YOUR GUIDE TO SUCCESS IN BIOLOGY AT MISSOURI S&T

MISSOURI S&T

Biological Sciences
Welcome to the Biological Sciences Department at Missouri Science and Technology. We are pleased that you have decided to join us. Our faculty and staff are committed to your success in achieving your goals. A wide range of career opportunities are available to you once you have earned a biological sciences degree, spanning healthcare, environmental conservation, forensic science, basic and applied research and many more. Life sciences careers are generally highly competitive. You have made a good start in establishing your competitive edge by selecting a program at our university where the focus is on science and engineering. There are many ways you can maximize your educational experience:

1) Get to know people. Introduce yourself to your professors, and the faculty members of the Biological Sciences Department. Discuss your career goals and aspirations with your professors and your academic advisors and solicit their help and advice when seeking opportunities and making decisions. Get to know the students in your classes and share your experiences and knowledge. Participate in department and university sponsored activities, and introduce yourself to speakers and other guests.

2) Get the most out of your classes. Benefit from everything your professors have to offer. To get the most out of classes you must actively engage with the materials. Take advantage of chances to ask questions. Consider all points of view. Treat assignments as opportunities to examine and challenge ideas and learn new facts.

3) Take advantage of student clubs and organizations, and other campus activities. Getting involved is a great way to enhance your university experience. Student organizations provide opportunities to gain valuable leadership experience and establish new connections.

4) Get involved in research. Undergraduate research opportunities are a distinguishing feature of our program. Our faculty members are actively engaged in research activities across biological sciences disciplines, and there are many opportunities for students to get involved. The university also encourages student research through several programs. Find out what opportunities are available to you, and take full advantage!

A college degree encompasses the sum total of all the experiences you have gained along the way. Always remember that the experiences you have gained outside, as well as within, the classroom will elevate you and set you apart from your peers when you apply to graduate and professional programs, or seek employment. It is from these experiences that you will be able to demonstrate your abilities and commitment, and find your strongest university advocates.

On behalf of the Department, we welcome you, and look forward to a great academic year!

David Duvernell, Ph.D.
Professor and Chair
Biological Sciences
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 professor's 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:
Houghton College, Houghton, New York, B.S. in Biology 1978
Ohio State University, Columbus, M.S. in Genetics, 1981
Ohio State University, Columbus, Ph.D. in Genetics, 1985

COURSES TAUGHT:
Ph.D. in Genetics, 1985
Ohio State University, Columbus,
M.S. in Genetics, 1981
Ohio State University, Columbus,
York, B.S. in Biology, 1978

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 3343); Evolution (BIO SCI 2233)

WEBSITE:
www.mat.edu/~houch

YUE-WERN HUANG, PH.D.
Professor
Director, Laboratory of Biomaterials
and Molecular Toxicology

RESEARCH INTERESTS:
Nanotechnology: using nanomaterials for targeted delivery to treat diseases
Nanomaterial toxicity: molecular mechanisms of cytotoxicity induced by exposure to nanomaterials
Pollutants and environmental health
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:
Human Anatomy and Physiology II (BIO SCI 3343); Evolution (BIO SCI 2233)

WEB SITE:
www.mat.edu/~huangy

MELANIE MORMILE, PH.D.
Professor
Laboratory of Environmental Microbiology

RESEARCH INTERESTS:
Anamorphic Microorganisms
Bioenergy Production
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 3313), Introduction to Astrobiology (BIO SCI 1001), Environmental Microbiology (BIO 6313), Advanced Biodiversity (BIO SCI 5613), Advanced Microbial Metabolism (BIO SCI 6513), Astrobiology (BIO SCI 6313), Biomimetic (BIO 6463), BIO 5001 Introduction to Genomics (BIO SCI 5001) Geomicrobiology

WEB SITE:
www.mat.edu/~mmormi

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 1173), Ecology (BIO SCI 2263), Field Ecology (BIO SCI 2001), Freshwaters Ecology (BIO SCI 4463), Global Ecology (BIO SCI 4463)

WEB SITE:
www.mat.edu/~vopjgyd

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.

BIOLOGICAL SCIENCES STAFF
Our office staff members are resources for our students. They can assist with class changes, questions, forms, keys, and many other functions. The office is generally open from 8 a.m. to 4:30 p.m. daily and closed on major holidays.

