

**YOUR GUIDE
TO SUCCESS
IN BIOLOGY AT
MISSOURI S&T**

MISSOURI S&T

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

WELCOME FIRST YEAR AND TRANSFER STUDENTS

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

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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.

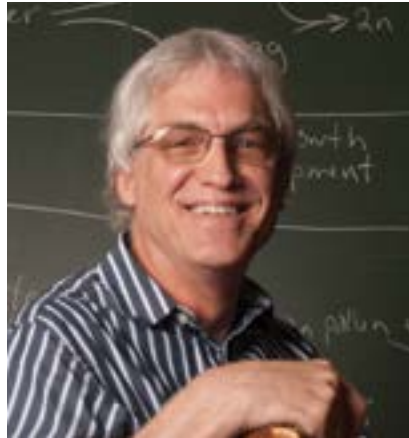
How to make the most of the student-professor relationship

- 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:

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:

General Genetics (BIO 2223), Evolution (BIO 2233), Molecular Genetics (BIO 4323), Genomics (BIO 5333)

WEBSITE:

web.mst.edu/~rfrank



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
Eusocial 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.mst.edu/~houch



YUE-WERN HUANG, PH.D.

Professor
Director, Laboratory of Bionanotechnology and Molecular Toxicology

RESEARCH INTERESTS:

Nanomedicine: 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:

Ecology (BIO SCI 2263), Toxicology (BIO SCI 4383/6383), Techniques in Applied and Environmental (BIO SCI 6273), Public Health (BIO SCI 2372), Nanobiotechnology (BIO SCI 3001/5001), Tissue Engineering (BIO SCI 5240/6240)

WEBSITE:

www.mst.edu/~huangy



MELANIE MORMILE, PH.D.

Professor
Laboratory of Environmental Microbiology

RESEARCH INTERESTS

Anaerobic 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 4313), Introduction to Astrobiology (BIO SCI 3001), Environmental Microbiology (BIO 6313), Advanced Biodiversity (BIO SCI 5423), Advanced Microbial Metabolism (BIO SCI 6513), Astrobiology (BIO SCI 6423), Bioremediation (BIO 6463), (BIO 3001) Introduction to Geomicrobiology, (BIO SCI 5001) Geomicrobiology.

WEBSITE

www.mst.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), Freshwater Ecology (BIO SCI 4363), Global Ecology (BIO SCI 4463)

WEBSITE

www.mst.edu/~niyogid

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 a resource 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 Pelc**, Office Support IV, 573-341-6008
- **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 Watters**, 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.PH in Public Health, 2003
Tulane University, New Orleans, Ph.D. in Molecular and Cell Biology, 2009

COURSES TAUGHT:

Introduction to Biomedical Engineering (Cer Eng 3010) Stem Cell Biology (BIO SCI 5001), Tissue Engineering (BIO SCI 5353)

WEBSITE:

web.mst.edu/~jsemon



KATIE B. SHANNON, PH.D.

Associate Teaching Professor
Director, Laboratory of Cytokines
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 4353/6353), Developmental Biology (BIO SCI 5353), Senior Seminar (BIO SCI 4010)

WEBSITE:

www.mst.edu/~shannonk openwetware.org/wiki/User:Katie_B_Shannon



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:

General Biology (BIO SCI 1213); General Biology Lab (BIO SCI 1219); Genetics (BIO SCI 2223); Plant Biology (BIO SCI 2383)



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

(BIO SCI 3333) Anatomy & Physiology, (BIO SCI 2001) Sleep Function & Dysfunction



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 3313) and Microbiology Lab (BIO SCI 3319), General Genetics (BIO SCI 2223), Microbial Genetics (BIO SCI 3001), Pathogenic Microbiology (BIO SCI 5313), Biological Design and Innovation (BIO SCI 3783), Advanced Microbial Metabolism (BIO SCI 3001/6513)

WEBSITE:

www.mst.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 2263), General Biology Lecture (BIO 1113) and Lab (BIO 1219), Principles of Biology (BIO SCI 1213), Cell Biology Lab (BIO SCI 2219), Biodiversity lecture (BIO SCI 1223) and Lab (BIO SCI 1229)

