Biology

Robert M. Wood, Ph.D., Chair
John C. Kennell, Ph.D., Associate Chair
Richard L. Mayden, Ph.D., Barnickel Endowed Chair
http://www.slu.edu/x14762.xml

Full-time Faculty:
Robert D. Aldridge, Ph.D
Nevin Aspinwall, Ph.D
Janet C. Barber, Ph.D
Peter Bernhardt, Ph.D
Elena Bray Speth, Ph.D
Gerardo R. Camillo, Ph.D
Brian P. Downes, Ph.D
Stephen J. Dina, Ph.D
Jonathan S. Fisher, Ph.D
Blythe E. Janowiak, Ph.D
Jason Knouft, Ph.D
Wesley J. Leverich, Ph.D
Allison Miller, Ph.D
Shawn E. Nordell, Ph.D
Judith M. Ogilvie, Ph.D
Laurie K. Russell, Ph.D
Donald Schreibweis, Ph.D
Laurie Shornick, Ph.D
Susan A. Spencer, Ph.D
William S. Stark, Ph.D
Yuqi Wang, Ph.D
Daniel E. Warren, Ph.D
Wenyan Xiao, Ph.D

Laboratory Coordinators
Timothy E. Dooley, M.A., D.O.
Elizabeth E. Bardon, M.S.

Laboratory Assistant
Paul C. Lega, B.A.

Associated Faculty:
Missouri Botanical Garden
Thomas B. Croat, Ph.D
Peter Goldbatt, Ph.D
Peter Raven, Ph.D
Mick Richardson, Ph.D

St. Louis Zoological Park
Cheryl S. Asa, Ph.D
Joan E. Bauman, Ph.D

Sigma-Aldrich Corp.
Kevin Kayser, Ph.D

Dept. of Biochemistry & Molecular Biology, SLU
Dorota Skowyra, Ph.D

Dept. of Obstetrics, Gynecology, and Women’s Health, SLU
Gerald S. Zavorsky, Ph.D

The undergraduate curriculum in the Department of Biology is diverse and will meet a variety of interests in the rapidly expanding fields of the biological sciences. It is also designed to provide a broad but intensive educational experience for students in other disciplines who have an interest in biology. In addition to courses offered on the Frost campus, the department offers courses at the University’s Reis Biological Station located by the Huzzah Creek in the Ozarks.

Programs
The department offers Bachelor of Arts (B.A.), Bachelor of Sciences (B.S.), and minor undergraduate degrees as well as MS(R) and Ph.D. graduate degrees. An interdisciplinary concentration in Conservation and Biodiversity and a degree in Environmental Sciences (in conjunction with the Department of Earth and Atmospheric Sciences) are also available for undergraduates.

Students who pursue either a major or minor in biology must have at least a 2.00 cumulative average in prerequisite(s) for upper division courses in Biology. These are BIOL104, BIOL106 (8 total credit hours); CHEM163/165, CHEM164/166 (8 total credit hours).

Biology (B.A.)
The department offers three B.A. degree tracks: 1) Biological Science, 2) Ecology, Evolution & Organismal Biology (EEOB), and 3) Plant Science. Each track requires the following Prerequisite and Upper-Division Biology Courses:

Required Prerequisite Courses
BIOL104: Principles of Biology I 4
BIOL106: Principles of Biology II 4
CHEM163: Introduction to Chemistry I 3
CHEM165: Introduction to Chemistry I Lab 1
CHEM164: Introduction to Chemistry II 3
CHEM166: Introduction to Chemistry II Lab 1

Required Upper-Division Biology Courses
BIOL301: Evolutionary Biology 3
BIOL302: Molecular Cell Biology I 3
BIOL303: Principles of Genetics 3

Each B.A. degree track requires a minimum of 25 upper-division credit hours in Biology (see lists below of elective courses), including at least one plant science course and a structured laboratory course (which includes 4 or 5 credit lecture/laboratory courses).

Note: A total of 3 hours of Independent Study (BIOL398) or Advanced Independent Study (BIOL498) can be counted toward the B.A. degree, but cannot count as structured lab courses.
### Biological Science B.A. Track

The Biological Science track provides students with a strong foundation in biology. This degree track allows maximum flexibility in selecting upper division courses and will prepare students for entry level employment in the life sciences, health professions, K-12 education and postgraduate advanced study (e.g., medical school, graduate school).