- Jessica Polk, Office Support III, 573-341-4831
- Stephanie Lewis, Office Support III, 573-341-4831

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 Wattee, 573-341-4029

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
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. in Public Health, 2003
Tulane University, New Orleans, Ph.D. in Molecular and Cell Biology, 2009

COURSES TAUGHT:
Introduction to Biomedical Engineering (Eer Eng 3010) Stem Cell Biology (BIO SCI 5001); Tissue Engineering (BIO SCI 5193)

WEBSITE:
web.mst.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 4333/6333), Developmental Biology (BIO SCI 5333), Senior Seminar (BIO SCI 4020)

WEBSITE:
web.mat.edu/~kshannon

NING SUI, PH.D.
Assistant Teaching Professor

RESEARCH INTERESTS:
Plant hormone Gibberellins (GAs) regulate various processes in plant growth and development, from seed germination to fruit development. The key repressors in the GA signaling pathway, DELLA proteins, serve as the central coordinator of multiple signaling networks through protein-protein interaction. SPINDLY (SPY), another negative regulator in the GA pathway, is a putative O-GlcNAc transferase (OGT) identified 20 years ago. I am interested in the structure and function of DELLA and SPY proteins. Our recent study revealed SPY to be an O-fucosyltransferase rather than an OGT, and it O-fucosylates DELLA to activate it through promoting its interaction with binding partners. This is the first work to identify O-fucosylation of nuclear proteins in any organism.

EDUCATION:
Duke University, Ph.D., 2016

COURSES TAUGHT:
Cell Biology (BIO SCI 2213), Cancer Biology (BIO SCI 4333/6333), Developmental Biology (BIO SCI 5333), Senior Seminar (BIO SCI 4020)

WEBSITE:
web.mat.edu/~kshannon

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

COURSES TAUGHT:
Anatomy & Physiology (BIO SCI 3333) and Microbiology Lab (BIO SCI 3339), Genetics (BIO SCI 2213), Plant Biology (BIO SCI 2183)

WEBSITE:
web.mat.edu/~mstmgan

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:
Microbiology (BIO SCI 3113) and Microbiology Lab (BIO SCI 3119); General Genetics (BIO SCI 2223); Microbial Genetics (BIO SCI 3001); Pathogenic Microbiology (BIO SCI 5113); Biological Design and Innovation (BIO SCI 3713); Advanced Microbial Metabolism (BIO SCI 3001/6513)

WEBSITE:
web.mat.edu/~djwesten

TERRY J. WILSON, MS
Associate Teaching Professor
Assistant Affiliate Director, PLTW 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 2203), General Biology Lecture (BIO SCI 1113) and Lab (BIO SCI 1123); Principles of Biology (BIO SCI 1213), Cell Biology Lab (BIO SCI 2119), Biodiversity lecture (BIO SCI 1225) and Lab (BIO SCI 1229)

WEBSITE:
www.mat.edu/~twilson

Julie Semon, Ph.D.
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. in Public Health, 2003
Tulane University, New Orleans, Ph.D. in Molecular and Cell Biology, 2009

Courses Taught:
Introduction to Biomedical Engineering (Eer Eng 3010) Stem Cell Biology (BIO SCI 5001); Tissue Engineering (BIO SCI 5193)

Website:
web.mst.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 4333/6333), Developmental Biology (BIO SCI 5333), Senior Seminar (BIO SCI 4020)

Website:
web.mat.edu/~kshannon

Ning Sui, Ph.D.
Assistant Teaching Professor

Research Interests:
Plant hormone Gibberellins (GAs) regulate various processes in plant growth and development, from seed germination to fruit development. The key repressors in the GA signaling pathway, DELLA proteins, serve as the central coordinator of multiple signaling networks through protein-protein interaction. SPINDLY (SPY), another negative regulator in the GA pathway, is a putative O-GlcNAc transferase (OGT) identified 20 years ago. I am interested in the structure and function of DELLA and SPY proteins. Our recent study revealed SPY to be an O-fucosyltransferase rather than an OGT, and it O-fucosylates DELLA to activate it through promoting its interaction with binding partners. This is the first work to identify O-fucosylation of nuclear proteins in any organism.

Education:
Duke University, Ph.D., 2016

Courses Taught:
Cell Biology (BIO SCI 2213), Cancer Biology (BIO SCI 4333/6333), Developmental Biology (BIO SCI 5333), Senior Seminar (BIO SCI 4020)

Website:
web.mat.edu/~kshannon

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

Courses Taught:
Anatomy & Physiology (BIO SCI 3333) and Microbiology Lab (BIO SCI 3339), Genetics (BIO SCI 2213), Plant Biology (BIO SCI 2183)

Website:
web.mat.edu/~mstmgan

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

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Website:
web.mat.edu/~djwesten

Terry J. Wilson, MS
Associate Teaching Professor
Assistant Affiliate Director, PLTW 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 2203), General Biology Lecture (BIO SCI 1113) and Lab (BIO SCI 1123); Principles of Biology (BIO SCI 1213), Cell Biology Lab (BIO SCI 2119), Biodiversity lecture (BIO SCI 1225) and Lab (BIO SCI 1229)

