YOUR GUIDE TO SUCCESS IN BIOLOGY AT MISSOURI S&T

MISSOURI S&T
Biological Sciences
WELCOME FIRST YEAR AND TRANSFER STUDENTS

Missouri S&T offers you the opportunity to learn biology in an environment unlike that of many other universities. Our faculty and students have the opportunity to explore interdisciplinary approaches to biological problems available to them as part of a university with a focus on science and engineering. As you take classes in other disciplines get to know your professors and learn how each course might impact your future career choice. As you explore research opportunities, student design teams and student organizations, don’t forget to also look outside of biology. Perhaps you might help establish a new interdisciplinary opportunity. This Guide to Success is prepared to help you thrive during your undergraduate years. We hope you find it useful.

Welcome!

David J. Westenberg, Ph.D.
Associate Professor and Interim Chair, Biological Sciences

WHY STUDY BIOLOGY AT S&T?

You will be a full participant in the biology academic community at S&T. Our undergraduates are students, researchers, writers, organizers and leaders. The biological sciences department at S&T offers:

• A comprehensive curriculum (diverse electives; extensive laboratory and field work)
• Abundant opportunities for student research
• Award-winning teachers
• Collegial student-faculty interactions and collaborations
• An excellent placement record to graduate and professional schools
• Small class sizes and a low student to faculty ratio
• Internationally recognized research programs

You are proud to have you join us as members of the biological sciences department at Missouri S&T. You are now a part of our thriving academic community. All of us in the department are here to help you get the most out of your undergraduate experience. We compiled this Guide to Success to help you along the way.

We are embarking on a new era and delighted to share this journey with you. Our faculty, staff and alumni as well as your fellow students are available as a resource, but we look forward to your input as well. We have a curriculum with core courses that will expose you to the breadth of the biological sciences and the opportunity to explore specific areas in greater depth through upper level electives. To get the most out of your educational experience we want you to challenge yourself and challenge us throughout your time at Missouri S&T.

One of the keys to success in college and in life is to be an active learner. It will be important to engage with the material being covered in each of your classes. Ask questions, visit with your professors during their office hours or schedule appointments with them to learn more about your chosen field of study. One of the newest aspects of a Missouri S&T education is the requirement for experiential learning. But our department has been doing this for years. From undergraduate research experiences to service projects hosted by our student organizations to our senior seminar course. We encourage you to take advantage of all of these opportunities as well as experiential learning opportunities offered through other disciplines.

Your time here at Missouri S&T will be over before you know it. To help you prepare for your career, get to know your academic advisor and let them know your goals and aspirations. We can help you succeed but need to know how you define success. College is all about learning who you are, discovering your passions and trying out new things. You’ll learn about new career options or create your own.

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Get to know your teachers and future mentors

12 Degree requirements
Check the degree requirements for all our degree options and emphasis areas

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A listing of all course offerings in biology including graduate courses and approved out-of-department courses

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Missouri S&T now requires all students to have experiential learning. Check out your options in biology

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Many of our alumni go on to graduate and professional schools. Learn more here

30 Student organizations
To get the most out of your education join a student organization or design team.
20 THINGS YOU SHOULD KNOW FOR ACADEMIC SUCCESS

1. Go to class!
2. Read the course syllabus (outline)
3. Read the assignments before the lecture
4. Take notes in class
5. Review notes from class
6. Hand in assignments on time
7. Ask questions!
8. Ask for help early
9. Quiz yourself over notes and reading assignments
10. Study every day
11. Know when and where to get help!
12. Balance! There is nothing wrong with taking a fun class to give yourself a break from your technical classes

13. This is not high school! It is almost impossible to take seven hours of classes in a row... but at the same time don’t schedule only one class for a particular day
14. Be aware of your limitation using your advisor’s help
15. Don’t miss your registration time
16. Know the various ways to register for classes
17. When planning your schedule, first plan around the classes that are only offered once
18. Learn what is expected in each class
19. Don’t take too many reading intensive classes at once. Plan ahead a couple of semesters. This way the prerequisites that are only offered every other year do not delay your graduation
20. Know your advisor by name and stop by regularly

GETTING TO KNOW YOUR PROFESSORS

By now, you’re well aware that there are many differences between class in high school and class in college. You’ve observed that your professors’ teaching styles and expectations are different than those of your high school teachers. More information about your professors and their jobs may help you to figure out how to better communicate with them.

Responsibilities of professors

- Teach up to 4 courses
- Advise students
- Supervise research
- Write manuscripts for journals and books
- Prepare presentations for conferences
- Serve on University committees
- Active in professional societies

Professors are people

- They have interests outside what they teach
- They respond to the same types of verbal and nonverbal cues that you do

Class will be managed differently than it was in high school.

- Professors may not teach directly from the textbook or base their test exclusively on the book. Their goal is to help you think critically and to synthesize the information in the textbook and lecture to gain new knowledge.
- Learning is your responsibility, but the professor is there to help. Use their help.

They are interested in you

- Take advantage of their office hours
- They are interested in your success as a student and a person

Why they chose college teaching

- Professors love their disciplines and find it rewarding to share that passion with students.
- They enjoy interacting with students and learning from them.

How to make the most of the student-professor relationship

- Go to class
- Be on time and prepared for class
- Ask questions
- Show interest
- If you miss class, get notes from someone else. Catch up on missed assignments, announcements, etc.
- Turn assignments in on time

Contacting your professors by email

- Be respectful and use formal language
- Address them by their title. Most faculty have earned a doctorate and should be addressed as “Dr.” but if you are unsure you can use the title of “Professor” unless they tell you otherwise
- Never miss an appointment. If an emergency comes up, call or email the professor with advance notice to reschedule.
MEET THE FACULTY

RONALD L. FRANK, PH.D.
Associate Professor
Laboratory of Plant Molecular Genetics
PRO Advisor
RESEARCH INTERESTS:
Protein secondary structure prediction
Identification, evolution and expression of gene families in plants
Analysis of genome evolution
EDUCATION:
Ohio State University, Columbus, M.S. in Genetics, 1981
Ohio State University, Columbus, Ph.D. in Genetics, 1985
COURSES TAUGHT:
Genomics (BIO 5333), Molecular Genetics (BIO 2233), General Genetics (BIO 2223), Evolution (BIO SCI 1163), Natural History, 2002
Molecular Biology Lab (BIO SCI 5243), General Biology Lab (BIO SCI 2223), General Genetics (BIO SCI 2223), Molecular Genetics Lab (BIO SCI 4320)

CHEN HOU, PH.D.
Assistant Professor
Director, Laboratory of Animal Physiology
RESEARCH INTERESTS:
Life History Theory Metabolic basis of aging
Energetic basis of animal growth and reproduction
Mammalian respiratory physiology
Essential insects
EDUCATION:
Sichuan University, Chengdu, China, B.S. in Physics, 1997
University of Missouri, Columbia, M.S. in Physics, 2000
University of Missouri, Columbia, Ph.D. in Physics 2005
COURSES TAUGHT:
Human Anatomy and Physiology II (BIO SCI 2219); Introduction to Geomicrobiology (BIO SCI 3001), Environmental Microbiology (BIO SCI 4313), Introduction to Biological Sciences (BIO SCI 1201), Microbiology (BIO SCI 3313), Geomicrobiology (BIO SCI 5423), Bioremediation (BIO 6463), Advanced Biodiversity (BIO SCI 6513), Advanced Microbial Metabolism (BIO SCI 6333), Bioremediation (BIO SCI 5423), (BIO SCI 5001) Geomicrobiology

YUE-WERN HUANG, PH.D.
Professor
Director, Laboratory of Nanotechnology and Molecular Toxicology
RESEARCH INTERESTS:
Nanomaterials and cell penetrating peptides (CPPs) to deliver biologically active molecules in vitro and in vivo
Investigate toxicity of nanomaterials to assess risk to human health and to discover physical and chemical properties of nanomaterials that govern molecular mechanisms of nanotoxicity
Study bone repair and regeneration and diabetic wound healing (regenerative medicine)
EDUCATION:
National Taiwan Normal University, B.A., 1985
National Taiwan Normal University, M.S. 1988
University of Wisconsin-Madison, Ph.D., 1998
COURSES TAUGHT:
Ecology (BIO SCI 1263), Taxonomy (BIO SCI 4383/5383); Techniques in Applied and Environmental (BIO SCI 6273); Public Health (BIO SCI 2376), Nano-biotechnology (BIO SCI 3501/5501), Tissue Engineering (BIO SCI 5440/6440)

