

**Biology Program Review**  
**University of Arkansas at Monticello**  
**School of Mathematical and Natural Sciences**  
**Fall 2015**

J. L. Hunt, K. P. Fawley, M. W. Fawley, J. M. Bramlett, E. J. Bacon, J. C. Chappell, G. J. Manning, L. A. Morgan, C. G. Sims, M. J. Stewart, and M. J. Taylor

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## GOALS, OBJECTIVES, AND ACTIVITIES

*Describe specific educational goals, objectives, and activities of the program.*

The mission the University of Arkansas at Monticello (UAM) shares with all universities is the commitment to search for truth and understanding through scholastic endeavor. The University seeks to enhance and share knowledge, to preserve and promote the intellectual content of society, and to educate people for critical thought. This serves as the basis for the goals of the programs housed in the School of Mathematical and Natural Sciences. The specific goals for the School of Mathematical and Natural Sciences are:

1. To provide academic programs which promote the development of professional scientists and mathematicians and provide opportunities for all students to enhance their understanding of the natural sciences and mathematics.
2. To prepare individuals for successful careers in industry and teaching and for graduate studies in science and mathematics
3. To provide curricula for pre-professional studies in dentistry, medicine, optometry, pharmacy, veterinary science, and allied health (physical therapy, radiological technology, respiratory therapy, medical technology, occupational therapy, and dental hygiene).
4. To provide technical and analytical courses to support studies in agriculture, forestry, nursing, education, pre-veterinary medicine, psychology, and wildlife management.
5. To serve the general education program through courses in biology, chemistry, earth science, mathematics, physics, and physical science that provide a basic background for a baccalaureate degree.

These goals are important to the Biology program, whose main objective is to offer Bachelor of Science degrees with a major or minor in Biology, or to contribute to a double major in Biology and Biochemistry. The program prepares graduates to continue their education in a variety of pre-professional and graduate programs, or for immediate employment in a number of industrial, business, or educational situations. Students are encouraged to consider post-graduate education upon graduation. In fact, we begin advising students to think about their post-baccalaureate education during their first freshman semester. Our most important objective is to help our students achieve their educational and career goals; we truly feel that their success is our success.

Faculty members have high expectations in the classroom in all biology courses, and they willingly work with students outside the classroom to help them achieve the level of expertise needed to be successful in their course work. They also work closely with students in activities outside the classroom to enhance their overall experience at UAM, and to help them mature into well-rounded students who are involved with their community. Some of these specific activities are:

- A. Sigma Zeta Math and Science Honor Society is an active student organization which fosters group camaraderie and allows students to network with others in the School of

- Mathematics and Natural Sciences. The students in the Sigma Zeta chapter participate in various service projects throughout the year, including working with the Southeast Arkansas Regional Science Fair and the ACTM Regional Mathematics Contest. They host a biannual Science Center cleanup day in which classrooms and laboratories are deeply cleaned, and unused or obsolete materials and equipment are removed. Members often work with high school students on various events on campus, such as Advanced Placement test preparation events, to promote interest in the sciences and mathematics.
- B. The Southeast Arkansas Regional Science Fair (SEARSF) has been hosted by UAM School of Mathematical and Natural Sciences for fifty-nine years. The fair is open to all high school and junior high school students from schools located in the southeastern region of the state. Students present research projects in a wide variety of categories, including Animal Sciences, Biochemistry, Biology, Chemistry, Computer Science, Engineering, Environmental Sciences, Mathematics, Plant Sciences, Space Sciences, and an all-encompassing classification for team projects. Biology faculty members and students often assist participants in setting up displays properly, serve as judges of the projects, or work with teachers during the research phase of project preparation.
  - C. The University of Arkansas at Monticello is a member of the Arkansas Space Grant Consortium (ASGC), which is funded by NASA. The UAM School of Mathematical and Natural Sciences receives funding from this program yearly through Research Infrastructure Development awards of about \$15,000 to \$20,000 per year. These awards have provided stipends for students to work with UAM Biology faculty members. Some of these students have also visited NASA research facilities. The ASGC also has an annual meeting where UAM students and faculty have presented their research results.
  - D. The UAM Biology Club is a group consisting of majors and minors from biology, sponsored by Biology faculty members. The major role of this group is to promote biology. They provide service for the Biology and Biochemistry programs and also offer a social outlet for the students in these majors. The Biology Club also performs community service activities. Past activities include streamside trash pickup through the Arkansas Stream Team, service to a local animal shelter, clean-up of roadside litter, and during the 2014-2015 academic year, a major fundraising drive to provide assistance for a clean water project for a village in Kenya. The Biology Club promotes recycling of aluminum cans, plastic bottles, and batteries within the Science Center. The Biology Club also takes an annual end-of-the-year field trip to some location of biological interest; past trips include Florida and the desert southwest.
  - E. The UAM Medical Science Club is a group consisting of pre-professional students, sponsored by Biology faculty members. This group promotes pre-professional studies and also provides a social outlet for the students. The Medical Science Club sponsors visits by recruiters from various medical, pharmacy, and veterinary schools, and promotes talks from UAM graduates who can share their experiences with current students. The club sponsors visits by groups of UAM students to medical schools, dental schools, pharmacy schools, and graduate schools.
  - F. The UAM Tutoring Center employs many of our majors as work-study students to tutor lower-level biology students. Not only is this a benefit to the lower-level students, but it

- gives the tutors a much deeper understanding of the material, and also allows them to improve their teaching skills prior to going into the MAT or other graduate programs.
- G. The UAM Research Program for Minority Students (UAM-RPMS) is a Science, Technology, Engineering and Mathematics (STEM) program which promotes research skills for students who are members of underrepresented minorities. The program provides a stipend to the students, involves the students in STEM research, and provides funds for the students to travel and present their research results at state, regional, and national meetings. The program began with a substantial grant from the Arkansas Lewis Stokes Alliance for Minority Participation (ARK-LSAMP, funded by the National Science Foundation), and has since transitioned to being funded completely by UAM. This program has been very successful; many students who have participated in UAM-RPMS have been accepted to graduate schools, medical schools, and other post-graduate programs.
  - H. Although UAM is primarily a teaching university, all tenure-track faculty members in the Biology department conduct scientific research. In most cases, this research includes participation of students. In addition, many Biology students conduct research with faculty members in the Chemistry department or with Wildlife Science professors in the School of Forest Resources. Students who participate in research are allowed to enroll in BIOL 399V to receive class credit for their research work. Many UAM student researchers have presented their work at state, regional, and national meetings; some have won awards for their research presentations. Students who have conducted research are often accepted into graduate and pre-professional programs.
  - I. Biology Seminar is a capstone course required of all Biology majors. Typically, the course is taken during the student's senior year after completing the bulk of required and elective course work. Normally, the student chooses a biological topic in their area of interest with the help of a faculty member. The student researches the topic and extends the level of coverage beyond what is covered in other courses. At the end of the term, the student conducts a public presentation to other students and faculty. The student is evaluated on content, organization, clarity, accuracy, completeness, quality of visual aids, and ability to answer questions and discuss the material in depth. This course is critical in the overall development of the student, and in the preparation of the student for professional school, graduate school, or a career in teaching.
  - J. The School of Mathematical and Natural Science is affiliated with the University of Southern Mississippi Gulf Coast Research Laboratory at Ocean Springs, Mississippi. Students may take courses there and receive credit at UAM. This affiliation allows students at UAM to specialize in marine biology, and allows use of facilities at the laboratory.
  - K. The University of Arkansas at Monticello is a member school of the Arkansas Academy of Science. Faculty members and students attend the annual meeting of the Academy and are eligible to present research talks and posters and to compete for student awards. Faculty and student research is often published in the Journal of the Arkansas Academy of Science.
  - L. The School of Mathematical and Natural Sciences is affiliated with the Ouachita Mountain Biological Station near Mena, Arkansas. This facility is owned and operated by Louisiana State University at Shreveport, and consists of a large area of undeveloped forest located in

the Ouachita Mountains. The Station has dormitories, labs, a kitchen, and several miles of hiking trails. Affiliation with OMBS allows use of the Station for field trips for biology classes with a field component, such as Mammalogy, Herpetology, and Regional Flora.

- M. The University of Arkansas is an affiliate of the Arkansas Idea Network for Biomedical Research and Education (AR-INBRE), a program funded by the National Institutes of Health (NIH). The Arkansas INBRE program provides support for biomedical research and education through several types of grant programs. Biologists at UAM have received several instrumentation awards and a faculty summer internship award over the last several years. In addition, UAM was included in the Infrastructure Alterations and Renovations section of the recent AR-INBRE renewal proposal which was funded by NIH. UAM received \$190,000 for the alteration of research space in the new Botanical Research and Herbarium Building and renovation of two laboratory areas and a faculty office in the Turner Neal Museum of Natural History.

*Explain how the program serves the general education program and other disciplinary programs on campus, if applicable.*

An important goal in the Biology program is to provide support courses for other majors and for the General Education program. All majors are required to pass eight hours of science (including laboratories) at the 1000 level or higher, and all of our freshman-level courses are acceptable options for this requirement. BIOL 1063, Introduction to Biological Science, and BIOL 1071, Introduction to Biological Science Lab, are most often used to help fulfill this requirement. In addition, there are several majors and minors at UAM that require specific Biology courses beyond the general education requirement. Table 1 (below) indicates which courses are required for specific majors and minors.