WEBSITE:

www.mst.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

Name	Office	Phone	Lab	Email
BioSci office	143 Schrenk	4831	-	biosci@mst.edu
Jessica Pelc	143B Schrenk	6008	-	pelcj@mst.edu
Stephanie Lewis	143 Schrenk	4831	-	lewisstep@mst.edu
Richard Watters	110G Schrenk	4029	-	rjwhg6@mst.edu
Dr. David Duvernell	143A Schrenk	6988	G-7 Schrenk	duverneld@mst.edu
Dr. Ron Frank	105 Schrenk	4861	105 Schrenk	rfrank@mst.edu
Dr. Chen Hou	M-6 Schrenk	6360	110B, C and F Schrenk	houch@mst.edu
Dr. Yue-Wern Huang	104 Schrenk	6589	127 Schrenk	huangy@mst.edu
Dr. Melanie Mormile	M-2 Schrenk	6346	301/302 Schrenk	mmormile@mst.edu
Dr. Dev Niyogi	110E Schrenk	7191	211 Schrenk	niyogid@mst.edu
Dr. Julie Semon	306 Schrenk	6606	206 Schrenk	semonja@mst.edu
Dr. Ning Sui	M-5 Schrenk	7274	-	suin@mst.edu
Dr. Katie Shannon	M-1 Schrenk	6336	102, Schrenk	shannonk@mst.edu
Dr. Matt Thimgan	G-13 Schrenk	7190	G-13, 110D Schrenk	thimgan@mst.edu
Dr. Dave Westenberg	202 Schrenk	4798	203 Schrenk	djwesten@mst.edu
Terry Wilson, MS	111A Schrenk	6121	111 Schrenk	twilson@mst.edu

S&T CAMPUS SUPPORT SERVICES

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

Name	Office	Phone	Email	Website
Career Opportunities	303 Norwood	4343	career@mst.edu	career.mst.edu
Cashier's Office	G-4 Parker	4195	cashier@mst.edu	cashier.mst.edu
Counseling Center	204 Norwood	4211	counsel@mst.edu	counsel.mst.edu
Financial Assistance	G-1 Parker	4282	SFA@mst.edu	sfa.mst.edu
Human Resources	113 Centennial Hall	4241	hrsinfo@mst.edu	hr.mst.edu
International Affairs	103 Norwood	4208	ia@mst.edu	international.mst.edu
IT Help Desk	Curtis Laws Wilson Library	4357	help@mst.edu	helpdesk.mst.edu
LEAD Peer Tutoring	105 Norwood	6665	lead@mst.edu	lead.mst.edu
Library	Curtis Laws Wilson Library	4227	library@mst.edu	library.mst.edu
Police	G-10 Campus Support Facility	4300	police@mst.edu	police.mst.edu
Registrar	103 Parker Hall	4181	registrar@mst.edu	registrar.mst.edu
Residential Life	205 W. 12th St.	4218	reslife@mst.edu	reslife.mst.edu
Student Health Services	910 W. 10th St.	4284	mstshs@mst.edu	studenthealth.mst.edu
Testing Center	G-10 Norwood	4222	testctr@mst.edu	testcenter.mst.edu
Undergraduate Advising	106 Campus Support	6665	lead@mst.edu	learn.mst.edu
Undergraduate Studies	105 Norwood Hall	7276	ugs@mst.edu	ugs.mst.edu
Wellness Programs	910 W. 10th St.	4284	mstshs@mst.edu	studenthealth.mst.edu/wellness
Writing Center	113 Campus Support Facility	4436	wac@mst.edu	writingcenter.mst.edu

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 semesters 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 (2 hours), BIO 1223: Biodiversity (3 hours), BIO 1229: Biodiversity Lab (1 hour), BIO 2213: Cellular Biology (3 hours), BIO 2219: Cell Bio Lab (1 hour), BIO 2233: Evolution (3 hour), BIO 2223: 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
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 1223: Biodiversity (3 hours), BIO 1229: Biodiversity 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) Nine semester hours of advanced elective coursework (2000 level or above)	
ELECTIVES	16 SEMESTER HOURS
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:

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
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, 2111 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 (3 hours), BIO 1229: Biodiversity 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) Nine Semester hours of advanced elective coursework (2000 level or above), (BIO 3333 (Anatomy and Physiology I) or BIO 3343 (Anatomy and Physiology II) and Chemistry 3419 (Biochemistry) recommended)	
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 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 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 160 Technical Writing (3 Hours), SP&M S 1185: Principle of Speech (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 (3 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 Organic Chemistry (6 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 (3 hours), BIO 1229: Biodiversity Lab (1 hour), BIO 1173: Introduction to Environmental Science (3 hours), BIO 2213: Cellular Biology (3 hours), BIO 2219: Cell Bio Lab (1 hour), BIO 2223: Genetics (3 hours), BIO 2233: Evolution (3 hours), BIO 2263: Ecology (3 hours), BIO 4010: Senior 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 (2 Hours), Education 2216: Teaching Reading in Content Area (3 Hours), Education 2251: Historical Foundation American Education (3 Hours), Education 3280: 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.