ADAM MARTIN, PH.D
Assistant Teaching Professor
EDUCATION:
University of Wisconsin-Madison, Ph.D., 1998
National Taiwan Normal University, M.S. 1988
University of Cincinnati, B.S. in Biology, 1985
COURSES TAUGHT:
Environmental Biology, 2004
National Taiwan Normal University, M.S. 1988
University of Oklahoma,  Ph.D. in Microbiology, 1988
University of Oklahoma, Ph.D in Microbiology, 1995

MELANIE MORMILE, PH.D.
Professor
Laboratory of Environmental Microbiology
RESEARCH INTERESTS:
Archaeal Microorganisms
Bioremediation
Extremophiles in saline environments
EDUCATION:
University of Cincinnati, B.S. in Biology, 1985
University of Louisville, M.S. in Microbiology, 1988
University of Oklahoma, Ph.D. in Microbiology, 1995
COURSES TAUGHT:
Introduction to Biological Sciences (BIO SCI 1201), Microbiology (BIO SCI 3313), Introduction to Environmental Microbiology (BIO SCI 4313), Introduction to Astrobiology (BIO SCI 3001), Environmental Microbiology (BIO 5131), Advanced Biodiversity (BIO SCI 5423), Advanced Microbial Metabolism (BIO SCI 6513), Astrobiology (BIO SCI 6423), Bioinformatics (BIO 6463), (BIO SCI 3001) Introduction to Geomicrobiology, (BIO SCI 5001) Geomicrobiology

WEBSITE:
www.mst.edu/~mmormile

OTHER FACULTY
• Roger F. Brown, Ph.D., Emeritus Professor
• Steven Roberts, Ph.D., Vice Provost and Dean of the College of Arts, Sciences, and Business

BIOLICAL SCIENCES STAFF
Our technical staff members provide support for the campus animal care facility and training in the use of equipment. They also maintain department equipment.
• Richard Watters, 937-341-4029
• Jessica Polt, Office Support III, 937-341-6008
• Stephanie Lewis, Office Support III, 937-341-4831
• Stephanie Lewis, Office Support III, 937-341-4831

HISTORY
The S&T biological sciences department (formerly Life Sciences) was established as an autonomous department within the College of Arts and Sciences in 1978. The department has 10 Ph.D. faculty members and currently has over 200 undergraduate majors and six graduate students. The department offers bachelor of science, bachelor of arts, and master of science degrees with emphasis areas in pre-medicine and teacher certification, and a minor in bioinformatics. Students in other degree programs can also choose to minor in biological sciences or bioinformatics.
JULIE SEMON, PH.D.
Assistant Professor
Laboratory of Regenerative Medicine

RESEARCH INTERESTS:
Identifying differences between sources of adult stem/progenitor cells
Regulation of stem/progenitor cell niche
 Trafficking and fate determination of stem/progenitor cells

EDUCATION:
Purdue University, West Lafayette, Indiana, B.S. in Agronomy, 1998
Tulane University, New Orleans, M.S. Ph in Public Health, 2003
Tulane University, New Orleans, Ph.D. in Molecular and Cell Biology, 2009

COURSES TAUGHT:
Introduction to Biomedical Engineering
Introduction to Tissue Engineering

WEBSITE:
www.mat.edu/~jsemon

KATIE B. SHANNON, PH.D.
Associate Teaching Professor
Director, Laboratory of Cytokinesis
Chair Pre-Medicine Advisory Committee

RESEARCH INTERESTS:
The temporal and spatial control of cell division
Budding yeast as a model to determine how cytokinesis is cell-cycle regulated.

EDUCATION:
University of North Carolina-Chapel Hill, B.A., 1994
Harvard Medical School, Boston, Ph.D., Cell and Developmental Biology, 2000

COURSES TAUGHT:
Cell Biology (BIO SCI 2213), Cancer Biology (BIO SCI 4115), Developmental Biology (BIO SCI 5100), Senior Seminar (BIO SCI 4108)

WEBSITE:
www.mat.edu/~kshannon openwetware.org/wiki/User:Katie_B_Shannon

MATTHEW S. THIMGAN, PH.D.
Assistant Professor
Director Laboratory of Genetic & Behavioral Sleep Research

RESEARCH INTERESTS
Genes and metabolic pathways that regulate both the sleep and wake cycles
Mathematical modeling of sleep/wake transitions
Wake inputs that prevent a good nights sleep
Salivary biomarkers of sleep deprivation and sleep disorders

EDUCATION:
University of California, Los Angeles, B.S., 1994
University of North Carolina-Chapel Hill, Ph.D., Cell and Molecular Physiology, 2005

COURSES TAUGHT:
(bio sci 3333) Anatomy & Physiology, (bio sci 2001) Sleep Function & Dysfunction

WEBSITE:
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DAVID J. WESTENBERG, PH.D.
Associate Professor
Laboratory of Molecular Microbiology
Faculty Athletics Representative

RESEARCH INTERESTS:
Cell-cell communication in the Bradyrhizobium japonicum/Soybean symbiosis
Rhizosphere microbiology
Antimicrobial materials and compounds
Synthetic Biology

EDUCATION:
Michigan State University, East Lansing, B.S. Microbiology and Public Health, 1982
University of California, Los Angeles, Ph.D. Microbiology and Molecular Genetics, 1991

COURSES TAUGHT:
Ecology Lecture (Bio 2263), General Biology Lecture (Bio 1115) and Lab (Bio 1215), Principles of Biology (Bio SCI 1213), Cell Biology Lab (Bio SCI 2219), Biodiversity lecture (Bio SCI 1225) and Lab (Bio SCI 1229)

WEBSITE:
www.mat.edu/~djwesten

DEV K. NIYOGI, PH.D.
Associate Professor
Director, Laboratory of Freshwater Ecology

RESEARCH INTERESTS:
Effects of humanity on stream ecosystems
Role of biodiversity in controlling ecosystem processes
Nutrient uptake in streams and other aquatic systems

EDUCATION:
Swarthmore College, Swarthmore, Pennsylvania, B.A., 1989
University of Colorado, Boulder, Ph.D., 1999

COURSES TAUGHT:
Biodiversity (BIO SCI 1223), Introduction to Environmental Science (BIO SCI 1175), Ecology (BIO SCI 2263), Field Ecology (BIO SCI 2201), Freshwater Ecology (BIO SCI 4163), Global Ecology (BIO SCI web)

WEBSITE:
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TERRY J. WILSON, MS
Associate Teaching Professor
Assistant Affiliate Director, PL TW Biomedical PRO Advisor

EDUCATION:
Southwest Missouri State University, Springfield, B.S. in Education, 1983
Southwest Missouri State University, Springfield, M.S. in Biology, 1993

COURSES TAUGHT:
Ecology Lecture (Bio 2263), General Biology Lecture (Bio 2263), General Biology Lab (Bio SCI 2264), Principles of Biology (Bio SCI 1213), Cell Biology Lab (Bio SCI 2219), Biodiversity lecture (Bio SCI 1225) and Lab (Bio SCI 1229)

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WEBSITE:
www.mat.edu/~djwesten
1. Expect challenges. Get involved and get experience. Nothing is too big for you to achieve.

2. Understand chemistry; biology is its greatest application.

3. Memorize photosynthesis, then you’re guaranteed >30% in all of your classes.

4. Take what people say about professors with a grain of salt. Everyone has their own learning styles, and a professor some people dislike may be one you love.

5. Don’t be afraid to ask older students for help. Get to know them and ask for advice on what classes to take when, or if they have a file you could borrow for one of your current classes.

6. Classes and studying are the most important aspects of college; however, it is good to become involved on campus.

7. Become active. Join a few clubs that seem interesting to you.

8. STUDY, STUDY, STUDY.

9. Form study groups; they can be very helpful.

10. Find a professor you like and try to do research with them.

11. Just because the course is easy, it doesn’t mean you can slack off.

12. Only use solution manuals to check your answers or to help explain problems. If you copy the answers, you will quickly be lost in class.

13. Start studying before the semester begins.

14. Some courses in high school seemed really easy, and I didn’t have to study very much, but in college I’ve had to learn better study habits.