Website:
www.mat.edu/~twilson
ADVICE FROM CURRENT STUDENTS

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>
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<th>Lab</th>
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<tbody>
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<td>143 Schrenk</td>
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<td>bio <a href="mailto:sci@mst.edu">sci@mst.edu</a></td>
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<td>Dr. Katie Shannon</td>
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<td>102, Schrenk</td>
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<tr>
<td>Dr. Matt Thimang</td>
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<td>G-13, 110D Schrenk</td>
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<td>4798</td>
<td>203 Schrenk</td>
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<tr>
<td>Terry Wilson, M5</td>
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<td>6121</td>
<td>111 Schrenk</td>
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<tr>
<td>Terry Wilson, M5</td>
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<td>111 Schrenk</td>
<td><a href="mailto:twilson@mst.edu">twilson@mst.edu</a></td>
</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>
</tr>
</thead>
<tbody>
<tr>
<td>Career Opportunities</td>
<td>303 Norwood</td>
<td>4343</td>
<td><a href="mailto:career@mst.edu">career@mst.edu</a></td>
</tr>
<tr>
<td>Cashier’s Office</td>
<td>G-4 Parker</td>
<td>4195</td>
<td><a href="mailto:cashier@mst.edu">cashier@mst.edu</a></td>
</tr>
<tr>
<td>Counseling Center</td>
<td>204 Norwood</td>
<td>4411</td>
<td><a href="mailto:counsel@mst.edu">counsel@mst.edu</a></td>
</tr>
<tr>
<td>Financial Assistance</td>
<td>G-1 Parker</td>
<td>4285</td>
<td><a href="mailto:financial@mst.edu">financial@mst.edu</a></td>
</tr>
<tr>
<td>Human Resources</td>
<td>113 Centennial Hall</td>
<td>4244</td>
<td><a href="mailto:humanres@mst.edu">humanres@mst.edu</a></td>
</tr>
<tr>
<td>International Affairs</td>
<td>103 Norwood</td>
<td>6208</td>
<td><a href="mailto:international@mst.edu">international@mst.edu</a></td>
</tr>
<tr>
<td>IT Help Desk</td>
<td>Curtis Laws Wilson Library</td>
<td>6357</td>
<td><a href="mailto:helpdesk@mst.edu">helpdesk@mst.edu</a></td>
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<tr>
<td>LEAD Peer Tutoring</td>
<td>105 Norwood</td>
<td>6665</td>
<td><a href="mailto:lead@mst.edu">lead@mst.edu</a></td>
</tr>
<tr>
<td>Library</td>
<td>Curtis Laws Wilson Library</td>
<td>6277</td>
<td><a href="mailto:library@mst.edu">library@mst.edu</a></td>
</tr>
<tr>
<td>Police</td>
<td>G-10 Campus Support Facility</td>
<td>6209</td>
<td><a href="mailto:police@mst.edu">police@mst.edu</a></td>
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<tr>
<td>Registrar</td>
<td>103 Pardee Hall</td>
<td>6181</td>
<td><a href="mailto:registrar@mst.edu">registrar@mst.edu</a></td>
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<tr>
<td>Residential Life</td>
<td>205 W. 12th St.</td>
<td>6218</td>
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<tr>
<td>Student Health Services</td>
<td>910 W. 10th St.</td>
<td>4284</td>
<td><a href="mailto:studenthealth@mst.edu">studenthealth@mst.edu</a></td>
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<td>6279</td>
<td><a href="mailto:ug@mst.edu">ug@mst.edu</a></td>
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<td><a href="mailto:wellness@mst.edu">wellness@mst.edu</a></td>
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<td><a href="mailto:writingcenter@mst.edu">writingcenter@mst.edu</a></td>
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</table>
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: English, speech, drama, art appreciation, music appreciation, philosophy, logic, and literature, excluding foreign language and studio courses.

SOCIAL SCIENCES 9 SEMESTER HOURS
Must include either History 1200, 1300, 1310, 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 biostatistics (MATH 5325).

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: Freshman Seminar, 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 2233: Evolution (3 hours)
- BIO 2263: Ecology (3 hours)
- BIO 4010: Senior Seminar (1 hour)

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 BIO 1113/1213 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). Humanities include: English, speech, drama, art appreciation, music appreciation, philosophy, logic, and literature, excluding foreign language and studio courses.