Course	Title	FS17	SP18	FS18	SP19
1113	General Biology	Sui	Sui	Sui	Sui
1163	Biotech in media	—	Hou	—	Hou
1173	Intro Env Sci	—	Niyogi	—	Niyogi
1201	Intro to Biol Sci	Shannon	—	Shannon	—
1213	Principles of Biology	Wilson	—	Wilson	—
1219	General Biology Lab	Sui	Sui	Sui	Sui
1223	Biodiversity	Niyogi	Wilson	Niyogi	Wilson
1229	Biodiversity Lab	Wilson	Wilson	Wilson	Wilson
2001	Mammal Ecology	—	—	—	—
2213	Cell Biology	Shannon	Shannon	Shannon	Shannon
2219	Cell Biology Lab	Wilson	Wilson	Wilson	Wilson
2223	Genetics	Sui	Frank	Sui	Frank
2233	Evolution	Frank	—	Frank	—
2242	Cave Biology	—	—	—	—
2243	Sleep Bio	—	Thimgan	—	Thimgan
2252	Vegetation of the Ozarks	—	—	—	—
2263	Ecology	Huang	Niyogi	Huang	—
2264	Field Ecology	—	—	—	—
2333	Nutrition	—	—	—	—
2372	Issues in Public Health	Huang	—	Huang	—
2383	Plant Biology	—	Sui	—	Sui
3313	Microbiology	Westenberg	Westenberg	—	Westenberg
3319	Microbiology Lab	—	Westenberg	—	Westenberg
3333	A&P 1	Thimgan	—	Thimgan	—
3339	A&P 1 lab	Staff	—	Staff	—
3343	A&P 2	—	Hou	—	Hou
3349	A&P 2 lab	—	Staff	—	Staff
3483	Biomedical problems	—	—	—	—
3001	Biology of Aging	—	Hou	—	Hou
3001	Geomicrobiology	—	—	—	—
3001?	Intro to Biomedical Eng	—	Semon	—	Semon
3783	Biological Design	Semon	—	Semon	—
4010	Senior Seminar	Shannon	—	Shannon	—
4313	Environ Microbiology	—	—	—	—
4323	Molecular Genetics	Frank	—	Frank	—
4329	Mol Genetics Lab	—	—	—	—
4353	Cancer Cell Biology	Shannon	—	Shannon	—

Course descriptions can be found at <http://catalog.mst.edu/undergraduate/degreeprogramsandcourses/biologicalsciences/#courseinventory>

Course	Title	FS19	SP20	FS20	SP21	SUM
1113	General Biology	Sui	Sui	Sui	Sui	—
1163	Biotech in media	—	Hou	—	Hou	—
1173	Intro Env Sci	—	Niyogi	—	Niyogi	—
1201	Intro to Biol Sci	Shannon	—	Shannon	—	—
1213	Principles of Biology	Wilson	—	Wilson	—	—
1219	General Biology Lab	Sui	Sui	Sui	Sui	—
1223	Biodiversity	Niyogi	Wilson	Niyogi	Wilson	—
1229	Biodiversity Lab	Wilson	Wilson	Wilson	Wilson	—
2001	Mammal Ecology	—	—	—	—	—
2213	Cell Biology	Shannon	Shannon	Shannon	Shannon	—
2219	Cell Biology Lab	Wilson	Wilson	Wilson	Wilson	—
2223	Genetics	Sui	Frank	Sui	Frank	—
2233	Evolution	Frank	—	Frank	—	Hou
2242	Cave Biology	—	—	—	—	Potter
2243	Sleep Bio	—	Thimgan	—	Thimgan	—
2252	Vegetation of the Ozarks	—	—	—	—	Thomas
2263	Ecology	Huang	Niyogi	Huang	Niyogi	—
2264	Field Ecology	—	—	—	—	Niyogi
2333	Nutrition	—	—	—	—	—
2372	Issues in Public Health	Huang	—	Huang	—	—
2383	Plant Biology	—	Sui	—	Sui	—
3313	Microbiology	—	Westenberg	—	Westenberg	—
3319	Microbiology Lab	—	Westenberg	—	Westenberg	—
3333	A&P 1	Thimgan	—	Thimgan	—	—
3339	A&P 1 lab	Staff	—	Staff	—	—
3343	A&P 2	—	Hou	—	Hou	—
3349	A&P 2 lab	—	Staff	—	Staff	—
3483	Biomedical problems	—	—	—	—	—
3001	Biology of Aging	—	Hou	—	Hou	—
3001	Geomicrobiology	—	—	—	—	—
3001?	Intro to Biomedical Eng	—	Semon	—	Semon	—
3783	Biological Design	Semon	—	Semon	—	—
4010	Senior Seminar	Shannon	—	Shannon	—	—
4313	Environ Microbiology	—	—	—	—	—
4323	Molecular Genetics	Frank	—	Frank	—	—
4329	Mol Genetics Lab	—	—	—	—	—
4353	Cancer Cell Biology	Shannon	—	Shannon	—	—

Course descriptions can be found at <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.