15. Practice, practice (especially for organic chemistry)

16. Make sure to find a quiet place to study for your harder classes.

17. Get involved in research.

18. Don’t be afraid to ask your professors questions if you don’t understand something; most are happy to help.

19. Make a to-do list; make a schedule of classes, study time, etc.

20. Review your notes daily, study as you go and keep up on your reading.

### DEPARTMENT CONTACT INFORMATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Office</th>
<th>Phone</th>
<th>Lab</th>
<th>Lab Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocen office</td>
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</tr>
</tbody>
</table>

### S&T CAMPUS SUPPORT SERVICES

To reach campus phone numbers from off-campus, add the prefix 341.

<table>
<thead>
<tr>
<th>Name</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Opportunities</td>
<td>303 Norwood</td>
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<td><a href="mailto:career@mst.edu">career@mst.edu</a></td>
<td>career.mst.edu</td>
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<tr>
<td>Cashier’s Office</td>
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<td>4195</td>
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<td>4211</td>
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<td>counsel.mst.edu</td>
</tr>
<tr>
<td>Financial Assistance</td>
<td>G-1 Parker</td>
<td>4285</td>
<td><a href="mailto:SFA@mst.edu">SFA@mst.edu</a></td>
<td>sfa.mst.edu</td>
</tr>
<tr>
<td>Human Resources</td>
<td>113 Centennial Library</td>
<td>4243</td>
<td><a href="mailto:human@mst.edu">human@mst.edu</a></td>
<td><a href="mailto:human@mst.edu">human@mst.edu</a></td>
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<tr>
<td>International Affairs</td>
<td>103 Norwood</td>
<td>4208</td>
<td><a href="mailto:ias@mst.edu">ias@mst.edu</a></td>
<td>international.mst.edu</td>
</tr>
<tr>
<td>IT Help Desk</td>
<td>Curtis Laws Wilson Library</td>
<td>4397</td>
<td><a href="mailto:help@mst.edu">help@mst.edu</a></td>
<td>helpdesk.mst.edu</td>
</tr>
<tr>
<td>LEAD Peer Tutoring</td>
<td>105 Norwood</td>
<td>6605</td>
<td><a href="mailto:lead@mst.edu">lead@mst.edu</a></td>
<td>lead.mst.edu</td>
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<tr>
<td>Library</td>
<td>Curtis Laws Wilson Library</td>
<td>4227</td>
<td><a href="mailto:library@mst.edu">library@mst.edu</a></td>
<td>library.mst.edu</td>
</tr>
<tr>
<td>Police</td>
<td>G-10 Campus Support Facility</td>
<td>4300</td>
<td><a href="mailto:police@mst.edu">police@mst.edu</a></td>
<td>police.mst.edu</td>
</tr>
<tr>
<td>Registrar</td>
<td>103 Parker Hall</td>
<td>4818</td>
<td><a href="mailto:registrar@mst.edu">registrar@mst.edu</a></td>
<td>registrar.mst.edu</td>
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<tr>
<td>Residential Life</td>
<td>205 W. 12th St</td>
<td>4218</td>
<td><a href="mailto:reslife@mst.edu">reslife@mst.edu</a></td>
<td>reslife.mst.edu</td>
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<tr>
<td>Student Health Services</td>
<td>910 W. 10th St</td>
<td>4284</td>
<td><a href="mailto:mshs@mst.edu">mshs@mst.edu</a></td>
<td>studenthealth.mst.edu</td>
</tr>
<tr>
<td>Testing Center</td>
<td>G-10 Norwood</td>
<td>4222</td>
<td><a href="mailto:testing@mst.edu">testing@mst.edu</a></td>
<td>testing.mst.edu</td>
</tr>
<tr>
<td>Undergraduate Advising</td>
<td>106 Campus Support</td>
<td>6601</td>
<td><a href="mailto:lead@mst.edu">lead@mst.edu</a></td>
<td>lead.mst.edu</td>
</tr>
<tr>
<td>Undergraduate Studies</td>
<td>105 Norwood Hall</td>
<td>7216</td>
<td><a href="mailto:ugs@mst.edu">ugs@mst.edu</a></td>
<td>ugs.mst.edu</td>
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<tr>
<td>Wellness Programs</td>
<td>910 W. 10th St</td>
<td>4284</td>
<td><a href="mailto:mshs@mst.edu">mshs@mst.edu</a></td>
<td>mshs.mst.edu</td>
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<td>Writing Center</td>
<td>113 Campus Support Facility</td>
<td>4436</td>
<td><a href="mailto:writing@mst.edu">writing@mst.edu</a></td>
<td>writing.mst.edu</td>
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</table>

SUCCESS GUIDE
### B.S. IN BIOLOGICAL SCIENCES DEGREE REQUIREMENTS

Anyone receiving the B.S. degree in biological sciences from Missouri S&T must complete the following academic requirements:

**HUMANITIES**

12 SEMESTER HOURS

Must include: English 1120 Exposition and Argumentation (3 Hours), English 1160 Writing and Research or 3560 Technical Writing (3 Hours). Humanities include: Art appreciation, drama, literature, music appreciation, philosophy, logic, and social sciences, excluding foreign language and studio courses.

**SOCIAL SCIENCES**

9 SEMESTER HOURS

Must include either History 1200, 1300, or Political Science 1200. Social sciences include: history, political science, sociology, psychology, economics, and anthropology.

**MATHEMATICS**

2 SEMESTERS

Must include one semester of calculus and one semester of linear algebra (MATH 3235).

**PHYSICS**

2 SEMESTERS

Two semesters of physics with lab (Physics 1111/1145, 1119, 2111/2145 & 2119).

**CHEMISTRY**

18 SEMESTER HOURS

Must include general chemistry courses 1310, 1319, 1320, and 1100, two semesters of organic chemistry lecture 2210, 2220, and labs 2219 and 2229.

**BIOLOGICAL SCIENCES**

46 SEMESTER HOURS

The following “core coursework in biological sciences” is required of all BS majors:

- BIO 1201: Introduction to Biological Sciences (1 hour)
- BIO 1213: Principles of Biology (3 hours)
- BIO 1219: General Biology Lab (1 hour)
- BIO 2213: Cellular Biology (3 hours)
- BIO 2219: Cell Bio Lab (1 hour)
- BIO 2223: Evolution (3 hours)
- BIO 2225: Genetics (3 hours)
- BIO 2263: Ecology (3 hours)
- BIO 4010: Senior Seminar (1 hour)

Twenty-five semester hours of advanced elective coursework including at least one advanced lab (2000 level or above).

**ELECTIVES**

Sufficient elective coursework to achieve the minimum of 130 semester hours required for graduation.

**ADVANCED PLACEMENT IN BIOLOGY**

Students who score a “4” on the Advanced Placement Biology Exam will receive three credit hours for Bio 1113/1213. A score of “5” on the same exam will earn the student five credit hours for Bio1113/1213 and 1219 General Biology Laboratory.

**MFAT**

All graduating students are required to take the Major Fields Achievement Test (MFAT) as their senior assessment and are responsible for signing up to take it. The MFAT is offered twice during each semester; the dates will be posted outside the biology department office.

### B.A. IN BIOLOGICAL SCIENCES DEGREE REQUIREMENTS

Anyone receiving a B.A. degree in biological sciences from Missouri S&T must complete the following academic requirements:

**HUMANITIES**

18 SEMESTER HOURS

Must include: English 1120 Exposition and Argumentation (3 Hours) English 1160 Writing and Research or 3560 Technical Writing (3 Hours). At least one course in each of literature, philosophy, fine arts.

**SOCIAL SCIENCES**

18 SEMESTER HOURS

Must include: History 1100 Early Western Civilization (3 Hours), History 1200 Modern Western Civilization (3 Hours). At least one course in two: economics, political sciences, psychology.

**FOREIGN LANGUAGE**

11 SEMESTER HOURS

Must include at least one course in each of: French, German, Spanish.

**MATHEMATICS/PHYSICAL SCIENCE**

9 SEMESTER HOURS

Must include at least one course in each of: math, physics, or geology. Proven proficiency at college level algebra.

**COMPUTER SCIENCE/STATISTICS**

3 SEMESTER HOURS

Must include three semester hours of computer science or statistics.