SOCIAL SCIENCES 18 SEMESTER HOURS
Must include: History 1100 Early Western Civilization (3 Hours), History 1200 Modern Western Civilization (3 Hours). Social sciences include: history, political science, sociology, psychology, economics, and anthropology.

FOREIGN LANGUAGE 11 SEMESTER HOURS
Must include at least one course in each of: literature, philosophy, fine arts.

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: Freshman Seminar, 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: Genetics (3 hours)
- BIO 2263: Ecology (3 hours)
- BIO 4010: Senior Seminar (1 hour)

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 BIO 1113/1213 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. 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:

**HUMANITIES** 18 SEMESTER HOURS

Must include: English 1120 Exposition and Argumentation (3 Hours) English 1160 Writing and Research or 1160 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 a language

**MATHEMATICS/PHYSICAL SCIENCE** 13-15 SEMESTER HOURS

Must include at least one course in math. Two semesters of physics with lab (Physics 1111 or 1145, 1119 or 2145, and 2119). Proven proficiency at college level algebra level (Note - Some med schools require Calculus I)

**COMPUTER SCIENCE/STATISTICS** 3 SEMESTER HOURS

Must include three semester hours of computer science or statistics

**CHEMISTRY** 18 SEMESTER HOURS

Must include: Chemistry 1310,1319,1320, and 1100 general chemistry and labs (8 hours) Chemistry 2210,2220,2219, and 2229 organic chemistry and labs (10 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 1223: Biodiversity Lab (1 hour), BIO 2223: Genetic Lab (1 hour), BIO 2229: Ecology (3 hours), BIO 4010: Seminar (1 hour)

**ELECTIVES** 16 SEMESTER HOURS

Sufficient elective coursework to achieve a minimum of 120 Semester Hours required for graduation in the College of Arts, Sciences, 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 BIO 1113 and 1213 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 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:

**HUMANITIES** 18 SEMESTER HOURS

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

**SOCIAL SCIENCES** 15 SEMESTER HOURS

Must include: History 1100 Early Western Civilization (3 Hours), History 1200 Modern Western Civilization (3 Hours), History 2530: History of Science (3 hours), Political Science 1200: American Government (3 hours), Psychology 1101: General Psychology (3 hours)

**MATHEMATICS/PHYSICAL SCIENCE** 9 SEMESTER HOURS

Must include Math 1103 or higher (3 Hours), Physics 1145 (3 Hours), Geology 1110 (13 Hours)

**COMPUTER SCIENCE/STATISTICS** 3 SEMESTER HOURS

Must include three semester hours of computer science or statistics

**CHEMISTRY** 17 SEMESTER HOURS

Must include: Chemistry 1310,1319,1320, and 1100 General Chemistry (9 hours) Chemistry 2210,2220,2219, and 2229 Organic Chemistry (8 hours)

**BIOLOGICAL SCIENCES** 27 SEMESTER HOURS

Must include twenty-seven 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 1223: Biodiversity Lab (1 hour), BIO 2223: Genetic Lab (1 hour), BIO 2229: Ecology (3 hours), BIO 4010: Seminar (1 hour)

**EDUCATION CERTIFICATE** 42 SEMESTER HOURS

Must include:

Education 1040: Perspectives in Education (2 Hours), Education 1104: Teaching Field Experience (2 Hours), Education 1164: Aiding Elementary, Middle and Secondary School (2 Hours), Education 1174: School Organization (4 Hours), Education 2216: Teaching Reading in Content Area (3 Hours), Education 2221: Historical Foundation American Education (3 Hours), Education 3200: Teaching Methods and Skills in Content Area (6 Hours), Education 4298: Student Teaching Seminar (1 Hour), Education 4299: Student Teaching (12 Hours), Psychology 2300: Educational Psychology (3 Hours), Psychology 3311: Psychological & Educational Development (3 Hours) Psychology 4310: Psychology of the Exceptional Child (3 Hours)
**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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Course descriptions can be found at [http://catalog.mst.edu/undergraduate/degreeprogramsandcourses/biologicalsciences/#courseinventory](http://catalog.mst.edu/undergraduate/degreeprogramsandcourses/biologicalsciences/#courseinventory)
FOUR-YEAR COURSE OFFERING PLAN (4363-6273)

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, 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 Pelc 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 (register.mst.edu). 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 day and time can be obtained from Joe’Ss. The registration time is the earliest you can register for classes; you do not need to register exactly at that time.

REGISTRATION PROCEDURES

Advising week for the following semester occurs during the 10th week of the Semester.
In the biology department, 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 Pelc 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 (register.mst.edu). 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 day and time can be obtained from Joe’Ss. The registration time is the earliest you can register for classes; you do not need to register exactly at that time.

