 hrs. cr.
Graphic Communications Internship
An off-campus work experience in a professional setting for advanced art majors with a graphic communications emphasis. All internships must conform to institutional policy regarding the number of hours per credit and with contractual agreements involving the cooperating organization. Prerequisite: six hours of graphic communications, junior standing or above, and approval of departmental committee.

Art 490 (F) 2 hrs. cr.
Senior Exhibit
Prepares senior art majors for their exhibit which is normally scheduled during spring in the Spiva Art Gallery. One hr. lecture, two hours of studio per week. Prerequisite: Senior standing and permission of the Junior Review Committee.

Art 498 1-3 hrs. cr.
Special Topics in Art
For upper division Art majors or related majors. Topics and methods of current interest not included in other courses. Enrollment by permission of instructor or department head. Prerequisites to be determined by Art Department.

Art 499 (F and/or S) 1-3 hrs. cr.
Independent Study
An in-depth study of some specialized topic or project not considered in the art department course offerings. An adviser from the art faculty will structure the independent study with the approval of the department head. Prerequisite: At least 90 hours completed and an overall cumulative GPA of 3.0 or higher. Enrollment must be approved by the department head and school dean.

BIOLOGY

Reynolds Hall 210, 417.625.9376

Faculty Wells - Head, Bay, Black, Fletcher, Heth, Jackson, Kennedy, Lawson, Lemmons, Plucinski, Roettger, Schlink

A Bachelor of Science in Biology will prepare students for diverse career options. Biology majors will enter fields such as biotechnology and bioinformatics, ecology and conservation biology, basic research, as well as health related professional careers in medicine, dentistry, optometry, veterinary medicine, pharmacy, and physical therapy.

Students interested in education may pursue the Bachelor of Science in Education with a major in unified science, biology endorsement. Completion of this program qualifies you to teach introductory level courses in biology, chemistry, earth science and physics, and to teach advanced courses in biology at the secondary level.

Internships are encouraged for biology majors. These internships allow the students to gain practical experience in a work or research setting. Students work under the joint supervision of a faculty member and a representative of the institute providing the intern experience.

Bachelor of Science with a Major in Biology

(Major Codes 0401-0409)

	Semester Hours
Core Requirements (p. 32) 51*	39
Biology Requirements	40
Bio 112 General Botany	4
Bio 122 General Zoology	4
Bio 210 Molecular Biology (WI).....	4
Bio 231 General & Medical Microbiology.....	5
Bio 305 Genetics (WI).....	4
Bio 402 General Ecology (WI)	
OR	
Bio 481 Aquatic Ecology (WI).....	4
Bio Electives (200 level or higher)	15
Supporting Requirements.	25
Math 140 Algebra & Trig (<i>Math 130 + Math 135 = Math 140</i>)	
OR	
Math 150 Calculus with Analytic Geometry I	5
Chem 101 General Chemistry I.....	5
Chem 102 General Chemistry II	5
Chem 301 Organic Chemistry I.....	5
Phys 151 Elementary College Physics I.....	5
Electives	20
	124**

*Required courses in biology, chemistry, mathematics and physics satisfy major requirements and 12 hours of the Core Curriculum.

**Must include at least 40 upper division (300 - 400 level) hrs. Although not required for the B.S. in Biology, some students may need additional courses to meet admission requirements for professional or graduate school. Students should contact their adviser and prospective professional or graduate school for information regarding the specific courses required.