**CHEMISTRY**

19 SEMESTER HOURS

Must include: Chemistry 1310,1319,1320, and 1100 general chemistry (9 hours) Chemistry 2210,2220 organic chemistry (6 hours)

**BIOLOGICAL SCIENCES**

30 SEMESTER HOURS

Must include twenty-one semester hours of required core coursework.

- BIO 1201: Introduction to Biological Sciences (1 hour)
- BIO 1213: Principles of Biology (3 hours)
- BIO 1219: General Biology Lab (2 hours)
- BIO 2213: Cellular Biology (3 hours)
- BIO 2219: Cell Bio Lab (1 hour)
- BIO 2223: Evolution (3 hours)
- BIO 2225: Genetics (3 hours)
- BIO 2263: Ecology (3 hours)
- BIO 4010: Senior Seminar (1 hour)

Nine semester hours of advanced elective coursework (2000 level or above).

**ELECTIVES**

Sufficient elective coursework to provide minimum of 120 semester hours required for graduation in the College of Arts, Science, and Business.

**ADVANCED PLACEMENT IN BIOLOGY**

Students who score a “4” on the Advanced Placement Biology Exam will receive three credit hours for Bio 1113/1213. A score of “5” on the same exam will earn the student five credit hours for Bio1113/1213 and 1219 General Biology Laboratory.

**MFAT**

All graduating students are required to take the Major Fields Achievement Test (MFAT) as their senior assessment and are responsible for signing up to take it. The MFAT is offered each semester; the dates will be posted outside the biology department office.
### B.A. WITH PRE-MED EMPHASIS DEGREE REQUIREMENTS

Anyone receiving a B.A. degree in biological sciences with a pre-medicine emphasis from Missouri S&T must complete the following academic requirements:

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<td>English 1120 Exposition and Argumentation (3 Hours)</td>
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</tr>
<tr>
<td>English 1160 Writing and Research or 1160 Technical Writing (3 Hours)</td>
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</tr>
<tr>
<td>At least one course in each of: literature, philosophy, fine arts</td>
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<td><strong>SOCIAL SCIENCES</strong></td>
<td>18 SEMESTER HOURS</td>
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<tr>
<td>Must include:</td>
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<tr>
<td>History 1100 Early Western Civilization (3 Hours)</td>
<td></td>
</tr>
<tr>
<td>History 1200 Modern Western Civilization (3 Hours)</td>
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<tr>
<td>At least one course in two: economic, political sciences, psychology</td>
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<tr>
<td><strong>FOREIGN LANGUAGE</strong></td>
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<td>13-15 SEMESTER HOURS</td>
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<td><strong>COMPUTER SCIENCE/STATISTICS</strong></td>
<td>3 SEMESTER HOURS</td>
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<td>Must include:</td>
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<td>Mathematics/Physical Science</td>
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<td>Must include:</td>
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<td>Mathematics/Physical Science</td>
<td>9 SEMESTER HOURS</td>
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<tr>
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<td>Chemistry 1301,1311,1320, and 1100 General Chemistry and Labs (8 hours)</td>
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<td>Chemistry 2210,2220,2219, and 2229 Organic Chemistry and Labs (10 hours)</td>
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<td><strong>BIOLOGICAL SCIENCES</strong></td>
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<tr>
<td>Must include:</td>
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<tr>
<td>Biology 1173: Introduction to Environmental Science (3 hours)</td>
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<tr>
<td>Biology 2213: Cellular Biology (3 hours)</td>
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<td>Biology 2223: Genetics (3 hours)</td>
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<td><strong>ELECTIVES</strong></td>
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<tr>
<td>Sufficient elective courses to achieve a minimum of 120 Semester Hours required for graduation in the College of Arts, Sciences, and Business</td>
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<tr>
<td><strong>ADVANCED PLACEMENT IN BIOLOGY</strong></td>
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<tr>
<td>Students who score a &quot;4&quot; on the Advanced Placement Biology Exam will receive three credit hours for Bio 1113/1213. A score of &quot;5&quot; on the same exam will earn the student five credit hours for Bio 1113/1213 and 1219 General Biology Laboratory.</td>
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### B.A. WITH TEACHER CERTIFICATION DEGREE REQUIREMENTS

Anyone receiving a B.A. degree in biological sciences-teacher certification from Missouri S&T must complete the following academic requirements:

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<th>Category</th>
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<td>English 1120 Exposition and Argumentation (3 Hours)</td>
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<tr>
<td>English 1160 Writing and Research or 1160 Technical Writing (3 Hours)</td>
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<tr>
<td>At least one course in each of: fine arts, literature and philosophy</td>
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<td><strong>SOCIAL SCIENCES</strong></td>
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<td>History 1100 Early Western Civilization (3 Hours)</td>
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<td>History 1200 Modern Western Civilization (3 Hours)</td>
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<td>History 2530: History of Science (3 hours)</td>
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<td>Political Science 1200: American Government (3 hours)</td>
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<td>Psychology 1101: General Psychology (3 hours)</td>
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<td><strong>MATHEMATICS/PHYSICAL SCIENCE</strong></td>
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<tr>
<td><strong>COMPUTER SCIENCE/STATISTICS</strong></td>
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<td>Mathematics/Physical Science</td>
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</tr>
<tr>
<td>Must include:</td>
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</tr>
<tr>
<td>Chemistry 2210,2220,2219, and 2229 Organic Chemistry (6 hours)</td>
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<td><strong>BIOLOGICAL SCIENCES</strong></td>
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<td>Biology 2213: Cellular Biology (3 hours)</td>
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<td>Biology 2223: Genetics (3 hours)</td>
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<td><strong>EDUCATION CERTIFICATE</strong></td>
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<td>Education 1040: Perspectives in Education (2 Hours)</td>
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<td>Education 1104: Teaching Field Experience (2 Hours)</td>
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<td>Education 1164: Aiding Elementary, Middle and Secondary School (2 Hours)</td>
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<td>Education 1174: School Organization (2 Hours)</td>
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<tr>
<td>Education 2216: Teaching Reading in Content Area (3 Hours)</td>
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<td>Education 2241: Historical Foundation American Education (3 Hours)</td>
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<td>Education 3280: Teaching Methods and Skills in Content Area (6 Hours)</td>
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<td>Education 4298: Student Teaching Seminar (1 Hour)</td>
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<td>Education 4299: Student Teaching (12 Hours)</td>
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<td>Psychology 2300: Educational Psychology (3 Hours)</td>
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<td>Psychology 3311: Psychological &amp; Educational Development (3 Hours)</td>
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<tr>
<td>Psychology 4310: Psychology of the Exceptional Child (3 Hours)</td>
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FOUR-YEAR COURSE OFFERING PLAN (1113-4353)

This proposed schedule of course offerings is only a recommendation and is subject to change.

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<td>Martin</td>
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This proposed schedule of course offerings is only a recommendation and is subject to change.

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REGISTRATION PROCEDURES

Advising week for the following semester occurs during the 10th week of the Semester.
In the biology department, most first year student advising is handled by Dr. Ron Frank and Mrs. Terry Wilson. After completing your first semester you will be assigned an academic advisor based on your interests or other factors. Your assigned advisor can be found through Joe’Ss. If you do not have an advisor listed, check with Jessica Palc in the biology department office.

Each advisor handles their advising differently, so consult with your advisor about their preferred procedure for academic advising. Prior to advising week, contact your advisor to either make an appointment to meet with them during advising week to discuss your courses or present them with a proposed class schedule. Some advisors will post a schedule of open advising times during advising week. Others may email you to schedule appointments. Others may not require a formal appointment and may only require you to submit a proposed schedule of classes.

Prior to meeting with your advisor you should at least have a basic idea of which classes you would like to take. Obtain a copy of the advising agreement form and fill out the form with courses you plan to take and also alternative choices for courses that may be full. You can check your degree audit via Joe’Ss to determine which courses you may need to fulfill your degree requirements.

A class schedule is available each semester through the registrar’s office website (Registrar@med). Here you will find instructions for registering for courses on the Joe’Ss website. This site also provides access to your grades, CAPS report, and unofficial transcripts.

Registration for courses is done either by phone or by Joe’Ss. Permission to register is placed on hold until your advisor releases your advising hold. Your advisor can only release advising holds. Other holds may be placed on advising and can only be released through the registrar’s office.

Your registration appointment date and time can be obtained from Joe’Ss. The registration time is the earliest you can register for a class, you do not need to register exactly at that time.