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**Table 1—Biology Classes Required for Other Majors and Minors at UAM**

**Agriculture (General Agriculture Option and Agri-Business Option)**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Lab, BIOL 2153 General Zoology *and* BIOL 2161 General Zoology Lab, *or* BIOL 2143 General Botany *and* BIOL 2171 General Botany Lab

**Agriculture (Animal Science Option)**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Lab, BIOL 2153 General Zoology, BIOL 2161 General Zoology Lab, BIOL 3553 Microbiology, BIOL 3561 Microbiology Lab

**Agriculture (Plant and Soil Science Option)**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Lab, BIOL 2143 General Botany, BIOL 2171 General Botany Lab, BIOL 3553 Microbiology, BIOL 3561 Microbiology Lab

**Chemistry (Biochemistry Option)**

BIOL 2053 Principles of Biology I, BIOL 2041 Principles of Biology I Laboratory, BIOL 2083 Principles of Biology II, BIOL 2091 Principles of Biology II Laboratory, BIOL 3553 Microbiology, BIOL 3561 Microbiology Laboratory, BIOL 3363 Cell Biology, BIOL 3354 Genetics, BIOL 4741 Biology Seminar (approved option), 3 hours of BIOL electives at the 3000-4000 level (approved option)

**Forestry Minor**

BIOL 3484 General Ecology

**General Studies (Biology Emphasis Area)**

BIOL 2053/2041 Principles of Biology I and Laboratory *and* BIOL 2083/2091 Principles of Biology II and Laboratory *or* BIOL 2153 General Zoology *and* BIOL 2161 General Zoology Lab *and* BIOL 2143 General Botany *and* BIOL 2171 General Botany Lab, 10 Hours of BIOL electives at the 3000-4000 level

**General Studies (Health Care Professionals Preparation Emphasis Area)**

BIOL 2233 Anatomy and Physiology I, BIOL 2291 Anatomy and Physiology Laboratory I, BIOL 2243 Anatomy and Physiology II, BIOL 2301 Anatomy and Physiology Laboratory II, BIOL 3553 Microbiology (approved option), BIOL 3561 Microbiology Laboratory (approved option), BIOL 4673 Pharmacology (approved option)

**General Studies (Wildlife Management Emphasis Area)**

BIOL 3434 Regional Flora, BIOL 3484 General Ecology, BIOL 3384 Herpetology *or* BIOL 3394 Ichthyology *or* BIOL 3413 Mammalogy *and* BIOL 3451 Mammalogy Lab

**Health and Physical Education**

BIOL 2233 Anatomy and Physiology I, BIOL 2291 Anatomy and Physiology Laboratory I

**Health and Physical Education, Exercise Science Option**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Lab, BIOL 2233 Anatomy and Physiology I, BIOL 2291 Anatomy and Physiology Laboratory I, BIOL 2243 Anatomy and Physiology II, BIOL 2301 Anatomy and Physiology Laboratory II

**Middle Childhood Education**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Lab

**Natural Science Major (All options)**

BIOL 1063 Introduction to Biological Science, BIOL 1071 Introduction to Biological Science Laboratory

**Natural Science Major (Life Science Option)**

BIOL 2143 General Botany, BIOL 2171 General Botany Lab, BIOL 2153 General Zoology, BIOL 2161 General Zoology Lab, BIOL 3484 General Ecology, BIOL 3553 Microbiology, BIOL 3561 Microbiology Laboratory, 12 hours of BIOL classes at 3000-4000 level

**Natural Science Minor**

BIOL 2143 General Botany, BIOL 2171 General Botany Lab, BIOL 2153 General Zoology, BIOL 2161 General Zoology Lab, 9 hours of BIOL classes at 3000-4000 level

**Natural Resources Management, Environmental Science Option**

BIOL 2153 General Zoology *and* BIOL 2161 General Zoology Lab, *or* BIOL 2143 General Botany *and* BIOL 2171 General Botany Lab, BIOL 3484 General Ecology, BIOL 3434 Regional Flora (approved elective)

**Natural Resource Management, Communication in Natural Resources Option, Forestry Option, and Geospatial Science Option**

BIOL 2153 General Zoology *and* BIOL 2161 General Zoology Lab, *or* BIOL 2143 General Botany *and* BIOL 2171 General Botany Lab, BIOL 3484 General Ecology

**Natural Resource Management, Wildlife Management and Conservation Option**

BIOL 2153 General Zoology, BIOL 2161 General Zoology Lab, BIOL 2143 General Botany, BIOL 2171 General Botany Lab, BIOL 3413 Mammalogy *and* BIOL 3451 Mammalogy Laboratory, *or* BIOL 3384 Herpetology, BIOL 3434 Regional Flora, BIOL 3484 General Ecology, BIOL 3524 Ornithology *or* BIOL 3394 Ichthyology

**Natural Resources Minor**

BIOL 3434 Regional Flora, BIOL 3484 General Ecology *or* BIOL 3493 Environmental Science

**Nursing**

BIOL 2233 Anatomy and Physiology I, BIOL 2291 Anatomy and Physiology Laboratory I, BIOL 2243 Anatomy and Physiology II, BIOL 2301 Anatomy and Physiology Laboratory II, BIOL 3553 Microbiology (approved option), BIOL 3561 Microbiology Laboratory (approved option)

**Wildlife Management Minor**

BIOL 3434 Regional Flora, BIOL 3484 General Ecology, BIOL 3384 Herpetology *or* BIOL 3394 Ichthyology *or* BIOL 3524 Ornithology *or* BIOL 3413 Mammalogy *and* BIOL 3451 Mammalogy Lab

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*Document market demand and/or state/industry need for careers stemming from the program.*

Graduates of the Biology program may advance to professional schools such as medical school, dental school, pharmacy school, and to other health-related programs. Some graduates enter graduate school, teaching programs, or positions in industry.

The Association of American Medical Colleges has estimated that the United States could face a shortage of physicians that may number over 90,000 by the year 2020. The same organization lists Arkansas as the second-most underserved state in terms of number of doctors per resident, with many of the other underserved areas being in neighboring states. In rural areas such as southeastern Arkansas, the problem is exacerbated. The State of Arkansas has acknowledged these shortages and is working to solve them by implementing the Rural Medical Practice Program. Applicants to the University of Arkansas for Medical Sciences who come from rural areas (including all of southeastern Arkansas) are given extra consideration for acceptance to the medical school, and may receive partial or complete tuition relief. The only medical school in the state, the University of Arkansas for Medical Sciences, has slightly increased its class size over the last few years, and more increases are being considered. More importantly, two schools of osteopathic medicine will open in Arkansas in the next few years (one at Arkansas State University in Jonesboro and another at Fort Smith). Graduates of the

UAM Biology program are in demand by medical schools; 22 of the last 24 med-school applicants have been accepted during the last 10 years. The two new D.O. schools will only increase this demand.

Similarly, while the demand for pharmacists is strong nationwide, it is strongest in Arkansas. According to the Aggregate Demand Index computed by the Pharmacy Workforce Center, Arkansas has the highest demand for pharmacists of any state. The ADI rates the demand for the state as 4.6 out of 5.0, meaning that there is difficulty in filling many open pharmacy positions. Demand for UAM pre-pharmacy students is very high. There are two pharmacy schools in Arkansas (at UAMS and Harding), and many UAM graduates are accepted at both. As with pre-medicine students, the vast majority of UAM pre-pharmacy students are accepted to pharmacy school upon application.

Arkansas has experienced steady population growth, and this growth has led to continued demand for secondary school teachers. Secondary science teachers (life, physical, and earth sciences) are usually on the annual list of subject shortage areas compiled by the Arkansas Department of Education. Although the population of southeastern Arkansas has not grown as much as the rest of the state, demand for science teachers remains high here. In fact, virtually every school district in the southeastern part of the state qualifies as a High-Needs District based on criteria established by the National Science Foundation. School districts throughout the region regularly solicit the UAM School of Education and the Dean of Math and Sciences for possible applicants. Many graduates of the UAM Biology program have entered M.A.T. programs (including the one at UAM), and almost without exception have a job waiting upon completion of the program.

*Document student demand for the program.*

Demand for the Biology program has generally remained strong through the last 10 years, with some fluctuation from year to year. Table 2 (below) lists the number of Biology and Pre-Medicine majors by class level over the last 10 years. It should be noted that the two categories are not strictly additive. Pre-Medicine students generally complete a degree in Biology, or for the last five years, a double major in Biology and Biochemistry. However, some students listed as Pre-Medicine majors may receive a degree in Biochemistry or Chemistry alone. In addition, due to a quirk of our registration software, a student is sometimes listed as both a Biology major and a Pre-Medicine student. However, the table gives an overall picture of demand for the program which is steady and strong. Another indicator of the demand for our program is reflected in the fact that from 2005-2009, Early College High School Students were allowed to declare a major, and an average of 20 of these students per year declared themselves as Pre-Medicine or Biology majors. These students are not included in the figures in Table 2.

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Table 2.—Number of Majors per Class Level Per Year

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<u>Biology</u>										
Freshman	10	11	9	8	9	7	10	16	16	29
Sophomore	7	4	10	7	11	8	3	10	5	8
Junior	7	8	7	8	9	10	9	6	11	5
Senior	11	13	18	15	17	12	20	16	10	18
Special	0	1	0	0	1	0	0	0	0	0
Post-Bach	0	1	0	0	2	0	0	1	1	0
Total	35	38	44	38	49	37	42	49	43	60
<u>Pre-Medicine</u>										
Freshman	19	30	20	16	14	28	20	23	22	27
Sophomore	5	7	5	7	4	2	7	6	6	3
Junior	5	2	3	5	4	2	3	7	1	5
Senior	2	0	0	1	0	1	2	4	5	1
Special	0	0	0	0	0	0	0	0	0	0
Post-Bach	0	0	0	0	0	0	1	1	1	0
Total	31	39	28	29	22	33	33	41	35	36

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Because of the overlap between Biology and Pre-Medicine majors, perhaps a better measure of demand is the number of students who graduate with Biology majors. Table 3 (below) includes the number of such graduates for the last 10 years.

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Table 3.—Number of Biology Graduates by Year

<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Average</u>
12	9	15	12	10	7	19	12	16	7	11.9

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While the number of graduates fluctuates from year to year, overall demand remains fairly steady. During some years, a larger than usual number of potential graduates is unable to complete all required classes for a variety of reasons. When this occurs, the number of graduates naturally rebounds the next year, helping to explain some of the fluctuations seen in the table above. In addition, during 2011-2012, a special effort was made to contact students who were only a few credit hours away from

graduation to encourage them to finish their degrees; this contributed to the unusually large number of graduates in 2012.

While number of Biology majors and graduates has remained more-or-less steady, the number of persons taking Biology classes has increased by over a third during the last 10 years. Table 4, below, indicates the number of students enrolled in Fall Semester offerings in Biology through the last ten years.

	<b>Table 4.--Enrollment in Biology Lecture Courses Offered Each Fall Semester</b>									
	F14	F13	F12	F11	F10	F09	F08	F07	F06	F05
Intro Biol Sci	194*	175	200	175	155	196	183	168	151	165
Prin. of Biology	59	56	61	50	57	55	59	49	40	23
Botany	39	42	20	26	25	16	21	23	28	29
Gen Zoology	25	34	25	31	28	27	31	19	26	21
A&P I	99	103	116	124	120	118	115	111	102	113
Genetics	26	24	24	24	21	22	11	18**	24**	17**
Ecology	27	30	22	30	23	25	21	24	20	14
Microbiology	77	60	58	59	51	67	58	48	49	39
Comp. Anatomy	18	14	15	11	19	6	13	10	10	NA
Totals	564	538	541	530	499	532	512	470	450	421

\*Includes 48 students from online Introduction to Biological Science taught by adjunct

\*\* Taught in spring term during year listed (Course later changed from Spring to Fall offering)

## **CURRICULUM**

*Describe how program content parallels current thinking and trends in the field (best practices, advisory committee recommendations, etc.).*

Biology faculty members continually review the curriculum in an effort to meet the needs of Biology majors and pre-professional students. This goal is achieved in a number of different ways. All Biology faculty members are encouraged and expected to participate in regular professional

development to stay current in their respective fields of expertise. To this end, all tenure-track faculty members maintain memberships in professional organizations appropriate for their biological specialties. Faculty members are given time to attend professional meetings and workshops, and the School of Mathematical and Natural Sciences maintains a budget to pay the cost of attending these meetings. Besides the obvious benefit to individual faculty of professional renewal, meeting attendance allows faculty members to be exposed to the newest trends within the field, and allows them to network with instructors from other universities and to be exposed to new ideas for curriculum development.