BIOL 1000 Special Topics (Variable) This course is designed to give the department an opportunity to test a new course.
BIOL 1001 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 preq., designed for non-majors, Does not fulfill requirement for biology majors).
BIOL 1101 General Biology (3) A comprehensive study of the general principles of the biology of plants, animals, and prokaryotes including population biology and regulation mechanisms. This course is for non-biology majors. (Entrance requirements: Fall, spring, summer).
BIOL 1103 Biotechnology and Film (3) Unraveling Facts from Fiction at the Movies (3) As advances in biotechnology and biological discoveries increase, so does the inclusiveness of biology in Hollywood movies. Films that use science-based plots can have a significant impact on society by disseminating scientific facts or by providing misinformation. In this course, popular movies will serve as a starting point for discussing the science behind biology-based Hollywood plots, accentuating facts from fiction, and understanding the role of public perceptions on science. The course will include screenings of current and classic films, lectures, and discussions. (No preq., designed for non-majors, Does not fulfill requirement for biology majors) (Spring).
BIOL 1104 Evolution (3) This course will provide a survey of all life, but emphasizes diversity of eukaryotes including plants, fungi, plants, and animals. Emphasis on form, function, ecology, and evolution of plants and animals and other organisms (Fall, spring).
BIOL 1105 Biodiversity (1) This course is designed to accompany instruction in the bryophyta class. Lab and field explorations of the varieties of life, with an emphasis on the role of function, ecology, and evolution of plants and animals and other organisms (Fall, spring).
BIOL 2233 Evolution (3) This course will provide a survey of all life, but emphasizes diversity of eukaryotes including plants, fungi, plants, and animals. Emphasis on form, function, ecology, and evolution of plants and animals and other organisms (Fall, spring).
BIOL 2235 Genetics (3) This course is designed to provide the department an opportunity to test a new course.
BIOL 2236 Biodiversity Lab (1) This lab course is designed to accompany instruction in the bryophyta class. Lab and field explorations of the varieties of life, with an emphasis on the role of function, ecology, and evolution of plants and animals and other organisms (Fall, spring).
BIOL 2237 Environmental Science (3) An introduction to environmental science, with an emphasis on biological aspects of current environmental problems. Topics range from chemical toxicity to global climate change. Environmental challenges facing local species and ecosystems will be emphasized.
BIOL 2238 Biological Sciences 1000 Special Topics (Variable) This course is designed to give the department an opportunity to test a new course.
BIOL 2239 Principles of Biology 1 (3) A comprehensive study of the general principles of the biology of animals. An in-depth study of the fundamental principles governing all living organisms from the cellular to the molecular level. Required for biological science majors. Cannot also receive credit for Bio 1113. (Entrance requirements: Fall).
BIOL 2240 General Biology Lab (1) The laboratory work accompanying general biology consists of experiments and clinics and extend lectures in 110/111. (Prereq. or accompanied by Bio 1113/1113) (Fall, spring).
Biochemistry

Bioinformatics

Virtually all biology majors fulfill the requirements for a minor in chemistry in the normal course of their training. There have been some concerns 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 30 hours in chemistry including the following courses: 1150, 1151, 1152, 1201, 1213, 1229, 1230, 1231, 1232, and either 2280 or 2281 (these total 15). You must complete the precalculus requirement in chemistry and be a regular student in the introductory chemistry sequence.
A minor in chemistry is a popular elective (CHM 4102/4103). Biology majors take most of these courses as part of their major sequence as often Chem 1510/1511/1512 and the necessary precalculus.

Psychology

The department offers four minor optimal degree programs in 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
Minor in Bioinformatics

Prerequisite(s): Bio 1213 and 1219
Cellular Biology

Prerequisites: Bio 3223 and/or Bio 3225

Molecular Genetics (Bio 4232)

Introduction Programming and Labs (CompSci 1760 and 1960)

Data Structures (CompSci 1950)

File Structure and Introduction to Database Systems (CompSci 2000)

Bioinformatics (Bio 5225 or CompSci 5790)

Prerequisite(s): Bio 4225 or CompSci 4790

A strong recommendation to take the course in the minor. (Fall).

Additional courses, 3000 or above in math, biology or computer science, outside of the above courses, may be required at the advisor’s discretion. (Fall).

Check the course catalog for detailed information.
introduction to the techniques used for the 3319 Microbiology Lab (2) their physiology, structure, and contribution to research as well as biomedical studies.

Nanobiotechnology has emerged to change human economy and society in many aspects. Nanobiotechnology (2) describes recent development of microbial genetics in genetic engineering or projects in the department. Consent credit to be arranged with the instructor. This course gives the department an opportunity to test a new course.