Bachelor of Science in Biology and Computer Information Science

Bioinformatics Option

(Major Code 0410)

	Semester Hours
Core Requirements (p. 32) 51*	39
Biology Core	33
Bio 101 General Biology	4
Bio 210 Molecular Biology (WI).....	4
Bio 231 General & Medical Microbiology.....	5

Bio 305 Genetics (WI).....	4
Bio 405 Bioinformatics	3
Bio Upper Division Electives**	13
CIS Core	33
CIS 110 Programming I.....	3
CIS 210 Programming II	3
CIS 302 Information System I	3
CIS 310 Database Management System I.....	3
CIS 315 Computer Networks	3
CIS 345 UNIX System Administration	3
CIS 350 Data Structures	3
CIS 410 Information System II (WI)	3
CIS 425 Database Management II (WI)	3
CIS 435 Data Mining	3
CIS 450 Operating Systems (WI).....	3
Supporting Requirements.	18
Bio 290 Research/Statistical Methods (WI)	3
Chem 100 Introductory Chemistry.....	5
Math 140 Algebra and Trigonometry	5
Phys 151 Elementary College Physics I.....	5
Electives	1
	124

*Required courses in biology, chemistry, mathematics, and physics satisfy major requirements and 12 hours of the Core Curriculum.

**Chose from the following courses: Bio 301, Bio 304, Bio 308, Bio 350, Bio 362, Bio 364, Bio 371, Bio 431, Bio 440, Bio 442, Bio 450, Bio 456, and Bio 499.

Only computer information science courses in which a student has earned a grade of "C" or above can be used to satisfy departmental requirements.

Bachelor of Science in Education with a Major in Unified Science, Biology Endorsement

(Major Code 9037)

	Semester Hours
Core Requirements (p. 32)	36
Educ 301 Use of Computer Software in the Classroom	3
Biology Requirements	35-38
Required Biology Courses	12
Bio 121 Anatomy & Physiology I.....	4
Bio 112 General Botany	4
Bio 122 General Zoology	4
Microbiology, Genetics, Cell Biology & Biochem., and Evolution	16-18
Bio 305 Genetics	4
Bio 210 Molecular Biology (4)	
OR	
Bio 364 Cellular Biology (3)	3-4
Bio 231 General and Medical Microbiology	5
Bio 221 Human Anatomy and Physiology II (5)	
OR	
Bio 301 Human Physiology (4)	
OR	
Bio 331 Comparative Vertebrate Anatomy (5).....	4-5

62 / Biology

Botany - select one:	3-4
Bio 316 Economic Botany (3)	
Bio 322 Taxonomy of Flowering Plants (4)	
Bio 371 Plant Physiology (4)	
Bio 440 Plant Pathology (4)	
Ecology - select one:	4
Bio 312 Environmental Biology (4)	
Bio 402 General Ecology (4)	
Bio 481 Aquatic Ecology (4)	
Supporting Requirements.	35
Phil 420 Philosophy of Science	
OR	
Approved Substitute	3
Math 140 Algebra and Trigonometry	5
(Math 130 + Math 135 = Math 140)	
Chem 101 General Chemistry I	5
Chem 102 General Chemistry II	5
Phys 151 Elementary College Physics I	5
Phys 152 Elementary College Physics II	4
Geol 110 Introduction to Geology	5
Geol 180 Introduction to Meteorology	3
Education Requirements (p. 189)	40-42
	149-154

*Required courses in biology, chemistry, mathematics, physics and psychology satisfy major requirements and 15 hrs. of the Core Curriculum.

Bachelor of Science in Education with a Biology Certification

(Major Code 9041)

	Semester Hours
Core Requirements (p. 32)	36
Educ 301 Use of Computer Software in the Classroom	3
Biology Requirements	33-34
Animal Form and Function	13
Bio 121 Anatomy & Physiology I	4
Bio 221 Anatomy & Physiology II	5
Bio 122 General Zoology	4
Plant Form and Function	4
Bio 112 General Botany	
Cell Biology, Genetics, Evolution	12-13
Bio 210 Molecular Biology (4)	
OR	
Bio 364 Cell Biology (3)	3-4
Bio 231 General and Medical Microbiology	5
Bio 305 Genetics	4
Biology Elective – Environmental/Earth Science: select one.	4
Bio 312 Environmental Biology (4)	
Bio 402 General Ecology (4)	
Bio 481 Aquatic Ecology (4)	
Supporting Requirements.	23
Phil 420 Philosophy of Science	
OR	
Approved Substitute	3
Math 140 Algebra and Trig	5
(Math 130 + Math 135 = Math 140)	
Chem 101 General Chemistry I	5

Chem 102 General Chemistry II	5
Phys 151 Elem College Physics I	5
Phys 152 Elem College Physics II	4
Education Requirements (p. 189)	40-42
	136-138

*Required courses in biology, chemistry, mathematics, physics and psychology satisfy major requirements and 15 hrs. of the Core Curriculum.