MINORS

Bioinformatics
• Principles of Biology (Bio 1213 and 1219)
• Cellular Biology Lab (CompSci 1976 and 1986)
• Data Structures (CompSci 1190)
• File Structure and Introduction to Database Systems (CompSci 2300)
• Brennlaştır (Stat 525)
• Bioinformatics (Bio 5232/CompSci 5780)

It is strongly recommended that the course be taken after the other biology courses are designated to support success.

One additional courses, 1000 or above in math, biology or computer science, outside of the major area of study, and as agreed upon by the minor advisor (3-6 hrs)

Check the course catalog for detailed information.

Chemistry

Virtually all biology majors fulfill the requirements for a minor in chemistry in the normal course of their training. There has been some confusion regarding the requirements for this minor, in particular Chem 1510 is not always required. The following guidelines come from the chemistry department.

A minor in chemistry can be obtained by completing 20 hours in chemistry including the following courses: Chem 1101, 1102, 1310, 1320, 1500, 1510, 2219, and either 2280 or 2219 (these total 18). The remaining two hours must be at the 200- or 300-level. Chemistry is a popular elective (CHM 4610/4619).

Biochemistry majors take most of these courses as part of their major requirements. Other than Chem 1510 (Quantiative Analysis, lab, 2 hrs), students who have taken Chem 1310 may substitute for it, but they are required to take a total of 21 hours of chemistry. To obtain a minor in chemistry, fill out a green "minor form" (available in the biology office) listing all your chemistry courses. Take this to the chemistry minor advisor, for this signature, then bring it to the registrar.

Psychology

The department offers four minor options (in addition to psychology that psychology majors may pursue). To qualify, students must take 15 hours of courses in psychology and at least nine of these hours must be at the 200-level or above.

The four options for a minor are:
• General Psychology
• Industrial/Organizational Psychology
• Psychology of Leadership
• Cognitive Neuroscience
• Multiculturalism & Diversity

1000 Special Topics (Variable) This course is designed to give the student an opportunity to test a new course.

1011 Genetics: Decoding Your Genes (3)
• Explore questions like: What are genes? How do genes affect health? How are genes inherited?
• What are the societal implications of genetic knowledge?
• What is the Human Genome Project and what can we learn from it?
• (No prereq, designed for non-majors. Does not fulfill requirement for biology majors)

1111 General Biology (3)
• A comprehensive study of the general principles of the biology of plants, animals, and protists including population biology and regulation mechanisms.
• This course is for non-biology majors. (Entrance requirements) Fall, spring, summer.

1163 Biotechnology and Film (3) Unraveling Facts from Fiction at the Movies (3) An introduction to the study of environmental science, which deals with ecosystems and their interactions, and the role of human actions in those interactions. The course will include screenings of current and classic films, lectures, and discussions. (No prereq, designed for non-majors. Does not fulfill requirement for biology majors) Spring.

1223 Biodiversity lab (1) This lab course is designed to accompany the introduction to biodiversity class. Lab and field explorations of the diversity of life on earth. (Prerequisite: Preceded or accompanied by Bio Sci 1113) Fall, spring.

1229 Biodiversity lab (1) This lab course provides an opportunity to test a new course.

2113 Environmental Science (6)
• An introduction to the study of environmental science, with an emphasis on biological aspects of the current environmental problems. Topics range from chemical toxicity to global climate change.
• Environmental analogies using local and global environmental challenges. (Fall, spring).

2223 General Genetics (3)
• A study of Mendelian principles and population genetics with emphasis on the human. (Fall, spring).

2233 Genetics (3) The study of the principles of heredity and recombination in prokaryotic and eukaryotic cells. Emphasis on molecular, metabolic pathways, and subcellular organelles. (Fall, spring).

2234 Genetic Counseling (3) An introduction to the role of the genetic counselor in the genetic counseling process. (Fall, spring).

2250 Evolution of the Ozarks (2)
• An outdoor educational experience focusing on the plants and plant communities of the Missouri Ozarks. The five day long course teaches participants to identify much of the flora of the region and provides practice and instruction in the use of dichotomous keys for plant identification. The course meets each day from 9-5. Trips will be held and performed to local field sites at an extra cost. (Prerequisites: Bio Sci 1113 or Bio Sci 1115) (Summer)

2372 Issues in Public Health (2)
• Issues in Public Health (2)
• This course provides an overview of current public health issues and trends in order to make informed decisions in areas of public service. (No prerequisites) (Fall, spring).

2373 Issues in Public Health (2)
• Issues in Public Health (2)
• This course provides an overview of current public health issues and trends in order to make informed decisions in areas of public service. (No prerequisites) (Fall, spring).

2380 Plant Biology (3)
• An interdisciplinary course covering plant form and function. Topics include the cellular structure unique to plants, their life cycles, and the mechanisms they use to store, reproduce, and convert solar energy into a form usable by all organisms. (Prerequisite: Bio Sci 1201) (Spring)

2381 General Genetics (3)
• The study of the principles of heredity and recombination in prokaryotic and eukaryotic cells. (Fall, spring).

2383 Evolution of the Ozarks (2)
• An outdoor educational experience focusing on the plants and plant communities of the Missouri Ozarks. The five day long course teaches participants to identify much of the flora of the region and provides practice and instruction in the use of dichotomous keys for plant identification. The course meets each day from 9-5. Trips will be held and performed to local field sites at an extra cost. (Prerequisites: Bio Sci 1113 or Bio Sci 1115) (Summer)

SUCCESS GUIDE
3313 Human Anatomy & Physiology I (3) First Semester of a two semester sequence dealing with the structure and function of human organs systems. (Prerequisite: Bio 1213 & Bio 2213) (Fall)

4329 Molecular Genetics Laboratory (2) This course provides experience in the use of a variety of DNA manipulation techniques that are common to molecular studies. These include DNA extraction, restriction mapping, Southern blotting, recombinant plasmid construction, DNA sequencing and analysis, and polymerase chain reaction. (Preceded or accompanied by Bio 4323) (Fall)

4331 Cancer Biology (3) An upper level, advanced cell biology course that examines cellular processes that go awry during tumorigenesis. We will discuss cell cycle control, apoptosis, cancer pathways, DNA repair, telomerase, cell migration and adhesion that are altered in cancer cells. (Prerequisite: Bio 2213) (Fall)

4343 Freshwater Ecology (3) The ecology of streams, lakes, and wetlands. Through the physical and chemical characteristics of freshwater environments, the diversity of life in freshwater biogeochemical processes, and threats to freshwater systems. Assignments will include problem sets, short papers, and a group presentation. (Prerequisite: Bio 2216) (Spring)

4353 Cancer Biology (3) A study of molecular mechanisms used in carcinogenesis. We will learn about the properties that enable organisms to cause disease as well as the disease process within the host. Specific emphasis will be placed on recent advances in the molecular genetics of host-pathogen interaction. (Prerequisite: Bio 3313) (Fall)

4333 Genomics (3) This course offers a general overview of the field of genomics. Topics covered include genome sequencing and annotation, transcriptomics, proteomics, metabolomics, genome variation, and the role of animal, plant, and microbial genomics. (Prerequisite: Bio Sci 2263) (Fall)

4533 General Virology (3) This is an overview of the biology of viruses including plant, animal, and bacterial viruses. Discussions will include morphology, classification, virus-host interactions, genetics, clinical and industrial aspects of viruses, and viruses as agents of biotechnology. (Prerequisite: Bio 2233) (Fall)

5310 Biomaterials I (3) This course will introduce seniors to biomaterials in a broad array of topics in biomaterials, including ceramic, metal, and polymeric biomaterials for in vivo use, basic concepts related to cells and tissues, host reactions to biomaterials, biomaterials-tissue compatibility and degradation of biomaterials. (Prerequisite: Senior standing)

5343 Advanced Biotechnology (3) Topics include biogeochemistry, community structure, competition, predation, food webs, ecology relationships, environmenal change, and human impact. Additional costs and a week long field trip are required. (Prerequisite: Bio Sci 2233 or Bio Sci 2263)

5433 Neurobiology (3) An intermediate course in cellular neurobiology. Emphasis will be placed on the unique properties of neurons and other excitable cells. Topics covered include the structure and biophysical properties of neurons, synaptic transmission, neuroscience, signal transduction, neuropharmacology and neuroendocrinology. (Prerequisite: Bio Sci 2213) (Spring)