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Some courses offered in other departments may count as upper level biology electives. Please consult with your advisor.

- Chem Eng 3200: Biochemical Separations (2)
- Chem Eng 4220: Biochemical Reactor Laboratory (2)
- Env Eng 2602: Biological Fundamentals of Environmental Engineering (5)
- Env Eng 6650: Public Health Engineering (3)
- Env 5642: Sustainability, Population, Energy, Water, and Plastics (3)
- Geol 3631: Systematic Paleontology (3)
- Geol 4641: Micropaleontology (3)
- Nutr Eng 3363: Applied Human Nutrition (3)
- Psych 4410: Neuroscience (3)
- Psych 4411: Sensation and Perception (3)
- Psych 5405: Abnormal Psychology (3)
- Stat 5425: Introduction to Biostatistics (4)

BIOLOGY UNDERGRADUATE COURSES (CONTINUED)

BIOLOGY UNDERGRADUATE COURSES (CONTINUED)

SUCCESS GUIDE

SUCCESS GUIDE

233 Diet and Nutrition (1) This introductory nutrition course provides an overview of the principles of nutritional science. Topics include the description, measurement, and assessment of the factors that influence food intake, nutritional status, and health outcomes. Prerequisites: Co-requisite: Bio Sci 1113 or Bio Sci 1213. (Fall)

2000 Special Problems (Variable) A study of natural and man-made toxicants, various possible routes of exposure, absorption, distribution, biotransformation, specific target sites, and mechanisms of action and effect. This course is designed to provide students with experience in the field of toxicology. (Prerequisite: Bio 283) (Spring)

283 Toxicology (2) A study of natural and man-made toxicants, various possible routes of exposure, absorption, distribution, biotransformation, specific target sites, and mechanisms of action and effect. This course is designed to provide students with experience in the field of toxicology. (Prerequisite: Bio 283) (Spring)

253 Developmental Biology (1) Study of the patterns of development of the vertebrate embryo, the molecular mechanisms underlying the development of vertebrates, and morphogenesis among developing tissues. (Prerequisite: Bio 2353 and Bio 2313) (Spring)

2245 Field Ecology (5) Field-based classes designed to teach students applications of ecological research. Students will study distribution and abundance of organisms in aquatic and terrestrial systems in the Ozarks. Class includes lectures and field sampling in the Rolla area. (Prerequisite: Any biology course. (Gummers)

233 Nutrition (1) This introductory nutrition course provides an overview of the principles of nutritional science. Topics include the description, measurement, and assessment of the factors that influence food intake, nutritional status, and health outcomes. Prerequisites: Co-requisite: Bio Sci 1113 or Bio Sci 1213. (Fall)

2331 Microbiology (1) Study of the general introduction to microbial growth, genetics, and gene function in extreme environments, biogeochemical cycling, bioremediation of contaminants, wastewater pathogens, environmental health course. (Prerequisite: Bio 3313) (Fall)

2333 Molecular Genetics (1) 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. (Prerequisite: Bio 2213 and 2223) (Fall)

2329 Molecular Genetics Laboratory (2) This course provides practical 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. (Prerequisite or accompanied by Bio 4323) (Fall)

2313 Cancer Biology (5) An upper level, advanced level biology course that examines specific cellular processes that go wrong during tumorigenesis. We will discuss cell cycle control, apoptosis, cell migration pathways, DNA repair, telomerase, cell migration and adhesion that are altered in cancer cells. (Prerequisite: Bio 2213) (Fall)

2316 Freshwater Ecology (5) The science 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 2316) (Spring)

2400 Seminar (1) Biology related or projects in the department. Consent credit to be arranged with the instructor. This course gives the department an opportunity to test a new course.

2431 Biomechanics (3) The study of how nutrients are deposited and absorbed, effects of nutrient imbalances, dietary guidelines, and the role of nutrition in weight management, health and disease. (Prerequisite: Preceded or accompanied by Bio Sci 3313) (Fall, spring)

2435 Cancer Biology (3) A study of the molecular genetics of host pathogen interactions. Students will learn about the processes that enable microorganisms to cause disease as well as the disease process within the host. Special emphasis will be placed on recent advances in the molecular genetics of host pathogen interaction. (Prerequisite: Bio 3313) (Fall)

2433 Genomics (3) This course offers a general overview of the field of genomics. Topics covered include genome sequencing and annotation, transcription, proteomics, metabolomics, genomic variation, assembly of human, and several animal, and microbial genome sequences. (Prerequisite: Bio 4323) (Spring)