Course	Title	FS17	SP18	FS18	SP19
4363	Freshwater Ecology	Niyogi	—	Niyogi	—
4383	Toxicology	—	Huang	—	Huang
4666	Nanobiotech	—	Huang	—	Huang
5001	Regen Medicine	Semon	—	Semon	—
5210	Biomaterials I	—	—	—	—
5240	Tissue Engineering I	—	Semon	—	Semon
5313	Pathogenic Microbiology	Westenberg	—	—	—
5323	Bioinformatics	—	—	—	—
5333	Genomics	—	Frank	—	Frank
5353	Developmental Biology	—	Shannon	—	Shannon
5423	Advanced Biodiversity	—	—	—	—
5433	Neurobiology	—	Thimgan	—	Thimgan
5463	Global ecology	—	—	—	Niyogi
5533	Pharmacology	—	—	—	—
6001	Microbial genetics	—	—	Westenberg	—
6223	Proposal writing	—	—	—	—
6202	Problems in AEB	—	Staff	—	Staff
5010	Graduate Seminar	Staff	Staff	Staff	Staff
6513	Adv Microb Metab	—	—	—	—
6353	Adv Cancer Cell Biology	Shannon	—	Shannon	—
6210	Biomaterials II	—	—	—	—
6240	Tissue Engineering II	—	Semon	—	Semon
6313	Environ Micro	—	—	—	—
6423	Astrobiology	—	Mormile	—	—
6363	Adv Freshwater Ecology	Niyogi	—	Niyogi	—
6463	Bioremediation	—	—	—	—
6383	Adv Toxicology	—	Huang	—	Huang
6273	Techniques in AEB	Huang	Huang	Huang	Huang

Course descriptions can be found at <http://catalog.mst.edu/undergraduate/degreeprogramsandcourses/biologicalsciences/#courseinventory>

Course	Title	FS19	SP20	FS20	SP21	SUM
4363	Freshwater Ecology	Niyogi	—	Niyogi	—	—
4383	Toxicology	—	Huang	—	Huang	—
4666	Nanobiotech	—	Huang	—	Huang	—
5001	Regen Medicine	Semon	—	Semon	—	—
5210	Biomaterials I	—	—	—	—	—
5240	Tissue Engineering I	—	Semon	—	Semon	—
5313	Pathogenic Microbiology	Westenberg	—	—	—	—
5323	Bioinformatics	—	—	—	—	—
5333	Genomics	—	Frank	—	Frank	—
5353	Developmental Biology	—	Shannon	—	Shannon	—
5423	Advanced Biodiversity	—	—	—	—	—
5433	Neurobiology	—	Thimgan	—	Thimgan	—
5463	Global ecology	—	—	—	Niyogi	—
5533	Pharmacology	—	—	—	—	—
6001	Microbial genetics	—	—	Westenberg	—	—
6223	Proposal writing	—	—	—	—	—
6202	Problems in AEB	—	Staff	—	Staff	—
5010	Graduate Seminar	Staff	Staff	Staff	Staff	—
6513	Adv Microb Metab	—	—	—	—	—
6353	Adv Cancer Cell Biology	Shannon	—	Shannon	—	—
6210	Biomaterials II	—	—	—	—	—
6240	Tissue Engineering II	—	Semon	—	Semon	—
6313	Environ Micro	—	—	—	—	—
6423	Astrobiology	—	Mormile	—	—	—
6363	Adv Freshwater Ecology	Niyogi	—	Niyogi	—	—
6463	Bioremediation	—	—	—	—	—
6383	Adv Toxicology	—	Huang	—	Huang	—
6273	Techniques in AEB	Huang	Huang	Huang	Huang	—

Course descriptions can be found at <http://catalog.mst.edu/undergraduate/degreeprogramsandcourses/biologicalsciences/#courseinventory>

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 JoeSS. 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 report via JoeSS 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.mst.edu). Here you

will also find instructions for registering for courses on the JoeSS website. This site also provides access to your grades, CAPS report, and unofficial transcripts.

Registration for courses is done either by phone or by JoeSS. 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 JoeSS. The registration time is the earliest you can register for classes; you do not need to register exactly at that time.

MINORS

Biology students frequently choose to minor in other disciplines. Here are the requirements for some of the more popular minors.