The Biology Department at UAM is relatively small. Although there are disadvantages associated with small size, the Biology Department uses its size to the advantage of students. One way in which this is true is that changes to one field of biology can be quickly communicated to all faculty members. For instance, the faculty members make every effort to ensure that changes to taxonomy are used in every class where appropriate, so that this remains as consistent as possible throughout the Department.

In addition, faculty members in Biology constantly monitor requirements for various post-graduate programs to ensure that the curriculum contains all required courses and all necessary material within those courses. For example, the Pre-Medical Director and the Dean attend annual meetings of Pre-Medical advisors at UAMS to stay abreast of current medical school requirements and changes to the MCAT. In 2012, a Pre-Veterinary curriculum was established by determining the requirements for every vet school in the region. Similarly, our Organismal Biology curriculum was assembled by reviewing lists of prerequisites for admission to appropriate graduate programs throughout the South.

*Provide an outline for each program curriculum, including the sequences of courses.*

As with all universities in the state of Arkansas, UAM is required by law to provide a curriculum which makes it possible for a student to enroll in a reasonable number of courses each semester and to fulfill all the requirements for a degree within four academic years. Although pre-professional programs are excluded from these requirements, we have arranged our schedule so that students can receive a Biology degree or a Biology/Biochemistry double major in four academic years. The so-called 8-Semester Course Sequences for Biology, Organismal Biology, and Biology/Biochemistry are included in Appendix A.

Students who arrive at UAM with a strong interest in biology and an ACT score of 22 or above are eligible to go directly into each of the Biology curricula. Those who arrive with an ACT score of less than 22 are required to take BIOL 1063, Introduction to Biological Science, before enrolling in BIOL 2053, Principles of Biology I. For these students, it is more difficult to complete any of the Biology curricula within four academic years. However, with proper advising and a willingness to take some classes during Summer terms, completion of a Biology or Biology/Biochemistry double major within four years is still possible. Likewise, students who transfer from other universities, or those who declare Biology as a major after their first semester, may have difficulty completing a degree within four years. However, every effort is made to help these students catch up through aggressive advising, and the Department is

exploring the possibility of adding sections of the Principles of Biology sequence to help such students graduate more rapidly.

The Biology curriculum schedule operates on a two-year cycle. Most courses are offered at least once per academic year, and some upper-level electives are available every other year. Please note that graduate level classes are offered each time the corresponding undergraduate class is offered. A schedule of class offerings is depicted in Table 5, below.

**Table 5.—Schedule of Class Offerings in the UAM Biology Department** (\*listed in the catalog but no longer offered)

Class	Fall and Spring	Every Fall	Every Spring	Fall Odd Years	Fall Even Years	Spring Odd Years	Spring Even Years	Summer	On Demand
Intro Bio Science	X							X	
Zoology/Lab	X							X	
Botany/Lab	X								
Microbiology/Lab	X								
Senior Research	X							X	
Principles I/Lab		X							
A & P I/Lab		X						X	
Ecology		X							
Genetics		X							
Comparative Anatomy		X							
Principles II/Lab			X						
A & P II/Lab			X					X	
Cell Biology			X						
Evolution			X						
Vertebrate Physiology			X						
Biology Seminar			X						
Medical Terminology			X						
Pharmacology			X						
Research Experience (RPMS)			X						
Mammalogy				X					
Ichthyology					X				
Environmental Science					X				
Regional Flora						X			
Herpetology						X			
Waterfowl Ecology						X			
Molecular Biology						X			
Ornithology							X		
Marine Biology									X
Invertebrate Zoology									X
Selected Topics									X
Mammalian Anatomy Lab									*
Plant Morphology									*
Ornithology/Mammalogy									*
Vertebrate Embryology									*
Histology									*
Animal Behavior									*

*State the degree requirements, including general education requirements, institutional, college, or school requirements, and major requirements.*

The Bachelor of Science degree in Biology requires 120 hours, which includes 35 hours of General Education program, the Bachelor of Science identity requirement, 39 hours of major requirements and 29-30 hours of supportive requirements. A minor is also required for the Biology degree. Electives may be needed to reach 120 hours, depending upon the minor; most Biology majors who do not double major in Biochemistry minor in Chemistry or Natural Science.

The Bachelor of Science degree in Organismal Biology requires 120 hours, which includes 35 hours of General Education program, the Bachelor of Science identity requirement, 39 hours of major requirements, 14 hours of approved Biology electives, and 23 hours of supportive requirements. No minor is required.

The Biology minor includes 12 hours of required courses, plus 10 hours of upper-level biology electives, for a total of 22 hours. General Education requirements are listed in Appendix B. Biology major and minor requirements are found in Appendix C.

*Indicate the semester/year the major/program courses were last offered. Exclude general education courses.*

All Biology classes and the most recent semester each was offered are listed in Table 6 below.

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**Table 6.—Most Recent Offering of All Listed BIOL Classes**

BIOL 198V	Research Experience (RPMS)	Spring 2015
BIOL 1063/1071	Intro to Biology/Lab	Summer 2015
BIOL 1102	Medical Terminology	Spring 2015
BIOL 2053/2041	Principles of Biology I/Lab	Fall 2014
BIOL 2083/2091	Principles of Biology II/Lab	Spring 2015
BIOL 2143/2171	Botany/Lab	Spring 2015
BIOL 2153/2161	Zoology/Lab	Summer 2015
BIOL 2233/2291	A&P I/Lab	Summer 2015
BIOL 2243/2414	A&P II/Lab	Summer 2015
BIOL 3333/3331	Molecular Biology/Lab	Spring 2015
BIOL 3324	Ornithology/Mammalogy	Spring 2002
BIOL 3354	Genetics	Fall 2014
BIOL 3363	Cell Biology	Spring 2015
BIOL 3384	Herpetology	Spring 2015
BIOL 3394	Ichthyology	Fall 2014
BIOL 3414/3451	Mammalogy/Lab	Fall 2013
BIOL 3423	Plant Morphology	Spring 1993
BIOL 3434	Regional Flora	Spring 2015
BIOL 3484	Ecology	Fall 2014
BIOL 3493	Environmental Science	Fall 2014
BIOL 3503/3511	Marine Biology/Lab	Spring 2015
BIOL 3524	Ornithology	Spring 2014
BIOL 3553/3561	Microbiology/Lab	Spring 2015
BIOL 3574	Comparative Anatomy	Fall 2014
BIOL 358V	Natural History	Spring 2015
BIOL 3594	Invertebrate Zoology	Spring 2013

BIOL 3763	Evolution	Spring 2015
BIOL 3801	Mammalian Anatomy Lab	Fall 2004
BIOL 4594	Waterfowl Ecology	Spring 2015
BIOL 4624	Vertebrate Embryology	Spring 2002
BIOL 4634	Vertebrate Physiology	Spring 2015
BIOL 4664	Mammalian Histology	Fall 2006
BIOL 4673	Pharmacology	Spring 2015
BIOL 469V	Senior Research	Summer 2015
BIOL 4724	Aquatic Biology	Spring 2012
BIOL 4734	Animal Behavior	Spring 2005
BIOL 4741	Biology Seminar	Spring 2015
BIOL 4753	Selected Topics in Biology	Fall 2006
BIOL 479V	Independent Study	Spring 2002
BIOL 5014	Waterfowl Ecology (Grad)	Spring 2015
BIOL 5024	Herpetology (Grad)	New course
BIOL 5144	Mammalogy (Grad)	Fall 2013
BIOL 5344	Ornithology (Grad)	Spring 2014

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*Provide syllabi for discipline-specific courses and departmental objectives for each course.*

Syllabi for all Biology classes are assembled in Appendix D.

*Outline the process for the introduction of new courses, including all internal curriculum review processes and the findings.*

Biology faculty members continually review the curriculum and make appropriate adjustments. Whenever a curriculum change is needed, Biology faculty members discuss the changes and construct a proposal. Individual faculty members who wish to assemble new classes may also construct a proposal. Such proposals are reviewed by the entire Biology faculty before further submission. The proposal is reviewed by the Dean of Math and Sciences. When approved, the Dean submits the proposal to Academic Council, which is a group that includes the Deans of all units, the Registrar, and the Vice Chancellor of Academic Affairs. A review period of 10 days begins at this point. This procedure ensures that all academic deans are aware of the consequences to their own programs before the new course is reviewed by the Curriculum and Standards (C&S) Committee of the Faculty Assembly. This ten-day review process usually affords sufficient time for minor issues to be resolved. The proposal is reviewed at an Academic Council meeting, which occurs approximately 8 times per semester. With Academic Council approval, the proposal is forwarded to the C&S Committee. The School of Mathematics and Natural Sciences representative then presents the proposal to the C&S Committee. Occasionally, the Dean or a faculty member will attend the meeting to answer any questions that may arise. With approval of the C&S Committee, the proposal is forwarded to the Faculty Assembly where it is brought to a vote. Once it has received the approval of the Assembly, the proposal is reviewed by the

Chancellor, the Board of Trustees, and then the Arkansas Department of Higher Education. Once all approvals have been made, the proposal is sent back to the Registrar's Office for final operation and inclusion into the official catalog. If the proposal does not meet the approval of any of the required committees, it may be returned to the Department for review and revision. Note that the procedure for graduate-level courses is identical, except that such proposals are submitted to the Graduate Council rather than the C&S Committee.

*List courses in the degree program currently offered by distance delivery.*

No courses within the Department of Biology are currently offered by distance delivery. Two on-line sections of BIOL 1063/BIOL 1071 Introduction to Biological Sciences are offered and administered by the Office of Academic Affairs.

*Describe the instructor-to-student and student-to-student interaction for distance courses (prerequisite courses, lab requirements, examination procedures-online/proctored, and instructor to student assignments).*

No courses within the Department of Biology are currently offered by distance delivery. Two on-line sections of BIOL 1063/BIOL 1071 Introduction to Biological Sciences are offered and administered by the Office of Academic Affairs.

#### **PROGRAM FACULTY (FULLTIME/ADJUNCT/PART-TIME)**

*Provide curriculum vitae or program faculty information form for all fulltime program faculty. The vita or form should include the following: all degrees and institutions granting the degrees; field or specialty of degrees; number of years employed as program faculty at the institution; current academic rank, if applicable; professional certifications/licenses; evidence of quality and quantity of creative and scholarly/research activity; evidence of quality and quantity of service activities; evidence of professional activities and non-teaching work experiences related to courses taught; list of course numbers/course titles of credit courses taught over the past two academic years; and other evidence of quality teaching.*

Please see Appendix E for faculty vitae.