5633 Global Ecology (3) This class covers ecological topics at large scales, emphasizing global scales. Topics include global energy balance, biogeochemical cycles of water, carbon, nitrogen, and trace elements. Emphasis will be placed on the role of humans in affecting ecosystem structure and function, and the role of humans in affecting global biogeography. Students will focus on primary literature related to global ecology. (Prerequisite: Bio Sci 2263) (Spring)

5533 Pharmacy (3) The basic principles of drug action, pharmacokinetics, pharmacodynamics and toxicology. We will emphasize the actions of drugs used to treat cardiovascular and nervous system diseases Students will be able to research and prepare both written and oral reports on drug actions. (Prerequisite: Bio Sci 2213)

5619 Introduction to Biostatistics (4)

2263 Ecology (3) Relationships among living organisms and their environment. The structure and function of ecosystems, with emphasis on limiting environmental factors, symbiotic relationships, biogeochemical cycling, adaptation, and macro and microevolutionary processes. (Prerequisite: Bio 2213) (Fall, Spring)

2331 Microbiology I (3) The study of microbial growth and kinetics, life in extreme environments, biogeochemical cycling, bioremediation of contamination, waterborne pathogens, environmental health. (Prerequisite: Bio Sci 3313) (Fall)

3233 Molecular Genetics (3) A study of the properties and functions of DNA that makes this macromolecule unique in the universe. Examples of replication, transcription, translation, repair, and regulation will be examined in viruses, prokaryotes, and eukaryotes. (Prerequisites: Bio 2213 and 2223) (Fall)

4120 Molecular Genetics Laboratory (2) This course provides experience in the use of a variety of DNA manipulation techniques that are common to molecular studies. These include DNA extraction, restriction mapping, Southern blotting, recombinant plasmid construction, DNA sequencing and analysis, and polymerase chain reaction. (Preceded or accompanied by Bio 4323) (Fall)

4331 Cancer Biology (3) An upper level, advanced cell biology course that examines cellular processes that go awry during tumorigenesis. We will discuss cell cycle control, apoptosis, cancer pathways, DNA repair, telomerase, cell migration and adhesion that are altered in cancer cells. (Prerequisite: Bio 2213) (Fall)

4331 Cancer Biology (3) A study of molecular mechanisms used in carcinogenesis. We will learn about the properties that enable organisms to cause disease as well as the disease process within the host. Specific emphasis will be placed on recent advances in the molecular genetics of host-pathogen interaction. (Prerequisite: Bio 3313) (Fall)

4333 Genomics (3) This course offers a general overview of the field of genomics. Topics covered include genome sequencing and annotation, transcriptomics, proteomics, metabolomics, genome variation, and the role of animal, plant, and microbial genomics. (Prerequisite: Bio Sci 2263) (Fall)

4533 General Virology (3) This is an overview of the biology of viruses including plant, animal, and bacterial viruses. Discussions will include morphology, classification, virus-host interactions, genetics, clinical and industrial aspects of viruses, and viruses as agents of biotechnology. (Prerequisite: Bio 2233) (Fall)

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5533 Pharmacy (3) The basic principles of drug action, pharmacokinetics, pharmacodynamics and toxicology. We will emphasize the actions of drugs used to treat cardiovascular and nervous system diseases Students will be able to research and prepare both written and oral reports on drug actions. (Prerequisite: Bio Sci 2213)
Students with senior standing may take two required courses per semester with the instructor. Undergraduates who enroll in graduate classes may choose to dual enroll to receive both undergraduate and graduate credit. Graduate courses are currently offered on a rotating basis. Consult with your advisor when planning your coursework.

**5010 Graduate Seminar** Presentation and discussion of current topics in Applied and Environmental Biology

**5099 Graduate Research** Investigation of an advanced nature leading to the preparation of a thesis or dissertation

**6202 Problems in Applied and Environmental Biology** Overview of the major areas of research in applied biology and environmental science with a focus on interdisciplinary approaches used at S&T campus in ongoing research.

**6210 Biomaterials II** This course will introduce graduate students to a broad array of topics in biomaterials, including ceramic, metallic,

**6213 Advanced Freshwater Ecology** (See Bio 418)

**6215 Advanced Toxicology** (See Bio 418)

**6423 Astrobiology:** The origins of life on early Earth and the possibility of life on extraterrestrial bodies will be explored. In addition, the instruments and methods to carry out space travel, necessary for studying the possibility of extraterrestrial life.

**6433 Bioremediation:** During this course, the use of microorganisms and other living organisms for the remediation of contaminated environments will be explored along with the techniques necessary for monitoring their activities.

**6510 Advanced Microbial Metabolism** A survey of the divergent metabolic properties of microorganisms. Course material will emphasize major metabolic pathways and how they relate to microbial diversity and microbial ecology.

**6512 Advanced Cancer Cell Biology** (See Bio 4153)

**6599 Graduate Research Investigation** Graduate Research Investigation is a requirement for PhD degree completion.

**6910 Graduate Seminar** Seminar to present and discuss fundamental and current principles of a selected area of study.

**6999 Graduate Research** Research may be in any area of interest to the student, within the limits of the faculty's expertise.

**7089 Reading Course** Independent study of material not covered in any course.

**7159 Reading Course** Independent study of material not covered in any course.

**7999 Reading Course** Independent study of material not covered in any course.

**Elective experiential learning requirement:***

With the approval of the student’s academic advisor, the student will complete another activity of appropriate duration and requiring significant effort. At the conclusion of the activity, the student is required to provide their advisor with a written reflective statement in order to receive credit for the activity.

Some examples of experiential learning activities that may be approved are: undergraduate research, leadership in a student organization, participation in a student design team, completion of a co-op or internship, student teaching, sustained community service activities such as Miner Challenge, or service as a peer mentor, tutor or advisor.

**UNDERGRADUATE RESEARCH** Your undergraduate educational experience can be greatly enhanced by participating in undergraduate research. Hands-on experience can be invaluable when seeking a job or graduate school after completing your bachelor’s degree. Our biology department has a strong reputation for close interactions between faculty and undergraduate students (in contrast with large research universities where undergraduate students are mostly supervised by postdoctoral fellows or graduate students). Opportunities for undergraduate research include:

- **Volume 1409** credit
- **Opportunities for Undergraduate Research Experience (OURE) program** or paid research assistant positions. S&T students also take advantage of summer undergraduate research programs at other universities.

**VOLUNTEERING**

If you are seeking an opportunity to observe the research environment in a particular lab, volunteering may be a first step before deciding that lab as the right one for you.

**BIOCS 4099** Students may register for up to six credit hours of independent study which can then apply toward completion of their electives. Students need to be in the Biology laboratory, a maximum of three credit hours of BioCS 4099 can be applied as Advanced Biological Sciences elective. An additional three credit hours can be applied to general electives. For every credit hour, a student is expected to work three hours per week in the laboratory or on library research.

**OURE**

Faculty in the department have extensive experience training undergraduate students through the OURE program. The OURE program is a S&T-sponsored approach to incorporate undergraduate students in research activity. Students submit a brief proposal in consultation with a faculty mentor and determine a time frame for completing the project. At the conclusion of their research projects, students are required to submit written reports of their research findings and are encouraged to submit a paper for an annual Undergraduate Research Conference poster or oral presentation.

Participants in the S&T OURE program have an excellent record of acceptance into graduate and professional schools. The application deadline for the OURE program is April 1 for the following academic year. Applications and further information can be found at campus.mst.edu/ugs/OURE.htm.

**RESEARCH ASSISTANTS**

Faculty with funded research projects are often seeking undergraduate students to assist in their research projects. Positions are available on a limited basis and obtaining a paid position can be very competitive. You do not have to limit yourself to biology faculty. Faculty members in other departments are often willing to mentor our hard-working and dedicated students.

**SUMMER RESEARCH PROGRAMS**

Many summer research opportunities are available at other universities. Check the bulletin boards outside the biology, chemistry, and chemical and biotechnical engineering and other department offices for announcements about summer research programs. Also, check with your fellow students. The Helix Club and the Schreider Society often invite students who have participated in summer research to talk about their experiences.

You can also visit websites such as the National Science Foundation (NSF) (www.nsf.gov) or the Howard Hughes Medical Institute (HHMI) (www.hhmi.org) for links to universities that have summer research programs sponsored by these organizations. Below is a brief description of the NSF program.