Bioinformatics

- Principles of Biology (Bio 1213 and 1219)
- Cellular Biology (Bio 2213) or General Genetics (Bio 2223)
- Molecular Genetics (Bio 4323)
- Introductory Programming and Labs (CompSci 1570 and 1580)
- Data Structures I (CompSci 1510)
- File Structure and Introduction to Database Systems (CompSci 2300)
- Biostatistics (Stat 5325)
- Bioinformatics (Bio 5323/CompSci 5789). *It is strongly recommended that this course be taken after the other biology and computer science requirements.*
- One additional courses, 3000 or above in math, biology or computer science, outside of the major area of study, and as agreed upon by the minor advisor (3+ 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: 1310, 1319, 1320, 1100, 1510, 2210, and either 2289 or 2219 (these total 16). The remainder can be from 2510 or 2000 or 3000 level courses. Biochemistry is a popular elective (CHEM 4610/4619).

Biology majors take most of these courses as part of their curriculum. The exception is often Chem 1510 (Qualitative Analysis, lab, 2 hrs). Students who have not taken Chem. 1510, may substitute for it, but then 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 their signature, then bring it to the registrar.

Psychology

The department offers four minor optional 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

BIOLOGY UNDERGRADUATE COURSE DESCRIPTIONS

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

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 prereq, designed for non-majors, Does not fulfill requirement for biology majors).

1113 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) Untangling Facts from Fiction at the Movies (3) As advances in biotechnology and biological discoveries increase, so does the inclusion 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, ascertaining 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 prereq, designed for non-majors, Does not fulfill requirement for biology majors). (Spring)

1173 Introduction to 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.

1201 Introduction to Biological Sciences (1) An introduction to the study of biology at S&T. Students will consider personal and professional opportunities within the various areas of biology and become acquainted with the biological sciences faculty and departmental and campus facilities. (Required for biological sciences majors). (Fall)

1213 Principles of Biology (3) A comprehensive study of the general principles of the biology. An in-depth study of the fundamental principles governing all living organisms from the molecular to the population level. Required for biological science majors. Cannot also receive credit for Bio 1113. (Entrance requirements) (Fall)

1219 General Biology Lab (2) The laboratory work accompanying general biology consists of experiments designed to supplement and extend lectures in 110/111. (Preceded or accompanied by Bio 1113/1213) (Fall, spring)

1223 Biodiversity (3) This course provides a survey of all life, but emphasizes diversity of eukaryotes including protists, fungi, plants, and animals. Emphasis is on form, function, ecology, and evolution of plants and animals and other organisms (Fall, spring)

1229 Biodiversity lab (1) This lab course is designed to accompany instruction in the biodiversity class. Lab and field explorations of the varieties of life, with an emphasis on form, function, ecology, and evolution of plants and animals and other organisms (Fall, spring)

2001 Special Topics (Variable) This course is designed to give the department an opportunity to test a new course.

2213 Cellular Biology (3) Study of the structure and function of eukaryotic and prokaryotic cells. Emphasis on macromolecules, metabolic pathways, and subcellular organelles. (Fall, spring)

2219 Cellular Biology Lab (1) Laboratory work includes microscopy, biochemical assays, enzymology, and genetic analysis. (Prerequisite: Preceded or accompanied by Bio Sci 2213) (Fall, spring)

2372 Issues in Public Health (2) Issues in Public Health investigates chronic and infectious diseases and the impact of globalization on such diseases, environmental toxins, and controversies in public health. Students will develop an awareness of current public health issues and trends in order to make informed arguments and personal choices. (Prerequisite: Bio Sci 1113 or Bio Sci 1213). (Spring)

2383 Plant Biology (3) An intermediate class covering plant form and function. Topics include the cellular structures unique to plants, their life cycles, and the mechanisms they use to survive, reproduce, and convert solar energy into a form usable by all other organisms. (Prerequisite: Bio 1213)(Spring)

2223 General Genetics (3) The study of the principles of heredity and reasons for variation in plants and animals. A study of Mendelian principles and population genetics with emphasis on the human. (Fall, spring)

2233 Evolution (3) A survey of the genetic and environmental mechanisms associated with organic evolution. (Fall, summer)

2242 Cave Biology (2) The study of cave organisms and cave ecosystems. Covering such topics as growth of speleothems, caves as a natural laboratory, behavior of cave animals, and regressive characteristics of cave species. Investigating the relationship between Karst topography (caves, springs, sinkholes) and underground water contamination. (Prerequisites: Any geology, environmental engineering, or biological sciences class except Bio Sci 1201). (Summer)

2243 Sleep: Function and Dysfunction (3) Learn the genes, proteins, and anatomy that govern sleep regulation. The course will also cover how sleep deprivation changes the body and degrades health and performance as well as sleep disorders that may disrupt sleep. (Prerequisites: Bio Sci 1213.) (Spring)

2252 Vegetation 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 class meets each day from 9-5. Trips will be arranged to local field sites at no extra cost. (Prerequisites: Bio Sci 1213 or Bio Sci 1113.) (Summer)

(Continued on page 22)