Minor in Biology

Requires a minimum of 20 biology credit hours. At least six semester hours must be upper division (300-400 level) and at least 12 semester hours must be 200 level or above. Courses must be chosen in consultation with an academic adviser from the Department of Biology.

Suggested Order of Study

Bachelor of Science

Major codes 401, 408, 409;
Pre-professional students (Major Codes 402-407) should see their adviser for specific courses required for graduate or professional school.

Biology Major

Freshman Year

1st Semester	Course	Hours
Bio 122	General Zoology	4
Math 140	Algebra and Trig	5
CORE	[Eng 101 Comp I]	3
CORE	[Humanities and Fine Arts]	3
Psy 120	College Orientation	1
		16

2nd Semester

Chem 101	General Chemistry I	5
Bio 112	General Botany	4
CORE	[Eng 102 Comp II]	3
CORE	[Comm 100 Oral Comm]	3
CORE	[Kine 101 Physical Activity]	1
		16

Sophomore Year

1st Semester	Course	Hours
Bio 231	General & Medical Microbiology	5
Chem 102	General Chemistry II	5
CORE	[Kine 103 Lifetime Wellness]	2
CORE	[PSc 120 Gov't:US/Sta/Loc]	3
		15

2nd Semester

Bio 210	Molecular Biology	4
Chem 301	Organic Chemistry I	5
Bio	Biology Elective	4
CORE	[International Cultural Studies]	3
		16

Junior Year

1st Semester	Course	Hours
Bio 305	Genetics	4
Bio	Biology Elective	3-5
Phys 151	Elementary College Physics I	5
CORE	[Humanities and Fine Arts]	3
		15-17

2nd Semester			
Bio	Biology Elective	8-9	
CORE	[Humanities and Fine Arts]	3	
CORE	[Hist 110 U.S. History]	3	
		14-15	

Senior Year			
1st Semester			
CORE	[Hist 120 U.S. History]	3	
CORE	[Behavioral Science]	3	
Electives		9	
		15	

2nd Semester			
Bio	Upper Division Ecology	4	
CORE	[Econ 180 Am Econ Sys]	3	
Electives		8-9	
		15-16	

[Department Recommendations] -not necessarily in this order

CORE	[Comm 100 Oral Comm]	3
CORE	[Econ 180 Amer Econ Sys]	3
CORE	[PSc 120 Govt:US/St/Loc]	3
		16

Senior Year			
1st Semester			
CIS 435	Data Mining	3	
CIS 450	Operating Systems (WI)	3	
Bio	Upper Division Elective	4	
CORE	[Hist 120 US History]	3	
CORE	[Area 5A International]	3	
		16	

2nd Semester			
CIS 425	Database Management Systems II (WI)	3	
Bio 405	Bioinformatics	3	
Bio	Upper Division Elective	1	
CORE	[Area 2B Literature]	3	
CORE	[Psy 100 Gen Psychology]	3	
		13	

**Bachelor of Science in Biology and
Bachelor of Science in CIS –
Bioinformatics Option**
Major Code 410

Freshman Year

1st Semester			
Course		Hours	
CIS 110	Programming I	3	
Math 140	College Algebra & Trigonometry	5	
Bio 101	General Biology	4	
CORE	[Eng 101 Eng Comp I (WI)]	3	
Psy 120	College Orientation	1	
		16	