The NSF funds a large number of research opportunities for undergraduate students through its REU Site program. An REU Site consists of a group of ten or so students who have participated in summer research programs sponsored by the NSF. Students are often seeking undergraduate students to assist in their research projects. Positions are available on a limited basis and obtaining a paid position can be very competitive. You do not have to limit yourself to biology faculty. Faculty members in other departments are often willing to mentor our hard-working and dedicated students.

**UNDERGRADUATE RESEARCH PRESENTATIONS**

Participation in undergraduate research would not be complete without presenting the results of your research. Numerous opportunities are available for presentation of your research. Faculty may invite students to give presentations at local, regional, or national conferences such as the Missouri Academy of Sciences and the American Society for Microbiology regional and national meetings. The presentations may be either posters or oral presentations. Students are also invited to submit papers and make a poster or oral presentation for the Annual Undergraduate Research Conference. The Undergraduate Research Conference visit their website at campus.mst.edu/ugs/UGRC.html.

By using the web page, Search for a REU Site (www.nrc.gov/home/cmpgrnt/rgrnt/ref_searcf.html), you may examine opportunities in the subject areas supported by the National Science Foundation. Use search by keywords to identify sites in particular research areas or with certain features, such as a particular location. Students must contact the individual sites for information and application materials. NSF does not have application materials and does not select student participants. A contact person and contact information is listed for each site. Additional opportunities are available through the Howard Hughes Medical Institute. The website hmg.org/grants/teaching/essays/main contains a searchable database of HHMI sponsored programs.
COOPERATIVE EDUCATION (CO-OP)

Biology students may choose to apply for a co-op. The co-op program provides students with the opportunity to acquire work experience related to their academic or career goals. Students interested in this program should contact Career Opportunities and Employer Relations (COER) which is located in 103 Hurwood Hall. Visit their website at career.mst.edu. The following information is taken from the COER website.

To be eligible to participate in the co-op program, a student must:
- be full-time when applying for and while participating in the co-op program.
- have completed at least two semesters. (The actual amount of academic work which must be completed before being selected for the program or before beginning a work period is up to the employer.) Other eligibility requirements may be established by the sponsoring company with the concurrence of S&T.
- have a cumulative GPA of at least 2.0 out of 4.0 to apply and participate in the program.
- have completed at least two semesters. (The actual amount of academic work which must be completed before being selected for the program or before beginning a work period is up to the employer.) Other eligibility requirements may be established by the sponsoring company with the concurrence of S&T.

REGISTRATION

Students beginning their first work term in the summer are required to register with the university if the position results from a COER facilitated interview or resume referral. All other students may register for their co-op work term. Advantages of registering for fall/Spring semester co-op work terms include maintaining continuously enrolled status for insurance and loan purposes, not having to apply for readmission to the university to attend classes following co-op, and having preregistration information for the next semester mailed to the co-op student. To apply for academic credit for co-op work through the student’s department the student must be registered for the work term. Students pay a fee equivalent to the cost of one hour of instruction when they register for their co-op work term. The program is conducted to allow the co-op student to enter and leave the university and the work location with a minimum of inconvenience. Degree credit is awarded for co-op experience at the discretion of the student’s academic department.

SELECTION PROCESS

Selection of co-op participants is usually made after on-campus interviews with representatives of the participating companies. Students must be registered with the on-campus office of the COER and have a transcript on file before interviewing. Some companies may not conduct on-campus interviews. In these instances resumes will be forwarded to the company by the co-op office. Co-op-employees sign an agreement to participate in the program. Students may identify an employer to participate in the program, and the co-op office will assist in registering the employer.

CO-OP SCHEDULE

Participants in the co-op program work and attend school on an alternating schedule. S&T’s academic year is comprised of two semesters and a summer session. The summer session, although only eight weeks long, is considered a co-op work period. The academic schedule is based on approximately 17 credit hours per regular semester and seven credit hours for a summer session. The work periods vary in length, but are approximately 16 weeks in the fall, 20 weeks in the spring, and 12 weeks in the summer. While students typically alternate full-time work at an employer, with full-time classes on campus, it is possible to work a semester and a summer straight-through, or in a few instances to go to school and work at the same time. Unless schedules are changed upon agreement by the co-op office, student and employer, participants may not remain away from campus for more than eight consecutive months.

ON THE JOB

Salaries and wages vary from one company to another, as do the benefits extended to co-op students. Wages may be increased to take into account progress toward a degree and accrued work experience. S&T does not set pay rates for any participating company or agency.

APPLYING TO GRADUATE SCHOOLS

Many S&T Biology alumni, continue on to graduate school after completing their bachelor’s degree. Alumni have gone on to such prestigious grad schools such as Duke, Northwestern, Washington University, and in fields as diverse as Ecology, Evolution, Immunology, and Microbiology.

If you are considering graduate school as an option after completing your bachelor’s degree, you should prepare yourself as early as possible. You should be aware that graduate schools will require that you take the Graduate Record Exam (GRE). Most schools will require only the general test but others may require a Subject test such as the Biology or Biochemistry and Molecular Biology Subject tests. Information on taking the GRE can be found on their website at www.gre.org. You can register online to take the exam. Most testing locations now use a computer-based exam which is offered multiple times during the year. However, the paper version of the exam is offered only three times per year. You can also check with the S&T Career Opportunities Center for information. Most graduate schools will be looking for GRE scores of at least 1200 and some of the more competitive programs will be looking for GRE scores above 1400. It is also recommended that you gain exposure to research experience prior to applying to graduate school. There are numerous opportunities to get research experience at S&T, including the Opportunities for Undergraduate Research Experience (OURE) program, Bio Sci 4999 credit, volunteering, paid research assistant positions, etc. You do not have to limit yourself to working with Biology faculty. Faculty members in other departments are often willing to mentor our hard-working and dedicated students. In addition, it is advisable to look into summer research opportunities at other Universities. Check the bulletin boards outside the Biology, Chemistry, Chemical and Biological Engineering and other department offices for announcements about summer research programs. Also check with your fellow students. The Helix Club and the Schrenk Society often invite students who have participated in summer research to talk about their experiences. You can also visit websites such as the National Science Foundation (www.nsf.gov) or the Howard Hughes Foundation (www.hhmi.org) for links to Universities that have summer research programs sponsored by these organizations.

As you consider graduate school opportunities, talk with your instructors about their experiences and seek their advice about choosing a University for graduate school. We have all been through this process and would be happy to help.
SUCCESS GUIDE

FAqs: MEDICAL AND PROFESSIONAL SCHOOL APPLICATION

Applying to professional schools is a time-consuming process. You need to be aware of the time frame early in your academic career so that you can plan accordingly. However, even if you are far along in your undergraduate career, you can still prepare to apply to professional school after graduation. This FAQ is provided to help you with the process.

When should first contact be made with the Pre-Health Professions Advisory Committee?
We recommend that a pre-health student contact a member of the Pre-Medical Advisory Committee during the student’s first year at S&T. The sooner we know a student’s intent to pursue health professions as a career the better we can advise them.

When would the admission process begin?
AMCAS (American Medical Colleges Application Service) begins accepting applications mid June for the entering class for Fall of the following year. [Yes, over a year in advance!] For other professional schools, check the appropriate application service or the specific school in which you are interested. i.e. AACOMAS (osteopathic medicine), AADAS (dental school)

When is the admission deadline?
For students applying to medical or dental school, the Pre-Health Professions Advisory Committee can provide a composite letter of recommendation based on an interview. This is actually the preferred option for most medical schools and replaces the need for multiple individual letters. Interviews are held in April and May before the application process begins. For applications to other professional schools, select faculty or health care professionals who know you quite well and can vouch for the qualities that will make you a good health care professional. Ask for letters of recommendation at least one month in advance. Provide the recommender with your resume, unofficial transcripts and personal statement. Descriptions of other activities on campus or in the community are also helpful.

How can a pre-health professional stay “plugged in” to pre-health activities?
Join Scrubs (S&T’s Pre-Med student organization) and get involved. Their website is web.mst.edu/~scrubs

How to request recommendation letters?
For students applying to medical or dental school, the Pre-Health Professions Advisory Committee can provide a composite letter of recommendation based on an interview. This is actually the preferred option for most medical schools and replaces the need for multiple individual letters. Interviews are held in April and May before the application process begins. For applications to other professional schools, select faculty or health care professionals who know you quite well and can vouch for the qualities that will make you a good health care professional. Ask for letters of recommendation at least one month in advance. Provide the recommender with your resume, unofficial transcripts and personal statement. Descriptions of other activities on campus or in the community are also helpful.