BIOLOGY UNDERGRADUATE COURSES (CONTINUED)

2263 Ecology (3) Relationships among living organisms and their environments. The structure and function of ecosystems, with emphasis on limiting environmental factors, symbiotic relationships, biogeochemical cycles, food chain relationships, population dynamics, and man in the environment. (Fall, spring)

2264 Field Ecology (2) Field-based class 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). (Summer)

2333 Nutrition (3) This introductory course provides an overview of the principles of nutritional science. Topics include the description and functions of nutrients, how nutrients are digested and absorbed, effects of nutrient imbalances, food sources, nutrient interactions, dietary guidelines, and the role of nutrition in weight management, health and disease. (Prerequisites: Bio Sci 1113 or Bio Sci 1213). (Fall)

3000 Special Problems (Variable) Problems or reading on specific subjects or projects in the department. Consent of the instructor is required.

3001 Special Topics (Variable) This course gives the department an opportunity to test a new course.

3001 Microbial Genetics (3) A study of the mechanisms of the control of gene expression, genetic modification and evolution of microorganism. The course will examine applications of the principles of microbial genetics in genetic engineering through analysis of the current literature in the field. (Prerequisite: Bio 3313) (Fall)

3001 Nanobiotechnology (2) Nanobiotechnology has emerged to change human economy and society in many aspects. Applications of nanobiotechnology in life sciences is termed nanobiotechnology. The course describes recent development of nanobiotechnology in fundamental biological research as well as biomedical studies. (Prerequisites Bio 2213 and Bio 2223) (Fall)

3313 Microbiology (3) General introduction to the culture and study of microorganisms, their physiology, structure, and contribution to biology. (Prerequisite: Bio 2213) (Fall, spring)

3319 Microbiology Lab (2) General introduction to the techniques used for the culture and identification of microorganisms, their physiology, structure, and contribution

to biology. Prerequisite: Preceded or accompanied by Bio Sci 3313. (Fall, spring)

3333 Human Anatomy & Physiology I (3) First Semester of a two semester sequence dealing with the structure and function of human organ systems. (Prerequisite: Bio 1213 & Bio 2213) (Fall)

3339 Human Anatomy and Physiology I Lab (1) Laboratory accompanying human anatomy & physiology I (Bio 3333). This course may be taken separately at a later date. (Prerequisite: Preceded or accompanied by Bio Sci 3333) (Fall)

3343 Human Anatomy & Physiology II (3) Second Semester of a two semester sequence dealing with the structure and function of human organ systems. (Prerequisite: Bio 1213 & Bio 2213) (Spring)

3349 Human Anatomy and Physiology II Lab (1) Laboratory accompanying human anatomy & physiology II (Bio 3343). This course may be taken separately at a later date. (Prerequisite: Preceded or accompanied by Bio Sci 3343) (Spring)

3483 Biomedical Problems (3) This course will use a problem-based learning approach to examine biological aspects of various medical conditions. Students will work in groups and individually to answer problems related to diagnostic testing and evaluation of diseases and other medical conditions. (Spring)

3783 Biological Design and Innovation I (3) Students identify significant problems in biological/biomedical sciences, and then design and implement innovative solutions using advanced techniques. Students present and defend proposals and results. (Prerequisite: At least two 2000 level or higher Biology courses). (Spring)

4010 Seminar (1) Biology related service course requiring teamwork. (Prerequisite: Senior standing) (Fall)

4099 Undergraduate Research (Variable) Designed for the undergraduate student who wishes to engage in research. Not for graduate credit. Not more than six hours for graduation credit. Subject and credit to be arranged with the instructor. (Prerequisite: Consent of the instructor)

4313 Introduction to Environmental Microbiology (3) The study of microbial growth and kinetics, life in extreme environments, biogeochemical cycling, bioremediation of contaminants, waterborne pathogens, environmental biotechnology. (Prerequisite: Bio 3313) (Fall)

4323 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. (Prerequisite: Bio 2213 and 2223) (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)

4353 Cancer Biology (3) An upper level, advanced cell biology course that examines cellular processes that go awry during tumorigenesis. We will discuss cell cycle controls, signal transduction pathways, DNA repair, telomerase, cell migration and adhesion that are altered in cancer cells. (Prerequisite: Bio 2213) (Fall)

4363 Freshwater Ecology (3) The ecology of streams, lakes, and wetlands. Through the physical and chemical characteristics of freshwater environments, the diversity of life in freshwaters, biogeochemical processes, and threats to freshwater systems. Assignments will include problem sets, short papers, and a group presentation. (Prerequisite: Bio 2263) (Fall)