2nd Semester			
CIS 210	Programming II	3	
Bio 231	General & Medical Microbiology	5	
Chem 100	Introductory Chemistry	5	
CORE	[Eng 102 Eng Comp II (WI)]	3	
		16	

Sophomore Year

1st Semester			
CIS 310	Database Management Systems I	3	
Bio 210	Molecular Biology (WI)	4	
Phys 151	Elementary College Physics	5	
CORE	[Kine 103 Lifetime Wellness]	2	
CORE	[Kine 101 Physical Activity]	1	
		15	

2nd Semester			
CIS 302	Information Systems I	3	
CIS 350	Data Structures	3	
Bio 305	Genetics (WI)	4	
CORE	[Hist 110 US History]	3	
CORE	[Area 2A Fine Art]	3	
		16	

Junior Year

1st Semester			
CIS 345	UNIX System Admin	3	
CIS 410	Information Systems II (WI)	3	
Bio 290	Resch/Statistics in Biology	3	
Bio	Upper Division Elective	4	
CORE	[Area 2C Lit/Humanity]	3	
		16	

2nd Semester			
CIS 315	Computer Networks	3	
Bio	Upper Division Elective	4	

Bachelor of Science in Education
Major Code 9037
Unified Science with Biology Endorsement

Freshman Year

1st Semester			
Course		Hours	
Bio 121	Anatomy & Physiology I	4	
CORE	[Eng 101 Comp I]	3	
Math 140	Algebra & Trigonometry	5	
Psy 100	General Psychology	3	
Psy 120	College Orientation	1	
		16	

2nd Semester			
Bio 122	General Zoology	4	
Bio 221	Anatomy & Physiology II	5	
CORE	[Humanities and Fine Arts]	3	
Chem 101	General Chemistry I	5	
		17	

Summer Semester

CORE	[Humanities & Fine Arts]	3
CORE	[Eng 102 Comp II]	3
		6

Sophomore Year

1st Semester			
<i>Take C-Base Test.</i>			
Bio 112	General Botany	4	
Chem 102	General Chemistry II	5	
CORE	[Kine 101 Physical Activity]	1	
Geol 180	Introduction to Meteorology	3	
Psy 301	Adolescent Psychology	3	
		16	

2nd Semester			
<i>Apply for admission to teacher education.</i>			
Bio 231	General & Medical Microbiology	5	
Bio 305	Genetics	4	
Educ 301	Computer Software	3	
Educ 302	[Psy 302] The Exceptional Child	2	
CORE	[Hist 110 U.S. 1877-Present]	3	
		17	

Summer Semester			
CORE	[Humanities and Fine Arts]	3	
CORE	[Comm100 Oral Comm]	3	
		6	

64 / Biology

Junior Year

1st Semester

Pass Media Competencies.

Educ 329	Ped Theory, Methods & Practices	4
Educ 321	Microteaching	2
Educ 423	Classroom Management	2
CORE	[Kine 103 Lifetime Wellness]	2
Psy 310	Education Psychology	2
Phil 402	Philosophy of Science	
OR		
Approved Substitute		3
Phys 152	Elementary College Physics II	4
		19

2nd Semester

Bio	Ecology Elective	4
Bio 210	Molecular Biology	4
Bio	Botany Elective	3-4
Educ 422	Content Area Lit: Secondary	2
CORE	[Econ 180 Amer Econ System]	3
		16-17

Summer Semester

CORE	[Hist 320 U.S.1877-Present]	3
		3

Senior Year

1st Semester

Apply for student teaching. All course work must be completed except for Professional Semester courses.