Should a student review this course work before taking the admissions test?
Preparation should begin as early as possible. One year is strongly recommended. Successful methods include test preparation booklets, formal prep courses (Kaplan or Princeton Review), and organized study groups (with pre-med colleagues at S&T). Speak with the S&T Pre-Med advisor, Dr. Katie Shannon for more information.

Anything else that should be completed before applying to professional schools?
Professional schools are interested in students who have some exposure to their profession so the applicant knows what it is like to be a practicing health care professional today. This can come from volunteering in a hospital or nursing home; working as an orderly; obtaining an EMT license or shadowing a physician/veterinarian/dentist/pharmacist/etc. for a few weeks. These experiences vary from profession to profession. For example, veterinary schools require a minimum of 100 shadowing hours but expect significantly more.

Announcements

JOBS IN THE BIOLOGY DEPARTMENT

Jobs are occasionally available in the biology department. Check the work-study job listings (sta.mst.edu/federalprograms/federal-work-study-jobs), human resources website (hr.mst.edu/workers/student) or contact individual faculty about available positions in their laboratories.

Most positions are filled through personal contacts with faculty. Faculty prefer to hire students who do well in their classes and are known to be hard workers. Do talk to your professors, learn about their research and teaching interests and do your best in your classes to show what you are capable of doing. Here are some examples of the types of jobs available in the department:

DISHWASHERS

The large number of laboratory classes offered in the biology department and the increasing number of research projects generate a large amount of glassware that requires washing. These jobs are typically filled by students with work study funding. If you are eligible for work-study, available jobs in the biology department are included in the campus list of work-study positions.

ANIMAL LAB

Students are hired to help maintain the S&T Animal Research Facility. The duties of this position include feeding the animals and cleaning their cages and changing their bedding. These positions are typically filled by work-study students.

RESEARCH ASSISTANTS

Biology department faculty with funded research projects frequently seek students to work as research assistants. Arrangements are made with the individual faculty member. Most faculty have laboratory web pages describing their research interests. If you find a lab that interests you, contact the professor about available positions in their lab. These positions are very competitive.

TEACHING ASSISTANTS

Undergraduate students are needed to support the numerous laboratory classes offered in the department. Duties may include preparing media, lab set-up and lab clean-up. TA’s are usually expected to be available during the lab period to help with answering questions and demonstrating techniques. Students who have already taken the lab and who have done well in the lab are typically hired for these positions. Faculty members typically identify those students in the laboratory class and invite them to serve as TAs the next time the course is offered. However, it does not hurt

SUCCESS GUIDE
**HEALTH PROFESSION PRE-ADMISSION PROGRAMS**

Some colleges of medical, dental and veterinary medicine offer pre-admission to their programs to select students. Below is a list of some of these programs. Consult their websites and speak to Dr. Katie Shannon, chair of the pre-medicine advisory committee for more information.

Students accepted into the pre-admissions program are offered acceptance into a particular entering class conditional upon achieving certain academic standards, demonstrating ongoing professional conduct, and participating in required activities.

**BRYANT SCHOLARS PROGRAM - MU SCHOOL OF MEDICINE**

Acceptance into the Bryant Scholars Program is based on high academic achievement, commitment to a career in rural medicine, personal characteristics expected of quality physicians, and a small town or rural background. Students are eligible for admission to the program following completion of their sophomore year in college.

Website: medicine.missouri.edu/amu/pre-admissions.html

**Applicant Criteria**

- Composite score on the ACT examination of 28 or 1260 (CR+M) on the SAT
- High academic achievement during high school
- High academic achievement during the first two years of college.
- Applicants must have a minimum 3.30 cumulative GPA and a minimum 1.30 math/science GPA and no grade lower than a B in core science courses (general chemistry, organic chemistry and biology)
- Evidence of leadership and interest in a variety of extracurricular activities
- Missouri residence
- Graduation from a rural Missouri high school as defined by the National Center for Education Statistics (NCES)

**Reserved Admission Program** for the Doctor of Dental Surgery (DDS) degree at the UMKC School of Dentistry.

Website: dentistry.umkc.edu/future_students/reserved.shtml

As a Reserved Admission Program student, you can apply for admission directly to the School of Dentistry without going through the national computerized application service required of traditional DDS candidates. To be eligible for Reserved Admission you must have completed four semesters of college credit while being continuously enrolled in full-time course loads (a minimum of 15-18 credit hours per semester). Your science grade point average must be at least 3.60 in a degree-seeking program including prerequisite courses.
NEED HELP? SPEAK UP.

PERSONAL

If you encounter personal problems while at S&T, the S&T Counseling Center can help. The Counseling Center’s staff members are committed to student learning and success, as well as to serving the S&T community. The Counseling Center services include individual, group, and crisis counseling; programming; consultation; referral information; and self-help materials to the S&T community. Services provided by the Counseling Center are free to full-time S&T students, faculty, and staff. Part-time students, faculty, and staff may receive consultation, limited services, or community referral. (If you have a question about eligibility, please contact their office at 341-4211.) Services are provided by professionally-trained counselors and psychologists and are confidential within legal limitations and professional guidelines. Support staff are also well-trained to meet the needs of the campus while in their roles in the Center. Appointments are made by contacting Erma Brand at 341-4211 or by stopping by the Counseling Center on the second floor of Norwood Hall (Room 204). Appointments usually last 50 minutes. If your situation is a crisis and it is during regular hours, please call the Counseling Center or come by their office. They will make sure you are seen as soon as possible that day. For psychological emergencies that occur when the office is closed, they can be contacted through the S&T Police at 341-4300.

ACADEMIC

If you encounter a problem with a faculty member or graduate student, please contact the department chair, Dr. Dave Westenberg (djwesten@mst.edu). If you are struggling in a class, speak to your instructor about the availability of tutoring or other alternatives. The Counseling Center and the S&T Testing center may also provide services to help with improving your study and test-taking skills. Assistance for some courses is also available through the Learning Enhancement Across Disciplines (LEAD) program (lead.mst.edu/).

ACADEMIC DISHONESTY

registrar.mst.edu/academicregs

Page 30 of the S&T Student Academic Regulations handbook describes the student standard of conduct relative to the System’s Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism or sabotage. Additional guidance for faculty, including a description of the process for dealing with issues related to academic dishonesty, is available online at ugs.mst.edu.

DISCRIMINATION AND SEXUAL HARASSMENT

S&T has a policy against race or gender discrimination and sexual harassment, and considers these kinds of behaviors intolerable and unacceptable. Should you encounter any form of discrimination or harassment, please contact Dr. Dave Westenberg at djwesten@mst.edu or 573-341-4831.

ACADEMIC ALERT SYSTEM

academicalert.mst.edu

All faculty are encouraged to utilize the online Academic Alert System. The purpose of the Academic Alert System is to improve the overall academic success of students by improving communication among students, instructors, and advisors; reducing the time required for students to be informed of their academic status; and informing students of actions necessary by them in order to meet the academic requirements in their courses.

DISABILITY SUPPORT SERVICES

counsel.mst.edu

Any student inquiring about academic accommodations because of a disability should be referred to Disability Support Services so that appropriate and reasonable accommodative services can be determined and recommended. Disability Support Services is located in 204 Norwood Hall. Their phone number is 341-4211 and their email is dss@mst.edu. Instructors may consider including the following statement on their course syllabus as a means of informing students about the services offered:

“If you have a documented disability and anticipate needing accommodations in this course, you are strongly encouraged to meet with me early in the semester. You will need to request that the Disability Services staff send a letter to me verifying your disability and specifying the accommodation you will need before I can arrange your accommodation.”

COMMUNITY SUPPORT SERVICES

- Alcoholics Anonymous – 659-6670
- Area Health Education Center – 1100 Duane Ave., 364-4797, midmoahec.org
- Pathways Community Behavioral – 364-7551
- Phelps County Regional Hospital – 1000 W. 10th St., 485-8899, pcrmc.com
- Planned Parenthood – 364-1509
- Poison Control – 800-366-8888
- Russell House – 364-0222
- Suicide Hotline – 800-395-2132