4383 Toxicology (3) A study of natural and man-made toxicants, various possible routes of exposure, absorption, distribution, biotransformation, specific target sites, and mechanisms, involved in elicitation of toxic effects, as well as detoxification an excretion. (Prerequisite: Bio 2353, Bio 2213) (Spring)

4493 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 studies. (Prerequisite: Bio 3313) (Fall)

5001 Special Topics (Variable) This course is designed to give the department an opportunity to test a new course.

5323 Bioinformatics (3) The course will familiarize students with the application of computational methods to biology, as viewed from both perspectives. It will introduce problems in molecular, structural, morphological, and biodiversity informatics, and will discuss principles, algorithms, and software to address them. Prerequisite: Junior standing or above. (Co-listed with Comp Sci 5323)

5210 Biomaterials I (3) This course will introduce senior undergraduates to a broad array of topics in biomaterials, including ceramic, metallic, 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)

5240 Tissue Engineering (3) This course will introduce senior undergraduates to the principles and clinical applications of tissue engineering, involving the use of biomaterial scaffolds, living cells, and signaling factors to develop implantable parts for the restoration, maintenance, or replacement of biological tissues and organs. (Spring)

5313 Pathogenic Microbiology (3) A study of medically important microorganisms. Students will learn about the properties that enable organisms 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)

5333 Genomics (3) This course offers a general overview of the field of genomics. Topics covered include genome sequencing and annotation, transcriptomics, proteomics, metabolomics, genomic variation, and an overview of human, and several animal, plant, and microbial genome projects. (Prerequisite: Bio 4323) (Spring)

5353 Developmental Biology (3) Study of the patterns of development of the vertebrate embryo, the molecular mechanisms of tissue induction, and interactions among developing tissues. (Prerequisites: Bio 2353 and Bio 2213) (Spring)

5423 Advanced Biodiversity (3) Topics include biogeography, community structure, competition, predation, food webs, geology-biology relationships, environmental 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, neurochemistry, signal transduction, neuropharmacology and neurodevelopment. (Prerequisite: Bio Sci 2213). (Spring)

5463 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 other biologically important elements, and global biodiversity. Students will focus on primary literature related to global ecology. (Prerequisite: Bio Sci 2263). (Spring)

5533 Pharmacology (3) The basic principles of drug action, pharmacokinetics, pharmacodynamics and toxicity. We will emphasize the actions of drugs used to treat cardiovascular and nervous system disorders. Students will review the primary literature to prepare both written and oral reports on drug actions. (Prerequisite: Bio Sci 2213).

APPROVED NON-BIOLOGY COURSES

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

- Chemistry 4610: Biochemistry (3)
- Chemistry 4619: Biochemistry Lab (2)
- Chemistry 4620: Intermediary Metabolism (3)
- Chem Eng 3200: Biochemical Separations (3)
- Chem Eng 4200: Biochemical Separations Laboratory (2)
- Chem Eng 4220: Biochemical Reactor Laboratory (2)
- Env Eng 2602: Biological Fundamentals of Environmental Engineering (3)
- Env Eng 5650: Public Health Engineering (3)
- Env Eng 5642: Sustainability, Population, Energy, Water, and Materials (3)
- Geol 3631: Systematic Paleontology (3)
- Geol 4641: Micropaleontology (3)
- Nuc Eng 4363: Applied Health Physics (3)
- Psych 4410: Neuroscience (3)
- Psych 4411: Sensation and Perception (3)
- Psych 4412: Evolutionary Psychology (3)
- Stat 5425: Introduction to Biostatistics (4)



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 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 on 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, 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. A term paper and oral presentation are required. Prerequisite: Graduate Standing. (Co-listed with Cer Eng 6210, Met Eng 6210, Chem Eng 6300)

6240 Tissue Engineering II: (See Bio 5240)

6273 Techniques in Applied and Environmental Biology: Students will have the opportunity for hands on experience with the various techniques used in the modern biology laboratory. Techniques will include gene cloning, DNA sequencing, protein purification, growth and development of various model organisms, data acquisition.

6313 Environmental Microbiology Topics to be explored in this course will include but are not limited to microbial growth and metabolic kinetics, life in extreme conditions, biogeochemical cycling, bioremediation of contaminants, waterborne pathogens, and environmental biotechnology.

6353 Advanced Cancer Cell Biology (See Bio 4353)

6363 Advanced Freshwater Ecology: (See Bio 4363)

6383 Advanced Toxicology: (See Bio 4383)

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.

6463 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 major metabolic pathways and how they relate to microbial diversity and microbial ecology.

EXPERIENTIAL LEARNING

Missouri S&T requires all students to participate in at least one significant experiential learning opportunity. The biology department has developed the following guidelines for experiential learning in our department.