Phys 151	Elementary College Physics I	5
CORE	[PSc 120 Gov't:US/Sta/Loc]	3
Geo 110	Introductory to Geology	5
CORE	[International Cultural Studies]	3
		16

2nd Semester

Educ 333	Teaching Science in Sec Sch	3
Educ 402	Foundations of Education	2
Educ 432	Critical Issues	2
<u>Select One:</u>		
Educ 412	Individual Curriculum Development (2)	
OR		
Educ 420	Introduction to Counseling (3)	
OR		
Psy 412	Measurements & Evaluations (2)	2-3
Educ 462	Student Teaching in Sec School	8
		17-18

[Department Recommendations] -not necessarily in this order

For additional information contact:

Dr. Scott Wells
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Phone: 417.625.9510
Email: wells-s@mssu.edu

ment and possible outcomes of these interactions. Three lectures, one two-hour lab per week. Fulfills Core Curriculum requirement in Area 3, Section A. Not for biology majors.

Bio 112 (F, S) 4 hrs. cr.

General Botany

The unifying principles of living organisms from cell structure and function to interactions within ecosystems are presented with an emphasis on photosynthetic organisms. These concepts are studied by examining the diversity of the plants, algae, and fungi found world-wide in terms of habit, habitat, morphology, anatomy, physiology, terminology, evolution, and classification. Three lectures, one three-hour lab per week.

Bio 121 (F, S) 4 hrs. cr.

Human Anatomy and Physiology I

The first in a two-course sequence in which human anatomy and physiology are studied using a body system approach. Includes the concept of scientific inquiry and the fundamental concepts of cell biology, cell metabolism, and genetics. Three lectures and one, two-hour lab per week. Fulfills the Core Curriculum requirements in Area 3, Section A for certain Allied Health, Environmental Health, Kinesiology, and Nursing majors.

Bio 122 (F, S) 4 hrs. cr.

General Zoology

The unifying principles of living organisms from single cells to interactions within communities and ecosystems are presented with emphasis on animals. Speciation, diversity, morphology, physiology, taxonomy, and conservation of all major animal phyla are examined. Three lectures, one three-hour lab per week.

Bio 201 (F,S) 4 hrs. cr.

Human Anatomy

A general treatment of human anatomy from the tissue through the organ system levels of organization. The lecture provides the conceptual and organizational framework for laboratory, which utilizes microscopy, dissection, anatomical models, and anatomical software. Three hours of lecture, one three-hour lab per week. Credit toward the biology major granted for one anatomy course: Bio 201 or 331. Prerequisite: Bio 101 or 122.

Bio 210 (F, S) 4 hrs. cr.

Molecular Biology

(Writing Intensive)

Physiological characteristics and function at the molecular levels of both plant and animal cells. Three lectures, one two-hour lab per week. Prerequisites: Bio 112 or 122 and Chem 102.

Bio 221 (F, S) 5 hrs. cr.

Human Anatomy and Physiology II

A continuation of Bio 121 – Anatomy and Physiology I. A systems approach will be used to emphasize the interrelationships between form and function at the gross and microscopic levels of human organization. Three lectures and two, two-hour labs per week. Prerequisite: Bio 121.

Bio 231 (F, S) 5 hrs. cr.

General and Medical Microbiology

Structure and function of microorganisms. Topics include general principles of microbiology, immunology, and identification of microorganisms. Three lectures, two two-hour labs per week. Prerequisites: Bio 112/122 (or Bio 121). Chem 100 or 101 strongly recommended.

Bio 240 (S) 3 hrs. cr.

Radiation Biology

Survey of various types of radiation affecting humans, the uses of radiation, and methods for monitoring radiation levels. Emphasis on the physiological damage that occurs to tissues following ionizing radiation. Three lectures per week. Prerequisites: Five hrs. of chemistry or acceptance into the School of Radiologic Technology.

Bio 101 (F, S) 4 hrs. cr.