*Indicate the academic credentials required for adjunct/part-time faculty teaching major/program courses.*

No lecture courses within the Department of Biology are currently taught by adjunct or part-time faculty, and none have been for at least the last 12 years. Occasionally an Intro Biology lab section or two has been taught by part-time adjuncts; requirements for these lab adjuncts are a B.S. in Biology and approval by the Dean of Math and Science. The only other partial exception to this is the status of Dr. Ed Bacon and Dr. Marvin Fawley. Dr. Bacon is a Professor Emeritus who retired in 2007. For some years after his retirement, Dr. Bacon occasionally taught classes and was paid as an adjunct during this

time. In 2012, Dr. Bacon returned to full-time work and is director of the Turner Neal Museum of Natural History and an Instructor. Dr. Marvin Fawley is Associate Dean for Science and Research, which is technically a part-time position. Dr. Fawley is also the campus coordinator for the Research Program for Minority Students (UAM-RPMS) and teaches Biology 198V, Research Experience for RPMS Students. He has also assisted with Biology Seminar and taught classes for faculty members on leave. The stellar qualifications of Dr. Bacon and Dr. Fawley are included in Appendix E.

*Describe the orientation and evaluation processes for faculty, including adjunct and part-time faculty.*

During the Faculty Development Week that occurs just prior to the beginning of the Fall semester, there is an official orientation program for new full-time faculty members which imparts information and documentation on advising, regulations, available resources, and teaching facilities. Throughout the meetings there are a number of workshops including academic advising, available software, and accessible technology.

Each faculty member is evaluated annually. Faculty members with less than six years of service are required to submit a self-evaluation to the Dean of the School of Mathematical and Natural Sciences. They are also evaluated by a minimum of three peer faculty members, and observed in a classroom setting by the peer evaluators. In addition, each class is subjected to student evaluation. Tenured faculty and non-tenure-track faculty who have completed six years of service are required to undergo the full evaluation process at least once every five years. A full evaluation requires that three colleagues be chosen as peer evaluators with the individual being evaluated choosing two and the dean one. Peer reviewers of faculty members having a full evaluation must make at least one classroom observation. Also at least one section of each course the faculty member teaches during the spring and the fall semesters must complete a student evaluation. Those faculty members not required to undergo the full evaluation process (those with over six years of service) have one peer evaluator chosen by the Dean. If an instructor is not having a full evaluation, one peer evaluator will be chosen by the dean. Faculty members in the first six years of service undergo student evaluation in every class. After the sixth year, faculty members are required to have only one section of their classes complete a student evaluation per calendar year; however, most faculty members in Biology choose to have all classes evaluated. Faculty members submitting abbreviated evaluations include only new accomplishments in their self-evaluations.

Once this process is complete, the Dean reviews all of the combined evaluations to assess performance of the faculty member. The Dean uses the totality of peer evaluations, student evaluations, self-evaluation, and classroom observation data to complete a review of the faculty member's performance. The Dean schedules a meeting with the faculty member to discuss his or her accomplishments and make suggestions for possible improvements. After this review, the evaluation and all supporting material are sent to the Vice Chancellor for Academic Affairs (Provost) for his review and comments. If a faculty member disagrees with the Dean's evaluation, he may send information to the Vice Chancellor for additional consideration. After this process is completed, the Vice Chancellor for Academic Affairs sends his recommendation to each faculty member and to the Dean.

Provide average number of courses and number of credit hours taught for full time program faculty for the current academic year.

The expected course load is 12 credit hours per term for a full-time faculty member who holds an academic rank of Assistant Professor or higher. For these purposes, labs are credited at two-thirds of actual contact hours. The course load for those holding the rank of Instructor is 15 credit hours per term. Lab instructors are given credit for three hours of preparation time. Occasionally, there are opportunities for extra courses to be taught as an overload for additional pay. Summer teaching opportunities are available for courses that meet the minimum enrollment of 10 students. The Department of Biology has two full-time Professors, three full-time Associate Professors, one full-time Instructor, and two full-time lab Instructors. In addition, the Assistant Dean for Science and Research is a half-time faculty member with the rank of Associate Professor. See Table 7, below, for faculty workload for the past academic year.

Table 7—Biology Faculty Workload for 2014-2015 Academic Year

Faculty Member	Department	Summer II 2014			Fall 2014			Spring 2015			Summer I 2015			Annual SSCH
		credit hrs	contact hrs	SSCH	credit hrs	contact hrs	SSCH	credit hrs	contact hrs	SSCH	credit hrs	contact hrs	SSCH	
Bacon, Ed	Biology				8	11	86	11	15	180				266
Chappell, Jessie	Biology	2	5	21	7	17	174	7	14	145	2	6	21	361
*Fawley, K	Biology				9	13	384	10	16	219	1	3	1	604
Fawley, Marvin	Biology				1	2	2	1	2	5				7
Hunt, John	Biology	6	6	60	12	15	293	20	19	498				819
Manning, G	Biology				10	12	385	11	15	386	4	6	36	807
Morgan, Lauren	Biology				4	11	68	5	13	105				173
Sims, Chris	Biology				10	12	405	15	15	178	3	3	66	649
Stewart, Mary	Biology				7	12	335	10	12	260				595
Taylor, Jeff**	Chemistry							3	3	117				117
Total On Campus with Full-time faculty members													4398	

\*Karen Fawley received a one-course reduction in Fall 2014 for NSF grant requirements.

\*\*Jeff Taylor taught one Biology course (Pharmacology) in Spring 2015

## PROGRAM RESOURCES

*Describe the institutional support available for faculty development in teaching, research, and service.*

The University offers a variety of support in these areas. In the area of teaching, faculty members are encouraged to seek areas of special interest and, when possible, teach in those specific areas. Faculty members are encouraged to develop special topics courses, which may later become part of the regular curriculum if need or demand is great enough. Faculty members who wish to develop on-line or hybrid courses are supported with institutional training and financial incentives.

The University also provides technical support for those who wish to use instructional software such as Blackboard™ in their courses. All of the classrooms in the Science Center are equipped with a computer, a document camera, and a projector. All Biology faculty members utilize this technology in their classroom instruction.

Faculty members are encouraged to attend professional meetings to enhance their teaching skills or their work in other scholarly activities. The School of Mathematical and Natural Sciences may support faculty research and scholarly activity by granting course relief or off-campus assignment leave; in recent years three faculty members in Biology have availed themselves of an off-campus assignment. Faculty members are encouraged to write textbooks and generate new methods of teaching using technology.

Competitive faculty research grants are available through the University to fund basic research. These grants can even pay student stipends for their work on projects with faculty members. Almost every tenured faculty member in Biology has won one of these grants; several have won multiple grants. In addition, the University administration is extremely supportive to Biology faculty who pursue research. UAM is primarily a teaching university, but the administration recognizes the importance of research for faculty renewal, and more importantly, for the advancement of students. The administration helps by facilitating and publicizing Biology research.

The UAM administration has also directly supported student and faculty research by providing matching funds for two instrumentation grants awarded by Arkansas INBRE. Over the last several years, two standard thermal cyclers, a gradient thermal cyler, centrifuge with rotors, bench top fluorometer, micropipetters, and miscellaneous laboratory supplies for teaching labs and undergraduate research have been purchased with these AR-INBRE instrumentation awards.

The UAM administration has also spearheaded fund-raising for the construction of a new Plant Research and Herbarium building on campus. The UAM Foundation provided an initial \$100,000 for matching outside contributions for this building. The new building has been approved, and we anticipate completion of the project by Spring, 2016. The UAM Botanical Research and Herbarium building will house the UAM Sundell Herbarium, a collection of approximately 27,000 plant specimens that is extensively used for botanical research and teaching, a microscopy laboratory, a DNA sequencing laboratory, a botanical library and conference room, and office space for the UAM botanist. In addition, the UAM administration has initiated a campaign to raise approximately \$25 million to construct a new science and mathematics center on campus. Although the new building is likely several years away, this campaign indicates the sincere commitment of the UAM administration to STEM education and research.

Biology faculty members are leaders on the UAM campus. Faculty members are encouraged to serve on university committees and Biology faculty members are very active in this regard. Faculty members use their experience and specific skills while serving on committees. This provides a growth opportunity for faculty members and the university appreciates the services.

Biology faculty members are also active in service to the community, providing their expertise in a variety of areas. For instance, members of the Biology faculty have provided assistance to local police departments and wildlife agencies in identification of animals or their remains. Several biology faculty members have provided informational assemblies or teaching assistance to local schools, state parks, and national parks.

*Describe the professional development of full time program faculty over the past two years including the institutional financial support provided to faculty for the activities.*

The School of Mathematical and Natural Sciences is provided a \$6,600 budget for faculty development. A portion of the money is used by Biology faculty members each year to attend professional meetings. Additional departmental funds are also sometimes used for faculty development. The development funds spent in Biology during the last two academic years are shown in Table 8 below.

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**Table 8.—Faculty Development Funds Spent 2013-2015**

<u>Date</u>	<u>Faculty</u>	<u>Amount</u>	<u>Description</u>
7-19-13	Manning	621.35	Ichthyologists and Herpetologists, Albuquerque, NM
9-27-13	Manning	338.61	Missouri Herpetological Association, Steelville, MO
10-11-13	M. Fawley	99.00	Arkansas Native Plant Society, Mountain View, AR
10-11-13	K. Fawley	256.08	Arkansas Native Plant Society, Mountain View, AR
10-17-13	Stewart	339.85	Arkansas INBRE, Fayetteville, AR
10-17-13	M. Fawley	10.88	Arkansas INBRE, Fayetteville, AR
10-17-13	K. Fawley	10.88	Arkansas INBRE, Fayetteville, AR
2-13-14	Hunt	376.83	Southeastern Bat Diversity Network, Nacogdoches, TX
4-4-14	M. Fawley	140.14	Arkansas Academy of Science, Searcy, AR
4-4-14	Bacon	209.82	Arkansas Academy of Science, Searcy, AR
4-4-14	K. Fawley	30.94	Arkansas Academy of Science, Searcy, AR
4-16-14	Hunt	922.81	Southwestern Association of Naturalists, Stillwater, OK
6-12-14	Manning	320.00	Ichthyologists and Herpetologists, Chattanooga, TN
7-30-14	Manning	1270.17	Ichthyologists and Herpetologists, Chattanooga, TN
10-10-14	M. Fawley	115.74	Arkansas Native Plant Society, Texarkana, AR
10-10-14	K. Fawley	233.95	Arkansas Native Plant Society, Texarkana, AR
10-23-14	M. Fawley	24.36	Master Gardeners, Hamburg, AR
11-6-14	Morgan	35.85	Arkansas INBRE, Fayetteville, AR
11-6-14	Chappell	34.15	Arkansas INBRE, Fayetteville, AR
11-6-14	K. Fawley	32.01	Arkansas INBRE, Fayetteville, AR

11-6-14	M. Fawley	61.12	Arkansas INBRE, Fayetteville, AR
4-1-15	Hunt	1766.45	Southwestern Association of Naturalists, San Diego, CA
4-9-15	Bacon	127.61	Arkansas Academy of Science, Arkadelphia, AR
4-25-15	Hunt	62.38	Pre-Medical Advisors, Little Rock, AR
6-12-15	Manning	320.00	Ichthyologists and Herpetologists, Reno, NV

*Provide the annual library budget for the program or describe how library resources are provided for the program.*

Each academic unit along with library liaisons recommends library purchases of materials. The budget is spent on books, e-books, journals, e-journals, and databases. The total budget for the entire School of Mathematics and Natural Sciences is \$15,000; however, the budget is not split into amounts spent for each department. Periodically, library liaisons contact the School of Mathematical and Natural Sciences and seek guidance on new materials for the library. They also ask for advice concerning removal of obsolete material, old editions of books, or physically damaged material. Electronic databases are upgraded regularly giving the faculty excellent access to new publications. The library also offers a very liberal interlibrary loan policy, allowing each faculty free library loan requests.