2455 General Virology (3) An overview of the field of virology, including plant, animal, and bacterial viruses. Discussions will include morphology, classification, virus-host interactions, genetics, clinical and industrial aspects of viruses, and viruses as model systems for basic biological research. (Prerequisite: Bio 2313; Bio 2213) (Spring)

2463 Neurobiology (3) The study of the patterns of development of the vertebrate embryo, the molecular mechanisms underlying the development of vertebrates, and morphogenesis among developing tissues. (Prerequisite: Bio 2353 and Bio 2313) (Spring)

2332 Introduction to Environmental Microbiology (3) The study of microbial growth and kinetics, life in extreme environments, biogeochemical cycling, bioremediation of contaminants, wastewater pathogens, environmental health course. (Prerequisite: Bio 3313) (Fall)

2325 Biostatistics (3) This course will introduce advanced statistical methods to biology, designed to provide students with experience in the field of toxicology. (Prerequisite: Bio 3313) (Fall)

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Graduate Course Descriptions

Students with senior standing may take graduate courses with permission of 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 Research Investigation of an advanced nature leading to the preparation of a thesis or dissertation.

6200 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 on S&T campus in ongoing research.

6210 Biometrics II: This course will introduce graduate students to a broad array of topics in biometrics, including: stochastic, survival, and survival models. For a complete list of topics, please refer to the course syllabus.

6313 Advanced Freshwater Ecology (See Bio 4191)

6315 Advanced Toxicology (See Bio 4181)

6442 Astrobiology: The origins of life on 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.

6453 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.

6513 Advanced Microbial Metabolism A survey of the diverse metabolic properties of microorganisms. Course material will emphasize key metabolic pathways and how they relate to microbial diversity and microbial ecology.

Volunteering

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

Bios 4099

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

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 post-doctoral fellows or graduate students. Opportunities for undergraduate research include:

- Volunteer opportunities
- Research Experience for Undergraduate (REU) program
- Paid research assistant positions
- Summer undergraduate research programs at other universities.

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- Summer undergraduate research programs at other universities.
CO-OPERATIVE EDUCATION (CO-OP)

Biology sciences 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 303 Nifong 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. (Full-time is defined as satisfactorily carrying and passing a minimum of 12 credit hours in a fall or spring semester and a minimum of six hours in a summer session.)
- have a cumulative GPA of at least 2.0 out of 4.0 to apply and participate in the program.
- not be on any type of probation.
- 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. Financial need is not a determining factor as to which students are employed. A transfer student 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 semester. 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 co-op 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 employers 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.

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.

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APPLYING TO GRADUATE SCHOOLS

Many S&T Biology alumni, continue on to graduate school after completing their bachelors 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 bachelors 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 4099 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 Schenck 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.etf.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.
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 Admission 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. ACOMAS (osteopathic medicine), AADAS (dental schools)

When is the admission deadline? Admission 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 websites for each medical school or www.aamc.org or the Medical School Admissions Record (MSAR) for school or www.aamc.org or the Medical School Admissions Record (MSAR) for most medical schools?

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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 Reviews), 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.

What is needed for the admission process? Each professional school will require an admissions test such as the MCAT, DAT, PCAT or GRE before they review your application. The MCAT exam is offered several times a year from January to September. The GRE is also offered several times. All tests are computer based and offered in testing centers. Spaces are limited so plan early for when you want to take the test. Be aware that MCAT scores will be released 30 days following the exam, so the September score will not be available until October. This may be too late for schools with early application deadlines. Many students take the MCAT exam more than once.

What courses should be completed before taking the entrance exam? For the MCAT, it is assumed that the minimum course requirements for admission to medical school will have been taken before attempting the exam. The exam is designed to test your knowledge of these subjects. The minimum requirements generally consist of a year of biology, two years of chemistry (one year of inorganic, one year of organic), a year of physics and one year of writing.

How does one register for admissions tests? Registration must be done on-line at www.aamc.org/students/mcat. Regular registration closes about five weeks before the test date; late registration ends three weeks before. Computer-based testing sites are limited as register as early as possible to get your desired test date.

How can a pre-health professions student 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

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How does one register for admissions tests?

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.

Preparing for the Entrance Exam

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Anything else that should be completed before applying to professional schools? Health profession 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 exposures vary from profession to profession. For example, veterinary schools require a minimum of 100 shadowing hours but expect significantly more.

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Anything else that should be completed before applying to professional schools? Health profession 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 exposures vary from profession to profession. For example, veterinary schools require a minimum of 100 shadowing hours but expect significantly more.
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 those programs. Consult their websites and speak to Dr. Katie Shannon, chair of the pre-medical advisory committee for more information.