#### Required Upper-Division Biology Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BIOL304: Molecular Cell Biology II</td>
<td>3</td>
</tr>
<tr>
<td>Plant Course</td>
<td>3-4</td>
</tr>
<tr>
<td>Electives</td>
<td>up to 25</td>
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#### Required related courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 142: Calculus</td>
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#### Recommended related courses

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<th>Course</th>
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<tr>
<td>CHEM342: Principles of Organic Chemistry I</td>
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<td>CHEM344: Organic Chemistry Lab I</td>
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<tr>
<td>CHEM343: Principles of Organic Chemistry II</td>
<td>3</td>
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<td>CHEM347: Organic Chemistry Lab II</td>
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<tr>
<td>PHYS131: Physics I</td>
<td>3</td>
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<td>PHYS132: Physics Lab I</td>
<td>1</td>
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<td>PHYS133: Physics II</td>
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<td>PHYS134: Physics Lab II</td>
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<tr>
<td>Statistics (MATH130 or BIOL479)</td>
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</table>

### EEOB B.A. Track

The Ecology, Evolution and Organismal Biology (EEOB) degree track is designed for students interested in various aspects of organismal biology. This track will provide students with a strong foundation in biology and will prepare students for careers in agricultural industries, agricultural research organizations, botanical research institutes (e.g., botanical gardens, museums), biotechnology companies, or for advanced training in graduate degree programs such as plant biology, plant conservation, plant ecology, and plant evolutionary biology, among others.

#### Required Upper-Division Biology Courses

<table>
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<tr>
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<tbody>
<tr>
<td>BIOL304: Molecular Cell Biology II</td>
<td>3</td>
</tr>
<tr>
<td>BIOL326: Biology of Plants &amp; Fungi</td>
<td>4</td>
</tr>
<tr>
<td>BIOL349: Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL409: Plant Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL482: Internship in Plant Science</td>
<td>1-3</td>
</tr>
<tr>
<td>Electives</td>
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<tr>
<td>CHEM347: Organic Chemistry Lab II</td>
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<tr>
<td>BIOL106: Principles of Biology II</td>
<td>3</td>
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<tr>
<td>BIOL104: Principles of Biology I</td>
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<tr>
<td>CHEM163: Introduction to Chemistry I</td>
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<tr>
<td>CHEM165: Introduction to Chemistry I Lab</td>
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</table>

## Plant Sciences B.A. Track

The Plant Sciences degree track is designed for students interested in various aspects of plant biology. This track will provide students with a strong foundation in biology with additional specialization in plant organismal biology, plant ecology, plant physiology, and plant molecular biology. This degree track will prepare students for careers in agricultural industries, agricultural research organizations, botanical research institutes (e.g., botanical gardens, museums), biotechnology companies, or for advanced training in graduate degree programs such as plant biology, plant conservation, plant ecology, and plant evolutionary biology, among others.

#### Required Upper-Division Biology Courses

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</tr>
<tr>
<td>PHYS134: Physics Lab II</td>
<td>1</td>
</tr>
</tbody>
</table>

## Biology (B.S.)

The department offers five B.S. degree tracks: 1) Biological Science, 2) Cell Biology & Physiology (CB&P), 3) Ecology, Evolution & Organismal Biology (EEOB), 4) Molecular Biology, and 5) Plant Science. Each track requires the following Prerequisite and Upper-Division Biology Courses:

#### Required Prerequisite Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL104: Principles of Biology I</td>
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<td>BIOL106: Principles of Biology II</td>
<td>4</td>
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<tr>
<td>CHEM163: Introduction to Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM165: Introduction to Chemistry I Lab</td>
<td>1</td>
</tr>
</tbody>
</table>
CHEM164: Introduction to Chemistry II 3
CHEM166: Introduction to Chemistry II Lab 1

**Required Upper-Division Biology Courses**
BIOL301: Evolutionary Biology 3
BIOL302: Molecular Cell Biology I 3
BIOL303: Principles of Genetics 3

A minimum of 35 upper-division hours of biology are required. All B.S. students must take at least three structured laboratory experiences (i.e. laboratory courses or 4 or 5 credit lecture/laboratory course) with at least one from each category, at least one plant science course, and one of four Senior Inquiry options (0–4 credits). *Note: A total of 4 hours of Independent Study (BIOL398), Advanced Independent Study (BIOL498) or Senior Inquiry (BIOL488) can be counted toward the B.S. degree, but cannot count as structured lab courses.*

**Required related courses:**
MATH 142: Calculus I 4
Statistics (MATH130 or BIOL479) 3-4

**16 credits of the following courses:**
CHEM342: Principles of Organic Chemistry I 3
CHEM344: Organic Chemistry Lab I 1
CHEM343: Principles of Organic Chemistry II 3
CHEM345: Organic Chemistry Lab II 1
PHYS131: Physics I 3
PHYS132: Physics Lab I 1
PHYS133: Physics II 3
PHYS134: Physics Lab II 1
EAS101: Earth’s Dynamic Environment I 3
EAS102: Earth Environment Lab I 1
EAS103: Earth’s Dynamic Environment II 3
EAS104: Earth Environment Lab II 1

**Biological Science B.S. Track**
The Biological Sciences track provides students a foundation in contemporary fields in biology. It allows maximum flexibility in selecting upper division courses that prepare students for professional degree programs (e.g. pre-med, pre-dental) as well as entry level employment in life science and health professions.