*Describe the availability, adequacy, and accessibility of campus resources (research, library, instructional support, instructional technology, etc.).*

The School of Mathematical and Natural Sciences provides the latest technology for instruction. Every classroom in the Science Center is equipped with a computer, a document camera, and a digital projector. All ten classrooms are connected to the internet. The Science Center Computer Lab and Tutor Center was upgraded in 2011 with computers that Information Technology (IT) indicates should provide excellent service for a minimum of seven years; five more computers were added in 2013. IT provides Microsoft™ software packages, SAS™ Statistical Software, and other needed software on request. IT also provides support for Blackboard™, which is available for every course offered on our campus or on-line.

The UAM Library features a large amount of content for faculty research and development, and can also be used in instructional technology. Library resources in the area of biology are extensive and include:

1. Periodical and Book Titles
  - 518 on-line periodical titles, 60 printed periodicals, and 6754 books in various areas of biology are present in the library, in addition to extensive holdings in related areas such as forestry, agriculture, medicine, and nursing.
2. Electronic Resources by Subject
  - a. Specialized Databases
    - i. Ecology Abstracts
    - ii. GreenFILE

- iii. JSTOR: Life Sciences Collection
- iv. Wildlife and Ecology Studies Worldwide
- b. General Databases
  - i. Academic Search Complete
  - ii. ArticleFirst
  - iii. Credo Reference Online
  - iv. FirstSearch Databases
  - v. LexisNexis Academic
  - vi. MasterFILE Premier 20
  - vii. ProQuest Research Library
- 3. Bibliographic Instruction
 

A faculty member may contact the library liaison to schedule a class period in which the librarian teaches students about resources that will be most helpful in their classes. Students can also request individual research consultations with a librarian.

*Provide a list of program equipment purchases for the last three years.*

Recent major purchases for the Biology program are listed in Table 9 below. Note that this list does not include computers or audio-visual equipment for use in faculty offices, laboratories, or classrooms. Such equipment is generally replaced every 3-4 years, and is purchased with School of Mathematical and Natural Sciences funds.

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**Table 9—Biology Department Major Equipment Purchases From 1-1-2012 to 7-1-2015**

<u>Date</u>	<u>Cost</u>	<u>Item</u>
5-7-2012	14,339.29	Water Distillation Unit
5-8-2012	21,718.08	Stereo Microscope with Camera System
8-27-2012	8,545.30	Biological Incubator
4-30-2013	25,215.29	Nikon NIU Microscope
1-2-2014	860.00	Life Technologies SDS-PAGE electrophoresis unit / Western blotting unit
2-28-2015	59,023.00	70 Nikon monocular microscopes and 4 digital microscope/camera units
6-5-2015	4,304.00	Set of 28 Micropipettors
6-5-2015	3,250.00	Two Eppendorf Model 5418 Microcentrifuges

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## **INSTRUCTION VIA DISTANCE TECHNOLOGY**

The School of Math and Sciences strongly feels that face-to-face course instruction is far superior to on-line or even Compressed Interactive Video (CIV) courses. We have purposely avoided offering upper level biology courses using this medium. It is our opinion that we cannot be everything to everyone; therefore we have focused our attention on providing top-notch face-to-face courses for our students. Faculty members are not discouraged from developing on-line or hybrid courses; however, very little has been done in this area. No courses within the Department of Biology are currently offered by distance delivery. Two on-line sections of BIOL 1063/BIOL 1071 Introduction to Biological Sciences/Introduction to Biological Sciences Laboratory are offered and administered by the Office of Academic Affairs.

The following questions are answered based on University policies, but are not applicable to this program.

*Summarize institutional policies on the establishment, organization, funding, and management of distance courses/degrees.*

The UAM campus governance and academic approval processes are followed for any new course added to the curriculum. Any new degree program, regardless of the method of delivery (distance technology or not) must be reviewed by the faculty, approved by the academic unit dean, the Academic Council, Assembly, Chancellor, the University of Arkansas Board of Trustees, and the Arkansas Department of Higher Education Coordinating Board prior to implementation.

For an existing course to be offered via distance delivery, a Course Shell Authorization form must be completed and signed by the faculty member and approved by the academic unit dean and the Provost. Each faculty member who teaches an online course must participate in Blackboard, the campus learning management system, and in training offered by the UAM Office of Academic Computing prior to each fall semester or as the need arises. Technical assistance is provided by the Office of Academic Computing as needed throughout the academic year.

The UAM Office of Academic Computing is responsible for the management and maintenance of the learning management system server and must communicate with the Office of Academic Affairs regarding available space in classes and other administrative concerns. Additionally, the Office of Academic Computing is responsible for providing technical assistance to the faculty who teach online courses.

*Summarize the policies and procedures to keep the technology infrastructure current.*

University of Arkansas at Monticello faculty and students have access to infrastructure and technology that includes intranet, Blackboard, Compressed Interactive Video, broadband Internet, and access to the online catalog, electronic books, and journals available in the Fred J. Taylor Library and Technology Center, as well as web-based mediums. Regular funding is part of an ongoing process that includes technology upgrades, software licensing, and technical support. UAM recently completed an eight-year plan to provide a technology infrastructure that increased the University's academic

competitiveness. This plan included Level One technology certification for all buildings on all three campuses.

In the summer of 2010, UAM, a founding member of the Arkansas Research and Education Optical Network (ARE-ON), connected to the ARE-ON Network allowing access to two high-speed national networks, the Internet2 and National Lambda Rail. Completion of this project allowed UAM to collaborate with all universities and colleges that share the network as well as access to the Internet at a much faster rate.

UAM has also purchased a financial and student information software system, PeopleSoft, updating the institution's 25-year old software system, which will make secure access to campus educational and planning resources available to students via the Internet. UAM began offering distance education courses in 1999 with WebCT, and utilized various versions of WebCT until summer 2010, when UAM changed over to Blackboard as its distance learning course management product of choice.

*Summarize the procedures that assure the security of personal information.*

The UAM Information Technology Department sets forth guidelines for the protection of personal information following information security policies regulated by the State of Arkansas security recommendations. These guidelines state that UAM can only collect personal information through a secure link and with prior approval from the individual involved. Personal information cannot be stored on the course management system by the students or faculty. The Office of Academic Computing regularly scans web sites for the presence of personal information. The removal of any personal information found on the course management system is immediate. The Learning Management system (Blackboard in this case) is subject to the same security measures as all other Information Systems on the UAM campus and meets State of Arkansas security guidelines for protecting personal information.

*Describe the support services that will be provided to students enrolled in distance technology courses/programs by the institution and/or other entities.*

Support services provided to students enrolled in distance technology include advising, course registration, financial aid services, course withdrawal, e-mail services, access to library resources, and a help desk.

Online students receive the same advising support as students taking courses on-campus. Advisors are available via published contact phone numbers and e-mail and are always ready to help students with preparation for registration. In regard to course registration, students who are registering for only online courses are directed to contact the UAM Office of Academic Affairs for support and assistance. For financial aid for distance education students, students may complete the Free Application for Federal Student Aid (FAFSA) online and can view their financial status via WeevilNet. UAM does not currently allow students to accept aid via WeevilNet; however, that is planned for the near future. Requested verification documents, loan requests, and award acceptance letters can be submitted via mail, e-mail or fax rather than through a personal visit. In regard to course withdrawal, students are directed to contact the institution's director of Academic Advising for support and assistance.

Student e-mail accounts are governed by the University Information Technology department. The UAM webpage contains links to connect to e-mail, tutorials on using the e-mail system, instructions for initial login, and support phone numbers to contact in the event students are unable to log in to their e-mail. Information Technology is open 8am-4:30pm Monday-Friday for student e-mail account problems.

Online students may access library resources in the same fashion as other students. The Library website is linked on the main UAM homepage, and provides distance education students access to Subject Guides, Library Guides, the Library catalog, an extensive list of databases, and a tool for searching magazines, newspapers, and journals for information. The Library webpage also provides contact information should students need specific services that are not linked to the main page.

The Office of Academic Computing features a Support Center, also linked on the main UAM Webpage (Blackboard link). This link allows students to access tutorials on “How to Use Blackboard” and “Problems with Blackboard” for students to reference for quick resolutions. The support page also features contact phone numbers for the Support Center, a form to complete to request assistance via e-mail, and a “Live Chat” option in which the student can be directly connected to an individual in the support center for live assistance. The Office of Academic Computing also periodically offers workshops on Blackboard usage; these workshops are now required for all students utilizing any form of distance education.

*Describe technology support services that will be provided to students enrolled in distance technology courses or programs by the institution or other entities.*

Support services are provided to students enrolled in distance technology courses primarily by the Office of Academic Computing. Faculty members also assist with issues with which they are familiar to help share resolutions. The Office of Academic Computing supports distance technology courses with training workshops on how to use Blackboard, online tutorials, e-mail forms for support, and by providing contact phone numbers for the Support Center, and a web option for Live Chat with support personnel. Blackboard training workshops are now required for all students using any form of distance education. The e-mail form, the chat option, and direct phone calls put users in contact with support personnel who gather information about the user’s computer, internet connection, and the specific problem. Using this information, support personnel attempt to diagnose the issue and provide a timely resolution to the problem.

*Describe the orientation for students enrolled in distance technology courses or programs.*

Institutional policy in regard to orientation for distance technology courses is as follows (from UAM Faculty Distance Education Handbook):

“Conduct an orientation (online) in each course at the beginning of each term to ensure each student understands the requirements of the course and can access the course. Advise students of the time and energy demands of the course as well as establishing clear limits on what the course is and is not.”