Students accepted into the pre-admission programs 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/ahc/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 3.0 math/science GPA and a 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)

PRE-ADMISSION PROGRAMS

The Reserved Admission Program for the Doctor of Dental Surgery (DDS) degree at the UMKC School of Dentistry enables highly motivated, ambitious, talented Missouri and Kansas residents to pursue their dream of becoming a dentist. Admission to the UMKC School of Dentistry’s DDS program is very competitive. Approximately 1,000 candidates apply every year for a limited number of seats. Reserved Admission Program students will have a reserved seat in a future UMKC DDS Program class.

Website: dentistry.umkc.edu/future_students/reserved_admitt.html

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 (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.

STILL SCHOLARS PROGRAM FOR PRE-OSTEOPATHIC STUDENTS - AT. STILL COLLEGE OF OSTEOPATHIC MEDICINE

Missouri S&T students may enroll in any major, provided the entry requirements are met by the designated year of enrollment. Missouri S&T students will apply for admittance to this program after completing three semesters (approximately 45 credit hours) as a Missouri S&T student. Applications will be available online in January of a student’s sophomore year and will be due to the Missouri S&T pre-health advisor on April 1. Applications of students selected for nomination by Missouri S&T must be submitted to A.T. Still College of Osteopathic Medicine by June 1. Applicants will interview during the summer following their sophomore year. Selected students will be awarded reserved admissions to RCOM at the beginning of the junior year.

Website: www.atu.edu/bcom/admissions/preparing_do_admission/still_scholars/

Applicant Criteria
• Minimum 28 composite ACT score or 1860 SAT score
• Minimum grade point average (GPA) of 3.40 overall and 3.40 in the sciences

STUDENT ORGANIZATIONS

Any students interested in joining these or another organization can join through OrgSync.

HELIX

HELIX is a Life Science Social Club and a student branch of the American Society of Microbiology. Here you can make new friends, and take part in activities, trips and volunteer projects. Our mission is to promote an appreciation and understanding of the biological sciences, and to foster stronger academic, social, and campus leadership. Regular membership is open to all S&T students not on scholastic probation at the time of joining. This includes biological sciences majors, minors, and anybody who just likes having fun helping others. Associate membership is open to members of the S&T faculty who have an interest in the biological sciences and the organization HELIX. Associate members have all rights and privileges of the organization except for the right to hold office.

If you have any questions about HELIX, please contact a HELIX officer or the HELIX advisor, Dr. Melanie Horman (mmaniel@mst.edu).

Our web page is: http://web.mst.edu/~helix

Our Facebook page is: www.facebook.com/MissouriStateUniversityHELIX

PHI SIGMA

Phi Sigma is a biological honors society that invites juniors and seniors with a 3.0 cumulative GPA and 60 completed credit hours to become initiated members. We are dedicated to the promotion of research and academic excellence in biological sciences. We also strive to better the local community through service events and highway clean ups. If you have any questions about Phi Sigma, contact a Phi Sigma officer of the Phi Sigma advisor Dr. Ron Frank (frank@mst.edu).

Our Facebook page: www.facebook.com/phisigmagammaiota

SCRUBS

Scrubs is open to students from any degree program interested in health care related careers. The goals of Scrubs are: 1) to promote an appreciation and understanding of all health related scientific fields; 2) to foster stronger academic, social, and campus leadership; 3) to promote scientific knowledge and intellectual curiosity through personal associations and exchange of ideas; 4) to promote communications among students interested in medicine, dentistry, pharmacy, veterinary science and physical therapy; 5) to promote awareness of career opportunities available in the fields of medicine, dentistry, pharmacy, veterinary science and physical therapy; and 6) to foster awareness and understanding of the process of applying to and preparing for a position in the fields listed above.

If you have any questions about Scrubs, please contact a Scrubs officer or the Scrubs advisor Dr. Katie Shannon (shannonk@mst.edu).

Our web page is: web.mst.edu/~scrubs

IGEM

International Genetically Modified Machine (IGEM) is an interdisciplinary team of students working to design and construct genetically engineered microorganisms. The team is a member of the Student Design and Experiential Learning Center and competes in the annual IGEM Jamboree in Boston. Each year the team plans and carries out a new project using synthetic biology to solve a real world problem.

If you have any questions about IGEM you can contact an IGEM officer or one of the IGEM advisors, Dr. Dave Westenberger (dwesten@mst.edu), or Dr. Shannon (shannonk@mst.edu).

Our web page is: http://igem.mst.edu

Our Facebook page is: www.facebook.com/igemst

Twitter: https://twitter.com/igemst
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 within 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, pcrcm.com
- Planned Parenthood – 364-1509
- Poison Control – 800-366-8888
- Russell House – 364-0222
- Suicide Hotline – 800-395-2132