General Biology

General treatment of unifying principles of living organisms at the chemical, cellular, organismic, and population levels of organization including cell structure and function, metabolism, genetics, evolution and ecology. Emphasis will be placed on biological principles as they relate to humans, stressing how humans interact with their environ-

Course Descriptions

<p>Bio 261 (Demand) 3 hrs. cr. Animal Nutrition Fundamental principles of animal nutrition with special emphasis given to applied nutrition and life-cycle feeding of domestic animals. Three lectures per week. Prerequisite: Bio 210.</p>	<p>Emphasis on human ecology and wise natural resource utilization. Three lectures, one two-hour lab per week. Prerequisite: Bio 101 or 121. (<i>Cross-listed in Environmental Health</i>)</p>
<p>Bio 290 (F, Even) 3 hrs. cr. Research and Statistical Methods in Biology (<i>Writing Intensive</i>) Develops literature research, experimental design, and statistical analysis skills required in biology and environmental health. Students learn both mathematical foundations and software applications of statistical methods. Students develop a research question, search literature, design a study, and write a proposal. Prerequisites: Bio 112/122 (or Bio 101) and Math 140.</p>	<p>Bio 316 (F) 3 hrs. cr. Economic Botany Economic uses of plants in the past, present, and future. Emphasis on economic aspects of plants in medicine, agriculture, horticulture, and industry. Includes the history of plant domestication facilitated by natural selection and purposeful breeding and an overview of plant chemistry, morphology, and reproduction pertinent to economics. Prerequisites: Bio 112.</p>
<p>Bio 298 (Demand) 1-5 hrs. cr. Topics in Biology Designed to give instruction in some discipline of biology not covered in other courses. Prerequisites to be determined by department.</p>	<p>Bio 322 (S) 4 hrs. cr. Taxonomy of Flowering Plants Relationships among selected plant groups with emphasis on classification and descriptions of taxa, nomenclature, and concepts concerning the evolutionary sequence of various plant characters. Southwestern Missouri flora emphasized. Two lectures, two two-hour labs per week. Prerequisite: Bio 112.</p>
<p>Bio 300 (S, Even) Evolution Course designed to enhance the understanding and appreciation of the modern scientific theory of evolution. Evidence and mechanics of evolution exemplified by molecular biology, systematics, genetics, and population ecology will be included as well as samples of current evolutionary research. Prerequisites: Bio 112/122 (or Bio 101).</p>	<p>Bio 331 (F) 5 hrs. cr. Comparative Vertebrate Anatomy Fundamental course designed to enhance understanding and appreciation of the structure and adaptations of vertebrates. Emphasis on evolution and the relationship between structure and function. Two lectures, two three-hour labs per week. Credit toward the biology major granted for one anatomy course: Bio 201 or 331. Prerequisite: Bio 122.</p>
<p>Bio 301 (F) 4 hrs. cr. Human Physiology A general treatment of normal human physiology which emphasizes physiological control and homeostasis at the organ system level of organization. Lecture focuses on physiological processes and concepts; the lab emphasizes the measurement of physiological variables. Three lectures, one three-hour lab per week. Credit toward the biology major granted for one physiology course: Bio 221, 301, or 431. Prerequisite: Bio 122 or Bio 201.</p>	<p>Bio 332 (F, Even) 4 hrs. cr. Introduction to Entomology Collecting methods, taxonomy, life history, morphology, and evolution of insects. Three lectures, one three-hour lab per week. Prerequisite: Bio 122.</p>
<p>Bio 303 (Demand) 3 hrs. cr. Computer Applications in Biology Explores ways in which microcomputers are used to better understand and study biological phenomena. The course develops technical expertise that is required in research, graduate school, teaching, and other career fields. Satisfies the computer literacy requirement for environmental health majors. Prerequisites: Bio 112/122 (or Bio 101).</p>	<p>Bio 350 (F, Odd) 2 hrs. cr. Techniques in Microbiology Training in techniques in microbiology through analysis of bacterial antibiotic resistance patterns and their medical ramifications. Includes the origin, incidence, effects, and prevention of antibiotic resistance. Prerequisite: Bio 231.</p>
<p>Bio 304 (F, Odd) 3 hrs. cr. Geographic Information Systems Explores the expanding use of Geographic Information Systems (GIS) in ecology, environmental health, and related fields. Satisfies the computer literacy requirement for environmental health majors. Prerequisites: Bio 112/122 (or Bio 101). (<i>Cross-listed in Environmental Health</i>)</p>	<p>Bio 352 (Demand) 1-4 hrs. cr. Biomes An in-depth study of a selected ecosystem. The interactions between plants and animals with their abiotic environment are studied in the classroom and during an extended field trip usually lasting one week or more. The habitat chosen for study varies from year to year and some trips require physical conditioning or specialized training. Living conditions range from primitive to reasonably comfortable dormitories. Students are required to bear the cost of the trip. Prerequisites: Bio 112/122 and permission.</p>
<p>Bio 305 (F, S) 4 hrs. cr. Genetics (<i>Writing Intensive</i>) Introduction to principles of heredity, gene structure, expression, and regulation. Emphasis on cytological and molecular approaches to nucleic acid replication, transcription, translation, and other genetic mechanisms. Lab exercises illustrate genetic principles and techniques used in modern genetic research. Three lectures, one two-hour lab per week. Prerequisite: Bio 112/122.</p>	<p>Bio 361 (Demand) 4 hrs. cr. Parasitology Systematic investigation of the numerous parasites found in vertebrates. Emphasis on life cycles of parasites that infect humans and domestic animals. Three lectures, one three-hour lab per week. Prerequisite: Bio 122.</p>
<p>Bio 308 (F,S) 4 hrs. cr. Pathophysiology Altered physiological states, the cellular manifestations and causes of disease, and adaptation to the alterations. Three lectures, one three-hour lab per week. Prerequisite: Bio 221 or 301.</p>	<p>Bio 362 (F, Even) 4 hrs. cr. Virology Structure, classification, and life cycles of bacterial, animal, and plant viruses, their significance in disease (including cancer) and the use of viruses in modern biological research. The laboratory will stress the cultivation of viruses in bacterial and other cells. Three lectures, one three-hour lab per week. Prerequisites: Bio 231.</p>
<p>Bio 312 (Demand) 4 hrs. cr. Environmental Biology (<i>Writing Intensive</i>) Environmental factors and their interactions with living organisms.</p>	<p>Bio 364 (F, Odd) 3 hrs. cr. Cell Biology A current perspective on cell biology will be addressed by examining various aspects of cell structure and function. Emphasis will be on communication and regulation mechanisms in both normal and</p>