Each faculty member interprets this orientation process in a slightly different manner, but all complete the requirements to ensure students understand how to use the software, view the syllabus, utilize the calendar and discussion boards, and how to access other software features. For the Advanced Microcomputer Applications course, there is an on-campus orientation session where the instructor covers the basics of Blackboard, discusses homework requirements, and presents testing dates in person. Each style of orientation session presents the instructors contact information, office hours, and expectations for student performance in the course.

In addition, all students utilizing any form of distance education are required to undergo training through a mandatory e-mentoring course. UAM has developed a fully electronic version of the E-Mentoring program that is accessible at the students' convenience. Students learn the fundamental computer-related skills needed to succeed at UAM, including how to log on to WeevilNet (the student management system), how to access their UAM e-mail accounts, how to use Blackboard, and how to use electronic library resources. Students are also taught how to connect their personal and UAM technologies. Beginning with the Spring 2015 semester, students who wish to take an on-line class are required to take either the electronic version or face-to-face instruction and must be successful in an on-line assessment demonstrating mastery of the information. Students who fail to complete the course in a timely manner are dropped from on-line course registration.

*Summarize the institutional policy for faculty course load and number of credit hours taught, compensation, and ownership of intellectual property.*

In regard to faculty course load, again referring to the UAM Faculty Handbook: "The course load for fulltime faculty holding the rank of instructor is 15 semester credit hours. The course load for fulltime faculty holding the rank of Assistant Professor or above is 12 semester credit hours."

Distance education courses are treated as part of faculty's standard workload. Thus, distance technology courses are viewed the same as classroom courses in the area of workload, credit hours taught, and compensation. Faculty members are given a special one-time incentive payment for development of each new on-line course that they teach.

In regard to ownership of intellectual property in the area of previously copyrighted materials, the UAM Distance Education faculty handbook sets forth the following guidelines for the use that all faculty must abide by: "Under Section 107 of the copyright law ([www.lcweb.loc.gov/copyright](http://www.lcweb.loc.gov/copyright)) passed in 1976, educators are given special exemptions from the law under the Fair Use Doctrine (<http://fairuse.stanford.edu>). Educators may use copyrighted works without first obtaining permission of the copyright holder, within limits. There are four criteria for determining whether copyrighted materials have been used legally under this doctrine: (1) Purpose and character of the use; (2) Nature of the materials used; (3) Amount and importance of the part used; and (4) Effect on the market of the use. This site ([www.cetus.org/fairindex.html](http://www.cetus.org/fairindex.html)) shows illustrations of the amounts of copyrighted work that may be used under the Fair Use Doctrine.

The Technology, Education and Copyright Harmonization Act (TEACH Act) passed in 2002 expands the Fair Use Doctrine to cover distance education. Generally, exemptions given for face-to-face instruction will apply to online instruction. Please visit the American Library Association website for more information.

The Fair Use Doctrine currently enables educators to use copyrighted materials without first seeking permission. An educator can also use any materials where copyright permission has been obtained. The following sites offer more information.

- The Copyright Clearance Center ([www.copyright.com](http://www.copyright.com)) will obtain permission for educators; a fee is attached to this service.

- The Copyright Management Center at Indiana University/Purdue University site has information on how to seek copyright permissions.

([http://www.iupui.edu/~webtrain/web\\_samples/cmc.html](http://www.iupui.edu/~webtrain/web_samples/cmc.html))

- The US Copyright Office ([www.lcweb.loc.gov/copyright](http://www.lcweb.loc.gov/copyright)) allows one to search a database for copyright ownership.”

In regard to course ownership of intellectual property developed by University faculty, please refer to attached Appendix F – University of Arkansas Board of Trustees Policy 210.2 regarding course ownership. In summary, this policy states that in most instances, faculty will own the copyright to material they have created, and retain the right to update, edit, or revise their work. Faculty also will receive all revenues of commercialization of content they create of their own initiative. For materials developed in regard to faculty contract employment pursuits, the University will retain the right for all revenues, but may decide to share such revenues with the developer at the discretion of the University.

## MAJORS/DECLARED STUDENTS

*State the number of undergraduate and graduate majors/declared students in each degree program under review for the past three years.*

Number of students in the Biology program has remained fairly stable over the last three years. Table 10, below, lists the number of Biology and Pre-Medicine majors by class level during this period. As stated earlier, the two categories are not strictly additive, as students may be listed as both Biology and Pre-Med majors due to a quirk in our registration system. There are no graduate Biology majors, as there is no graduate program in Biology at UAM.

**Table 10—Number of Majors per Class Level per Year, 2012-2015**

	<u>2012-2013</u>		<u>2013-2014</u>		<u>2014-2015</u>	
	<u>Biology</u>	<u>Pre-Med</u>	<u>Biology</u>	<u>Pre-Med</u>	<u>Biology</u>	<u>Pre-Med</u>
Freshman	16	23	16	22	29	27
Sophomore	10	6	5	6	8	3
Junior	6	7	11	1	5	5
Senior	16	4	10	5	18	1
Post-Bach.	0	1	0	1	0	0
Total	49	41	43	35	60	36

*Describe strategies to recruit, retain, and graduate students.*

As part of recruiting, the School of Mathematical and Natural Sciences has developed relationships with area high school biology teachers. Biology faculty members occasionally make trips to local middle schools and high schools to present biology topics to Biology or other science classes. These activities give faculty members an opportunity to market the University, and the Biology program in particular. The Dean of Math and Science is particularly active in visiting local schools, and his visits and workshops double as recruiting trips.

The School of Mathematical and Natural Sciences also recruits potential students during their visits to events such as Scholar's Day, Weevil Welcome Days, and Parent/Family Appreciation Day. The Office of Admissions does an outstanding job of identifying top-notch students with skills in biology, and forwarding their information to our office. Prospective students receive a contact letter describing the Biology and Pre-Medicine programs and an invitation to visit the school for further information concerning the Bachelors of Science degree in Biology.

The State of Arkansas has changed the formula for state funding to emphasize the importance of retention and graduation, so that UAM has become even more focused than before on these important issues. The School of Mathematical and Natural Sciences has been heavily involved in a campus-wide initiative to promote retention and graduation. This initiative has resulted in a five-pronged attack on low retention and graduation rates:

1. E-Mentoring. This portion of the initiative seeks to teach students the fundamental computer related skills needed to succeed in both the traditional classroom setting and the on-line environment. This will be accomplished through the establishment of a Technology Fair, the introduction of a required On-line Learning Skills Course, and improvement and expansion of faculty use of Blackboard.

2. First Four Weeks program. This program seeks to improve student engagement, interest, and success during the first four weeks of each semester through a variety of techniques involving faculty-student interactions in the classroom. Faculty members will become more focused on raising expectations for student success, on communicating what those expectations are, on providing rapid, regular, complete feedback to students, and promoting active, engaged learning. Faculty members will also increase the integration of Student Support services into the learning experience.

3. First-Year Experience program. This initiative seeks to expand efforts to improve student success during the first year. Efforts will be made to aid students in improving their study skill set, and to provide assistance to faculty members in integrating study-skills components into freshmen level classes.

4. Student Services. This program seeks to increase the effectiveness of Student Services programs by achievement of synergies between academic advising, admissions, athletics, counseling/testing, instructional technology, library services, academic faculty, and the recruited student.

5. Remediation. Revision of scheduling and course load for students who require remediation has occurred, and adjustments will be continued as needed.

Several faculty members in the School of Mathematical and Natural Sciences served on the various committees involved in construction of this initiative, and many of the proposed strategies are already used by the Biology faculty, but more are being incorporated into the program.

To retain and graduate students, a large amount of emphasis is placed on academic advising. Every semester, each Biology major must meet with his academic advisor prior to enrollment in classes. The advisors carefully plan the sequence of courses so that the student can graduate at the desired date. After the student reaches 70 hours, the advisor and student must submit an Advisement Report and a degree completion plan to the Registrar's Office.

Free biology tutoring is available on campus for students who are struggling, even in upper level courses. Many Biology upper level majors earn work-study wages by working in the tutoring lab. This helps the tutors handle the financial burden of college, while improving their biology and teaching skills. The Biology faculty members spend an enormous amount of time providing help sessions or working one-on-one with students during office hours. They also work with students that are dealing with personal problems or other issues that may prevent them from being successful.

During the student's last year of undergraduate work, faculty members help students with placement in medical school, dental school, pharmacy school, veterinary school, graduate school, or a masters of teaching (MAT) program. Even after graduation, faculty members often act as mentors for former students in various post-baccalaureate programs.

*Provide the number of program graduates over the past three years.*

There were 12 graduates of the UAM Biology program in 2013, 16 in 2014, and 7 in 2015, or an average of 11.7 per year. This is almost exactly the same as the 10-year average of 11.9. The low number of graduates in 2015 is due in part to a greater-than-usual number of students that were granted early acceptance into pharmacy schools the year before. These students will likely receive degrees from UAM during the next two years as they complete coursework in pharmacy school and transfer credits back to UAM.

## **PROGRAM ASSESSMENT**

*Describe the program assessment process and provide outcomes data (standardized entrance or placement test results, exit test results, etc.).*

The School of Mathematics and Natural Sciences uses four primary means for assessment of students as they work through the program and as an annual assessment of the program itself. First, students are evaluated by course examinations and projects to measure their learning. Exams cover material from the textbooks, instructor lecture, or activities completed during the course. In some classes, projects or homework are opportunities for students to display their understanding of concepts taught in the course as part of the grading component.

Secondly, senior students often take a standardized exam involving biology, including the MCAT pre-medical examination, the PCAT pre-pharmacy exam, the DAT pre-dental exam, or the OAT pre-optometry exam. Each exam has a specific life sciences component in addition to sections on physical

science and language skills. Others may take the GRE, as a prelude to application to graduate school or veterinary school (rarely does anyone take the Biology subject exam, because most graduate programs require only the general GRE exam). Students are strongly encouraged to report results of these exams to the School of Math and Science, specifically so that the scores can be used to assess program effectiveness. Recent pre-professional exam scores are shown in the table below. Note that not all students report results of such tests, and that some students take more than one test, or take one test more than once.