Biological Sciences Experiential Learning Requirement

All Biological Sciences undergraduates must participate in experiential learning activities to complete their BS or BA degree. Experiential learning occurs outside of the classroom, and allows students to expand their knowledge and practice problem solving. Experiential learning is an important part of a student's personal, professional, and educational growth.

In order to complete the experiential learning requirement in biological sciences, all students must complete a core required experiential learning requirement and one elective experience.

Core required experiential learning requirement:

Complete Senior Seminar BIO SCI 4010, a one-semester service learning course with a requirement for a reflective statement, with a grade of "C" or better.

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 post-doctoral fellows or graduate students). Options for undergraduate research include: volunteering, BioSc 4099 credit, the 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 if that lab is the right one for you.

BIO SC 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, 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 activities. 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.S&T.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 working with 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, chemical and biochemical 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 (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 Sites program. An REU Site consists of a group of ten or so undergraduates who work in the research programs of the host institution. Each student is associated with a specific research project, where he/she works closely with faculty and other researchers. Students are granted stipends and, in many cases, assistance with housing and travel. Undergraduate students supported with NSF funds must be citizens or permanent residents of the US or its territories. An REU Site may be at either a US or foreign location.

By using the web page, Search for an REU Site (www.nsf.gov/home/crssprgm/reu/reu_search.cfm), you may examine opportunities in the subject areas supported by various NSF units. Also, you may 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.

Similar opportunities are available through the Howard Hughes Medical Institute. The website hhmi.org/grants/reports/scienceopp/main contains a searchable database of HHMI sponsored programs.

UNDERGRADUATE RESEARCH PRESENTATIONS

Participation in undergraduate research would not be complete without presenting the results of that research. Numerous opportunities are available for presentation of your research. Faculty may invite their 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 is held in April and the top three posters and oral presentations receive awards. Every year since 2006, biological sciences students have placed in the top three oral and poster presentations in the natural sciences category. Look around the department for examples of posters that your fellow students have presented at various meetings. For more information on the Undergraduate Research Conference visit their website at campus.mst.edu/ugs/UGRC.html

COOPERATIVE EDUCATION (CO-OP)

Biological 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 Norwood 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 co-op as soon as they begin classes. A transfer student who is participating in a co-op program through another institution may transfer and continue the co-op affiliation subject to S&T's guidelines.

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 session. 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.

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 or location 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 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 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.

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 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. AACOMAS (osteopathic medicine), AADAS (dental school)]

When is the admission deadline for most medical schools?

The standard application deadline for regular admissions is Nov. 1; some may be earlier, so check websites for each medical school or www.aamc.org or the Medical School Admissions Record (MSAR) for exact dates. However, it is recommended that you apply as early as possible.

What is needed for the admissions 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. The biology, chemistry and physics courses should include labs. Similar preparation is expected for most admissions tests.

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

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 so register as early as possible to get your desired test date.

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 expectations vary from profession to profession. For example, veterinary schools require a minimum of 100 shadowing hours but expect significantly more.

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.

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



JOBS IN THE BIOLOGY DEPARTMENT

Jobs are occasionally available in the biology department. Check the work-study job listings (sfa.mst.edu/federalprogs/federal-work-study-jobs), human resources website (hr.mst.edu/careers/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. So 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. TAs 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 had 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



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 strong 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 Mormile (mmormile@mst.edu).

Our web page is: <http://web.mst.edu/~Helix>

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

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 (rfrank@mst.edu).

Our Facebook page is: 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 strong 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 Westenberg (djwesten@mst.edu), or Dr. Shannon (shannonk@mst.edu).

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

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

Twitter - <https://twitter.com/mstigem>

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 smalltown or rural background. Students are eligible for admission to the program following completion of their sophomore year in college.

Website: medicine.missouri.edu/ahec/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 3.30 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)
- Full-time enrollment at Missouri S&T.

Application materials for the program can be obtained from the Chair or the Pre-Medicine Advisory Committee or you can download the file from the Scrubs website (web.mst.edu/~scrubs/links.htm). Applications are due June 1. Once your file is complete, your Bryant Scholars Program Advisor will evaluate your candidacy and then forward it to the MU School of Medicine Office of Medical Education. A screening committee will review completed files. Members of the Preprofessional Scholars Programs Committee of the MU School of Medicine will conduct interviews in late July and select the Bryant Scholars.

STILL SCHOLARS PROGRAM FOR PRE- OSTEOPATHIC STUDENTS - A.T. 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 admissions 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 KCOM at the beginning of the junior year.

Website: www.atsu.edu/kcom/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

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

RESERVED ADMISSION PROGRAM - UMKC SCHOOL OF DENTISTRY

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.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 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, pcrmc.com
- Planned Parenthood – 364-1509
- Poison Control – 800-366-8888
- Russell House – 364-0222
- Suicide Hotline – 800-395-2132