66 / Biology, Chemistry

abnormal states. In addition, the historical aspects of cell biology research and the techniques used by researchers will be discussed. Specific topics will be chosen each semester depending on current research with the use of primary literature to illustrate important concepts. Prerequisite: Bio 210.

Bio 370 (S) 3 hrs. cr.
Environmental Health

Contemporary environmental health problems and public protection measures, including public health disease prevention and environmental health hazards. Three lectures per week. Prerequisite: Bio 101 or 121. (Cross-listed in Environmental Health)

Bio 371 (F, Odd) 4 hrs. cr.
Plant Physiology

Introduction to plant physiology emphasizing a review of the cell, plant biochemistry, regulation of plant development, and factors producing physiological stress in plants. Three lectures, one two-hour lab per week. Prerequisites: Bio 112 and 210.

Bio 380 (S, Odd) 3 hrs. cr.
Epidemiology

Introduction to the concepts, principles and methods useful in the surveillance and investigation of communicable disease. Prerequisites: Bio 101 or 121 or Bio 112/122. (Cross-listed in Environmental Health)

Bio 402 (F) 4 hrs. cr.
General Ecology (Writing Intensive)

Study of plant and animal communities and their interaction within the environment. Emphasis on flora and fauna of Southwest Missouri and soils, climate and other major environmental factors responsible for the distribution and association of plants and animals. Three lectures, one three-hour lab per week. Prerequisites: Bio 112 and 122.