**Table 11—Results of Standardized Pre-Professional Test Scores**

**DAT (Dental Admission Test)**

<u>Student</u>	<u>Year</u>	<u>Biology</u>	<u>%</u>	<u>Total Science</u>	<u>%</u>	<u>Academic Average</u>	<u>%</u>
Ellington	2009	16	36	17	51	17	48
Wallace	2010	17	49	18	63	18	63
White	2011	15	26	14	14	14	12
Roberts	2011	17	NA	17	NA	18	NA
Roberts	2012	18	64	17	49	18	63
Roberts	2014	20	NA	20	NA	20	NA

**GRE (Graduate Record Evaluation)**

<u>Student</u>	<u>Year</u>	<u>Verbal</u>	<u>%</u>	<u>Quantitative</u>	<u>%</u>	<u>Analytical</u>	<u>%</u>
Henley	2007	590	83	580	44	4	33
Henley	2007	580	81	660	63	4	33
Shepherd	2009	390	30	620	53	4	37
Mitchell	2010	380	29	600	48	4	41
New Scoring System							
Prescott	2011	162	90	158	74	NA	NA
Fuller	2012	151	NA	146	NA	NA	NA
Rose	2012	158	79	160	84	4.5	72
Stephens	2012	162	90	160	84	4	NA

**MCAT (Medical College Admission Test)**

<u>Student</u>	<u>Year</u>	<u>Biological Sciences</u>	<u>Total Score</u>
Cagle	2009	NA	25
Hoang	2009	9	23
Renfro	2010	8	29
Scott	2010	10	28
Ellington	2010	8	23
Ellington	2011	9	24
Hathcox	2011	7	22
Lockwood	2011	12	32
Rowell	2011	8	23
Hatten	2012	NA	23
Probst	2012	11	28

Rose	2012	12	34
Wallace	2012	8	25
Whipple	2012	14	39
Beatty	2013	8	23
Brown	2014	8	26
Holland	2014	5	16
Reyes	2014	10	29
Snider	2014	8	22

**OAT (Optometry Admission Test)**

<u>Student</u>	<u>Year</u>	<u>Biology %</u>	<u>Total Science</u>	<u>%</u>	<u>Academic Average</u>	<u>%</u>
Scott	2009	350 83	350	88	350	94

**PCAT (Pharmacy College Admission Test)**

<u>Student</u>	<u>Year</u>	<u>Biology %</u>	<u>Composite</u>	<u>%</u>
Brown	2006	412 71	417	80
Holmes	2006	376 16	395	41
Jenkins	2006	399 52	413	75
Hoang	2007	411 69	401	53
Hoang	2007	414 69	410	67
Barnett	2008	421 80	418	77
Brown	2008	411 63	397	37
Brown	2008	409 66	401	53
Brown	2009	440 94	419	79
Lang	2009	404 54	401	45
Dickey	2010	401 51	396	39
McDill	2010	405 56	398	39
McDill	2010	399 45	400	45
Tabor	2010	379 14	390	24
Tabor	2010	387 25	391	26
Gasaway	2011	411 66	394	31
Livingston	2011	382 17	389	22
Norrell	2011	401 49	398	39
Norrell	2011	421 80	399	41
Emberton	2012	398 38	396	36
Gasaway	2012	424 82	398	40
Huddleston	2012	411 63	408	64
Huddleston	2012	434 91	410	68
Livingston	2012	417 75	400	45
Livingston	2012	408 57	402	50
Merritt	2012	384 15	394	31
Merritt	2012	411 63	417	81
Norrell	2012	411 63	401	47
Raney	2012	382 13	373	4
Rice	2012	381 12	377	6
Rice	2012	379 10	386	16
Smith	2012	396 35	394	31
Stephens	2012	411 63	417	81

Tabor	2012	408	57	398	40
White	2012	411	63	409	66
Winnon	2012	414	71	404	51
Cash	2013	402	46	414	76
Emberton	2013	399	40	399	43
Emberton	2013	393	29	406	59
Hill	2013	411	63	399	43
Raney	2013	396	35	380	9
Smith	2013	399	40	400	45
Ashcraft	2014	430	89	414	76
Emanuele	2014	435	92	412	76
Haire	2014	411	63	419	84
Hill	2014	435	92	412	72
Raney	2014	396	35	388	20
Thomasson	2014	405	51	405	57

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Thirdly, Biology Seminar, BIOL 4701, is a capstone course required of all Biology majors. One goal of this course is to validate the student's biology background through the development of a research presentation in which the student applies previous knowledge to a topic that was not specifically taught in the curriculum. Students in the course must write a research paper and give an oral presentation, demonstrating knowledge and understanding in a specific area of biology. Students may use original research if they are participating in such research with faculty. Some of these students also present their work at a state, regional, or national meeting. This year, seventeen students took Biology Seminar. This group was very strong compared to past years, and all students performed very well and met the desired learning outcomes.

Finally, the program is assessed by placement of the graduates. Most graduates are successful in finding positions. Over 95% of UAM Biology students who have applied to medical schools over the last 10 years have been accepted (although not all made it on the first try). The students' acceptance rate in pharmacy schools is nearly as strong. Others have attended graduate programs; almost every student who has applied for graduate school in the last ten years has been accepted. Some students have applied to MAT programs; again, the acceptance rate is very high. A few have gone into private business or industrial positions. A graduate placement list is shown in Appendix G.

In addition to these methods of assessment, the Biology program undergoes an annual assessment reporting process whereby faculty assess the program on the basis of student learning outcomes and how they relate to the mission of the University, student performance and evaluation, and program efforts in the area of student retention. This report is submitted to the Provost each August.

*Describe program/major exit or capstone requirements.*

BIOL 4701, Biology Seminar, is the capstone course for the Biology major. This course provides students with an opportunity to use concepts previously learned in their curriculum and to apply

creativity and critical thinking to a project in the development of a paper and oral presentation. The objectives of the capstone course are:

1. To provide an overview of the biology the student has studied.
2. To improve the student's written and oral communication skills.
3. To acquaint the student with the basic library research techniques in biology.
4. To validate the student's biology background.

The course requires that each student conduct library research on a specific topic in biology. The instructor must approve the chosen topic. The student should search through the biological literature and gain detailed knowledge of the topic. The student is required to submit a word-processed report in a pre-selected journal format, with references, and to give a fifteen-minute oral presentation on the topic. By going through this process, the student obtains experiences that better enable him to enter the job force or professional school with confidence. The student also learns to demonstrate higher level communication skills and biological knowledge. The grade awarded is based on the student's ability to organize important information, provide adequate coverage of a topic, and to complete a written report and an oral presentation while meeting pre-set deadlines. The most recent syllabus for this course is included with all other syllabi in Appendix D.

*Provide information on how teaching is evaluated, the use of student evaluations, and how results have affected the curriculum.*

Teaching evaluation is one of the main components of the faculty evaluation process. Courses are evaluated through classroom observation by the Dean of the School of Mathematical and Natural Sciences and peer faculty, and by student evaluations. The classroom observation portion of the evaluation process focuses on a faculty member's preparation and organization in the classroom, knowledge and presentation of the content, and communication and interpersonal relationship skills. This evaluation gives the reviewer a chance to provide constructive criticism on teaching performance and to suggest possible improvements. Please refer to Appendix H for the Classroom Visitation Form.

Student evaluations are an important means of feedback on the instructor's performance, the course content, and an opportunity to provide valuable comments and feedback for possible improvements in the course. Students are first asked to evaluate themselves as a student, thus providing some context for their input in regard to their classification, effort level, attendance, projected grade, and academic history. Students also evaluate the instructor on material presentation, teaching performance, and effectiveness. After evaluating the instructor, the student evaluates the course itself in the areas of content, testing, assignments, and textbooks. Student input is valuable in both the faculty evaluation process and feedback on the courses themselves. Student evaluation of courses is an important part of the process whereby the faculty reviews our curriculum. Student written comments in particular can provide valuable insight that faculty can consider for changes in course content or curriculum, or the possible creation of new courses.

Student evaluation of teaching is accomplished through a secure online survey operated by CoursEval. (The evaluation is being transitioned to Blackboard during the 2015-2016 academic year, but the evaluation process will be the same.) Students complete the survey outside of class. The survey

consists of 6-8 specific questions, with opportunities to include written comments on some of the questions. In the survey, statements are made and the student has the opportunity to Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, or Strongly Disagree. The survey statements used on the Spring 2015 evaluations are:

1. The instructor is willing to help the students learn.
2. The instructor shows interest in and knowledge of the subject.
3. The instructor demonstrates effective oral and written communication skills.
4. I would recommend this instructor to other students.
5. I have more knowledge and a deeper understanding of the subject matter as a result of this course.
6. (A written response question) What did you like and dislike most about this course?

Faculty members use the written response question to make minor changes in their policies and course content. In addition, faculty members have the option to add questions to the normally used questions when specific circumstances dictate.

*Provide transfer information for major/declared students including the receiving institutions for transfer and programs of study.*

Incoming transfer students are welcomed to the program. Their transcripts are analyzed by one or more faculty members, and determinations are made as to which major requirements have been adequately fulfilled. There have been very few transfer students entering the program, and most of those have had very few courses in Biology above the general education core. Faculty members are familiar with the other in-state programs and can efficiently evaluate the transcripts for students from those institutions. For other universities, the Registrar often supplies catalog information to the Biology faculty to help in placement. Course substitutions are allowed when appropriate.

The Biology program does not serve as a feeder for specific programs at other institutions, so we rarely have a program student transfer to another university. However, all eligible courses follow the requirements of the Arkansas Course Transfer System, which sets standards for transfer of coursework in general education and some other courses between public universities in Arkansas. UAM Biology courses which meet these requirements include Introduction to Biological Science, Principles of Biology I and II, Anatomy and Physiology I and II, Botany, Zoology, and each of the corresponding laboratories. Students or faculty at UAM or other universities may determine transfer eligibility at the Arkansas Department of Higher Education website (<http://acts.adhe.edu/studenttransfer.aspx>).

*Provide information for program graduates continuing their education by entering graduate school or by performing volunteer service.*

Biology faculty members at UAM feel that the program is successful when graduates are able to move on to the next level of their educational journey. Often, curriculum changes that occur are attempts to meet changing requirements for entry into a graduate or pre-professional program. For instance, construction of the Organismal Biology degree track was a direct attempt to provide an

appropriate pathway for students who wish to enter graduate programs in field biology. It is the goal of the department to provide a program that is sufficiently broad to allow students to enter graduate programs, pre-professional programs, or to directly enter the workforce. The faculty works closely with all Biology majors to make sure they are advised into the proper courses for the pathway they have chosen, and with juniors and seniors to help them make choices that best fit their skills and goals and to assist them through the various application processes. One Biology faculty member is designated as the Director of Pre-Medical Studies, and acts as the primary advisor for most Biology majors who are pre-medical or other pre-professional students. Over the past three years, 5 students have been accepted into medical school, 9 have been accepted into pharmacy school, one has been accepted into dental school, one has been accepted into veterinary school, 6 have been accepted into graduate school for biology or other sciences, and 2 have entered the MAT program at UAM. Note that these numbers do not include several biology students who were accepted into pharmacy school and one who was accepted into medical school before completing a degree. Placement information for all Biology graduates for the last ten years is provided in Appendix G.