**Required Upper-Division Biology Courses**
BIOL304: Molecular Cell Biology II 3
CMDB Elective, including a Lab Course 4-5
EEOB Elective, including a Lab Course 4-5
CMDB or EEOB Lab Course 1-5
Plant Course 3-4
Senior Inquiry Course 0-4
Electives up to 35

**Cell Biology & Physiology (CB&P) B.S. Track**
The CB&P track provides students with a strong foundation in the structure and function of organ systems and tissues that comprise them. This is a good choice for students planning careers as academic, biomedical, and/or biotechnology researchers, health professionals or K-12 teachers.

**Required Upper-Division Biology Courses**
BIOL304: Molecular Cell Biology II 3
BIOL346 or 454: Physiology-related 3
BIOL306, 405, 461, or 465: Cell-related Lab 2
BIOL342, 344, 347, or 444: Physio-related Lab 2-5
EEOB Elective, including a Lab Course 4-5
2 CB&P Elective Courses 6-10
Plant Course 3-4
EEOB Elective(s) 4
Senior Inquiry Course 0-4
Electives up to 35

**Ecology, Evolution, and Organismal Biology (EEOB) B.S. Track**
The EEOB track provides students with a strong foundation in organismal biology with specialization in ecology and evolution. This is a good choice for students planning careers as a research biologist at local, state, federal agencies or NGOs; Environmental consultants, or K-12 teachers.

**Required Upper-Division Biology Courses**
BIOL475: Ecology 4
Ecology (EC) Elective 3
Evolution (EV) Elective 3
Organismal (O) Elective 3
Tools (T) elective 3
CMDB Elective, including a Lab Course 4-5
Plant Course 3-4
Senior Inquiry Course 0-4
Electives up to 35

**Molecular Biology B.S. Track**
The Molecular Biology track provides students with a strong foundation in the structure and function of biomolecules and cells that comprise them. This is a good choice for students planning careers as academic, biomedical, and/or biotechnology researchers, health professionals or K-12 teachers.

**Required Upper-Division Biology Courses**
BIOL304: Molecular Cell Biology II 3
BIOL470: Molecular Biology 3
2 of BIOL306, 310, 405, 465: Lab courses 4
EEOB Elective including a Lab Course 4-5
BIOL481: Bioinformatics Internship 1
Plant Course 3-4
Senior Inquiry Course 0-4
Electives up to 35
Plant Science B.S. Track
The Plant Science track is designed for students interested in various aspects of plant biology. This is a good choice for students planning careers in agricultural research, botanical museums as well as graduate programs in plant biology, conservation, ecology and evolutionary biology.

Required Upper-Division Biology Courses

BIOL304: Molecular Cell Biology II 3
BIOL326: Biology of Plants & Fungi 4
BIOL349: Plant Physiology 3
BIOL409: Plant Ecology 3
CMDB Elective, including a Lab Course 4-5
CMDB or EEOB Lab Course 1-5
BIOL482: Internship in Plant Science 1-3
Senior Inquiry Course 0-4
Electives up to 35

Biology Elective Courses*

Cellular, Molecular and Developmental Biology (CMDB)

BIOL304: Molecular Cell Biology II 3
BIOL306: Cell Laboratory 2
BIOL310: Experiments in Genetics 2
BIOL342: Comparative Anatomy (EV, CB&P) 5
BIOL344: Embryology (CB&P) 5
BIOL347: Physiology Laboratory 2
BIOL349: Plant Physiology (P, CB&P) 3
BIOL402: Vertebrate Reproductive Physiol. (CB&P) 3
BIOL405: Molecular Techniques Laboratory (T) 2
BIOL407: Advanced Biochemistry 3
BIOL408: Advanced Cell Biology (CB&P) 3
BIOL415: Nerve Cell Mech. in Behavior (CB&P) 3
BIOL441: Comparative Animal Physiol. (O, CB&P) 3
BIOL444: Vertebrate Histology 4
BIOL446: Exercise Physiology (CB&P) 3
BIOL447: Electron Microscopy 3
BIOL450: Introductory Endocrinology (CB&P) 3
BIOL451: Behavioral Endocrinology (CB&P) 3
BIOL454: Human Cellular Physiology 3
BIOL460: Developmental Biology (CB&P) 3
BIOL461: Developmental Biology Laboratory 2
BIOL463: Immunobiology (CB&P) 3
BIOL464: Microbiology (O, CB&P) 3
BIOL465: Microbiology Laboratory 2
BIOL470: Molecular Biology 3