Bio 405 (S, Even)
Bioinformatics

Introduction to the principles and procedures used to obtain and synthesize information from DNA databases. Topics and techniques presented will include similarity searching and determination of homology, alignment, and phylogeny of DNA sequences. This course is offered as part of an interdisciplinary Bioinformatics option that includes courses in Computer Information Science and Biology, but is not limited to these students. Prerequisites: Bio 305 and CIS 110.

Bio 422 (Demand) 5 hrs. cr.
Invertebrate Zoology

Classification, morphology, physiology, development, and evolution of invertebrate animals. Three lectures, two two-hour labs per week. Prerequisite: Bio 122.

Bio 431 (Demand) 4 hrs. cr.
Animal Physiology

Comparative approach to the physiology of animals with emphasis on laboratory studies of both mammalian and non-mammalian vertebrates. Three lectures, one three-hour lab per week. Credit toward the biology major granted for only one physiology course: Bio 301 or Bio 431.

Bio 433 (S, Even) 4 hrs. cr.
Histology

Detailed study of microscopic structure of animal tissues and organs with special emphasis on mammalian tissue. Three lectures, one three-hour lab per week. Prerequisite: Bio 201 or 331.

Bio 440 (S, Odd) 4 hrs. cr.
Plant Pathology

Historical significance of plant pathology, the physiological response of plants to abiotic factors, the anatomical, and physiological aspects of plant susceptibility to disease and examples of management systems. Includes major diseases caused by bacteria, fungi and viruses. Three lectures, one two-hour lab per week. Prerequisite: Bio 112.

Bio 442 (S, Odd) 5 hrs. cr.

Pathogenic Bacteriology

A study of the structure, identification and pathology of the infectious bacteria. Three lectures, two two-hour labs per week. Prerequisite: Bio 231.

Bio 450 (F, S) 1-4 hrs. cr.
Internship in Biology

In conference with a departmental board a half semester in advance, the student shall elect to work and observe in any area of applied biology in which on-the-job experience would be beneficial to the student's training. Course can be repeated, but a maximum of 4 credit hours can be used to meet the biology major requirements. Prerequisites: Junior standing or above in biology with a minimum of 20 biology hours and 20 upper division hours.

Bio 456 (S, Even) 4 hrs. cr.
Immunology

Cellular and molecular basis of the immune response in vertebrates including structure, induction, and regulation of the immune response. Autoimmune disorders, vaccines, transplantation, and diagnostic immunology will also be presented. The laboratory will stress the induction and manipulation of the immune response. Three lectures, one three-hour lab per week. Prerequisites: 231.

Bio 481 (S) 4 hrs. cr.
Aquatic Ecology (Writing Intensive)

Analysis of components of freshwater systems, both impoundment and stream environments. Three lectures, one two-hour lab per week. Prerequisite: Bio 112/122.

Bio 490 (Demand) 1 hr. cr.
Seminar

Faculty supervised discussion group and critical review of current topics in biology. Students will present reviews in selected topics. One meeting per week. Prerequisites: For upper division biology majors. May be repeated for additional credit.

Bio 498 (Demand) 1-5 hrs. cr.
Advanced Topics in Biology

Designed to give advanced instruction in some discipline of biology not covered in other courses. For upper division majors. Prerequisites to be determined by department.

Bio 499 (F, S) 1-3 hrs. cr.
Independent Research in Biology

Individual work under the supervision of a faculty member, with the credit and hours to be arranged. Research may be undertaken in any field of biology, with adequate preparation and the consent of the supervising instructor, department head, and school dean. Prerequisite: Minimum GPA of 3.0 with 90 credit hours completed.

CHEMISTRY

Reynolds Hall 210, 417.625.9376

Faculty Sloan - Head, Albright, Archer, Garoutte, Mosher, Summerfield

Chemistry graduates will find an impressive array of options and exciting opportunities in fields such as basic research, environmental protection, instrumentation, new product and process development, technical marketing, market research,