Ecology, Evolution and Organismal Biology (EEOB)

BIOL322: Biology of Invertebrates (O) 3
BIOL326: Biology of Plants & Fungi (O, P) 4
BIOL328: Ethnobotany (O, P) 3
BIOL345: Economic Botany (O, P) 3
BIOL401: Sex, Evolution and Behavior (EV) 3
BIOL404: Pollination Biology (EV) 3
BIOL406: Structure and Function of Ecosystems 3
BIOL409: Plant Ecology (EC, P) 3
BIOL410: Natural History of Vertebrates (O) 4
BIOL412: Field Botany (EV, P) 5
BIOL413: Field Mammalogy (O) 5
BIOL414: Field Ornithology (O) 5
BIOL417: Intro to GIS (T) 3
BIOL418: Intermediate GIS (T) 3
BIOL419: GIS in Ecology (T) 3
BIOL420: Aquatic Ecology (EC) 4
BIOL421: Biology and Classif. of Orchids (P, O) 3
BIOL426: Biology of Amphibians and Reptiles (O) 4
BIOL428: Biology of Fishes (O) 4
BIOL431: Biology of Birds (O) 4
BIOL432: Cave Biology 3
BIOL433: Spring Flora of the Ozarks (O, P) 4
BIOL434: Systematic Biology (EV) 3
BIOL435: Biology of Parasitic Organisms (O) 3
BIOL436: Animal Behavior (EC) 3
BIOL437: Animal Behavior Laboratory 1
BIOL438: Biology of Mammals (O) 4
BIOL440: Applied Ecology (EC) 3
BIOL441: Comparative Animal Physiology 3
BIOL445: Ecological Risk Assessment (EC) 3
BIOL448: Conservation Biology (EC) 3
BIOL458: Applied Population Genetics (EV) 3
BIOL467: Population Biology (EC) 3
BIOL468: Landscape Ecology (EC) 3
BIOL475: General Ecology 4
BIOL477: Coevolution (EV) 3
BIOL478: Molecular Phylogenetic Analysis (T) 4

* Structured labs are in italics. P = plant course,
  O = organismal, EV = evolutionary, EC = ecology, T = tools, CB&P = cell biology & physiology

Senior Inquiry Course Options include:

BIOL484 Library Project and Thesis 1-4
BIOL485 Graduate Level Course in Biology 0
BIOL488 Research Project 1-4
BIOL489 Comprehensive Examination 0

Note: A total of 4 hours of Independent Study (BIOL 398),
Library Project (BIOL 484), Research Project (BIOL 488) or Advanced Independent Study (BIOL 498) can be counted toward the B.S. degree, yet these courses do not count as structured lab courses nor can they satisfy elective requirements.

Reduced College Core Requirements

Students pursuing a B.S. degree are eligible to reduce the number of credit hours in Philosophy (from 9 to 6), Theology (from 9 to 6), English Literature (from 6 to 3), and Language (from 9 to 6). Note: Students that drop out of the B.S. degree program and seek a B.A. must fulfill the
standard set of college core requirements.

**Interdisciplinary Concentration in Conservation and Biodiversity**

For students interested in careers in conservation, natural resource management, environmental science. Requirements: 21 credit hours including General Ecology, Conservation Biology, Internship in Conservation, biology electives (5 hrs), interdisciplinary courses (6 hrs).

**Minor**

A minor in Biology may be obtained by students who complete the following prerequisite courses: BIOL 104 and 106 or equivalents (8 credits) and CHEM 163/165 and 164/166 or equivalents (8 credits), and a minimum of 12 credits of upper-division Biology electives selected from BIOL301 through 479 (excluding BIOL 398). For all courses taken as part of the minor, a student must have earned at least a 2.00 grade point average.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL104</td>
<td>Principles of Biology I</td>
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<td>BIOL106</td>
<td>Principles of Biology II</td>
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<tr>
<td>CHEM163</td>
<td>Introduction to Chemistry I</td>
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<tr>
<td>CHEM165</td>
<td>Introduction to Chemistry I Lab</td>
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<td>CHEM164</td>
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</tr>
<tr>
<td>CHEM166</td>
<td>Introduction to Chemistry II Lab</td>
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</tbody>
</table>

**Elective Courses**

12 hours of upper division (BIOL301 – BIOL479) electives (excluding BIOL398)

*In accordance with Arts and Sciences graduation requirements, a student must earn an overall 2.00 grade point average in all major and minor (certificate or related) courses that are approved for completion of their degree program*