*Provide aggregate results of student/alumni/employer satisfaction surveys.*

Each year, graduating seniors are invited to an exit interview with the Dean of the School of Mathematical and Natural Sciences. Many students take advantage of this opportunity. This year, 7 graduating biology students participated in the exit interview. Their responses were very similar to those from previous years. The usual questions asked during the interview and typical responses are found below:

- 1) Background information: Name, Hometown, Major, Mailing Address, E-mail.
- 2) What brought you to UAM?
- 3) How do you rate your time at UAM, 1-5 with 5 being best?
- 4) What were your favorite parts of your educational experience at UAM?
- 5) What were your least favorite parts of your educational experience at UAM?
- 6) If you could do it over again, would you come to UAM? If no, why not?
- 7) Do you feel that you have received a quality education at UAM? If no, why not?
- 8) Is there anything you would change in your major curriculum?
- 9) Is there anything you would change in your minor (if in Math and Sciences)?
- 10) Was your academic advising adequate?
- 11) What about UAM would you change if you were chancellor for the day?
- 12) What are your plans after graduation?
- 13) What are your long term plans?
- 14) Is there anything else you would like to tell us?

Most Common Responses:

- 2) Grew up locally, didn't want to go far away. Have family that work in this area. Came because of athletics.

- 3) Most rank either 4 or 5. Occasionally someone ranks a 3. No student gave ranking of 1 or 2.
- 4) Small classes. Get to know professors and other students very well. Cheap. Lots of work study opportunities. Lots of friends here. I learned a lot.
- 5) Upper level courses not offered often enough. Not big enough to avoid course conflicts with multiple sections of some courses. Nothing to do here socially.
- 6) Most answer yes. Those that answer no usually indicate it is for non-academic reasons (lack of social life is most common explanation).
- 7) Most answer yes. The occasional negative answer is often related to not being able to find a job in the area they wanted after graduation.
- 8) Reduce the number of labs needed for a degree in sciences. Don't teach calculus only at 8:10 a.m. five days a week. More night class offerings.
- 9) Most say they have no changes. Don't require minors to take the lab portion of the courses. Increase the number of upper level options in chemistry and physics.
- 10) Most say yes. There are a few, especially those that start in general studies, who complain about their first semester advising.
- 11) This question has a wide variety of replies. Improve buildings. Improve parking lots. Give entire campus wireless access. Build a new entrance to the college that doesn't have to go through Drew Central or Monticello schools. Drop athletic programs. Move the campus into town. Change the mascot. Relax the alcohol rules on campus. Drop the history requirement.
- 12) Most already have jobs or professional programs in place. A few students planning to teach are too late to enter MAT program, and therefore have to wait a year.
- 13) Most have specific plans involving family and employment near hometown. A few plan to leave for bigger city.
- 14) This is most often unanswered.

The School of Mathematical and Natural Sciences has not conducted any sort of employee satisfaction survey concerning our graduates. However, constant contact with administrators and recruiters at professional schools indicates that UAM students are usually successful upon matriculation. Graduates of UAM are recruited strongly by medical schools such as UAMS and William Carey, and by pharmacy schools including UAMS, Harding, and UT-Memphis. The School of Math and Science works closely with school districts in the area, and its students are often hired as teachers of biology or other sciences. UAM students are widely praised by school administrators for their content knowledge.

Every effort is made by the Dean of Math and Sciences and by faculty members to remain in contact with Biology alumni. Very few of these students have indicated that they have experienced any problems because of weaknesses in the program. Instead, most report that they have been exceptionally well-prepared for professional school or graduate programs. Many have been highly complimentary of the Biology-Biochemistry double major. A few graduates who have attended medical school have mentioned that a class in Histology might have been helpful had it been available. Several others have commented that Comparative Anatomy might have been useful. UAM has usually offered a course in Comparative Anatomy, but in the past it has not been required of pre-med students; this situation will change beginning in Fall 2016.

*Describe how the program is aligned with the current job market needs of the state or local communities.*

As stated earlier in this document, Arkansas has an extremely strong demand for health-care professionals, including doctors and pharmacists. The Biology faculty constantly monitors the requirements for medical and pharmacy schools (as well as dental, veterinary, graduate, and other post-baccalaureate programs) to ensure that the curriculum is properly aligned with these schools. The Dean and Biology faculty remain in constant contact with school districts in the area to ensure that demand for teachers is met. The curriculum is broad enough, with three different degree tracks and enough upper-level electives that graduates are well-prepared for careers in health, the laboratory, agriculture-related industries, or other private industry.

*Provide job placement information for program graduates including the number of graduates placed in jobs related to the field of study.*

A list of program graduates for the last 10 years and their initial placement is provided in Appendix G.

#### **PROGRAM EFFECTIVENESS (STRENGTHS, OPPORTUNITIES)**

*List the strengths of the program.*

The major strength in the program is the devotion of the faculty. The School of Mathematics and Natural Sciences has a very experienced and caring Biology faculty who are continually searching for better methods to serve the students. All tenure-track faculty members have received tenure and promotion, and have been at UAM since at least 2007. The faculty is extremely student-focused. Virtually every activity of each faculty member is conducted with students in mind; this student focus extends to faculty research programs and service activities. This attitude extends not just to Biology majors, but to all students of the School of Math and Science, and indeed to all students who take classes in the department. For instance, the faculty considers students of wildlife and nursing to be “our” students. Every member of the faculty, from the most experienced emeritus professor to the newest lab instructor, understands that the only true measure of the success of the Department is the success of our students, so that every effort is made to ensure that success.

A second important strength of the Biology program is the strong relationship with other science faculty. The Chemistry department at UAM is probably the strongest in the state, especially when size of the University is considered. Establishment of the Biology-Biochemistry track has required the two departments to work closely together on scheduling and curriculum. Fortunately, this has never been a problem, as the faculties of the two departments have been close colleagues for decades. Rivalries and hard feelings between these departments that are sometimes seen at other universities are non-existent at UAM; instead, biologists and chemists often work together on research projects and consult with each other about matters of curriculum, science, and student affairs. This collegiality extends to Math, Physics, and Earth Science faculty.

A third strength of the Biology program is the support received by the program from administrators and staff across the University. The Dean of Math and Science is the strongest supporter of Biology, constantly fighting for funding and always facilitating any suggestion by the faculty that will help students to succeed. The Admissions department works closely with Biology to recruit outstanding students and to find scholarship or other financial aid for deserving students. The administration recognizes the quality and success of the program and has moved to support it, especially recently.

*List the areas of the program most in need of improvement.*

Biology faculty members are underpaid compared to faculty at similar institutions in the state and across the region. This disparity is especially egregious considering the experience and abilities of the faculty and the success of the students. Nowhere is this more evident than in the salaries of the lab instructors. Because laboratories traditionally have counted less toward the teaching load of faculty members, those who teach only labs have some of the heaviest workloads. Biology laboratories are extremely important to students, as is reflected in the comments of graduates. However, lab instructors in the department have salaries which are even lower and more stagnant than other Biology faculty members. There is some indication that the upper administration of the University has recognized this problem and will begin moving to solve it, but until this happens, faculty salaries will remain a drag on the morale of the Department.

There is an ever-increasing need for research experiences for biology students. Many graduate schools and professional programs want students to have research experiences, which requires that our faculty members are able to provide research opportunities. However, as FTEs are presently calculated, faculty members receive no credit for one-on-one research training with students. This policy needs to be modified to encourage and reward faculty members for mentoring undergraduate research.

The physical facilities are in great need of replacement. The Science Center continues to break down. There are several roof leaks that have not been repaired, despite multiple attempts. The cement steps are breaking apart in several locations around the building. Mold grows very well in the shady overhangs and shaded sides of the building. There is no return air in the labs which have hoods, so a great deal of air from underneath the building is pulled into the rooms. This has caused major problems with mold growing behind hoods, underneath lab benches, and under the heating and cooling units. Several faculty offices have mold deposits. Windows are original to the building. Most do not fit well and allow air and rain to enter the building. None offer any insulation. Since some of the windows are on the walls adjacent to raised sidewalks, security is non-existent. Many of the locking mechanisms are rusted to the point of not working at all. One digital projector system was stolen from the Science Center; others have been vandalized. Exterior doors offer little security. Frequently rain is blown through the doors. During weather changes more than one door sticks allowing air conditioning to be lost and creating very distracting noises. At times during the past year, certain doors were blocked off due to problems with the doors dragging. Even with its problems, many students think of the Science Center as their second home and hang out in the building between classes, despite the fact that there are no real student lounges or study areas. On top of the dilapidated state of the Science Center, it is too small to cope with growth in size and number of classes, and storage space is nearly non-existent. Great efforts have been made to make the Science Center a comfortable learning environment, but

despite the best efforts of the Maintenance Department and the Dean of Math and Sciences, the building is unsafe, unhealthy, lacking in security, ugly, and a barrier to recruitment. Fortunately, the upper Administration and Board of Trustees have recognized the situation and have made replacement of the Science Center a top priority of the University.

*List program improvements accomplished over the past two years.*

The Department of Biology, its faculty, and its students have been consistently successful for the last decade. Faculty members continue to receive nominations and awards for teaching, student research results in awards and publication of results, and students continue to be accepted into post-graduate programs at an extremely high rate. To continue this success, the faculty is always striving to improve and upgrade the program. Improvements in the last two years include changes and additions to the curriculum, and attempts to upgrade facilities and equipment.

Changes to the curriculum include the establishment of a new course, BIOL 3333/3331, Molecular Biology and Lab. Although the lecture portion of this course had been on the books for a number of years, it had never been offered. Dr. Mary Stewart proposed a laboratory for the course, which was approved by the C&S Committee, and offered the course and laboratory for the first time in Spring, 2015. The course was well-received and will be offered in Spring of odd-numbered years in the future. Dr. Stewart is also working on a possible Immunology course to be offered in even-numbered years.

A major change within the last two years was the hiring of an additional lab instructor. Lauren Morgan now teaches Microbiology labs and some Intro Biology labs. This addition is what allowed Dr. Stewart to offer the Molecular Biology class, and has also enabled the Department to offer additional sections of Microbiology lab and Genetics lab. This has helped remove a bottleneck in these courses and eased scheduling problems and will allow more students to graduate on time.

In 2014, the Department received a major donation that allowed the replacement of most of the ancient, obsolete microscopes in the two largest teaching labs. The donation was matched by a Centennial Circle grant from the university. These microscopes will be used in the laboratories associated with Intro Biology, Principles of Biology I and II, A & P I and II, Botany, and Zoology. Microscopes in the Microbiology lab were replaced just a few years ago, so that nearly every scope in the program has been upgraded. In early 2015, the Department received two major grants which will allow purchase of new equipment and major upgrades to the UAM Sundell Herbarium of the Turner Neal Museum of Natural History.

*Describe planned program improvements, including a timetable and the estimated costs. Identify program improvement priorities.*

At the end of the 2015 academic year, the Department received permission to add a tenure-track biologist. This biologist will be hired during the Fall 2015 semester and will begin teaching in Spring 2016. Addition of a faculty member will allow the Department to add offerings of some courses such as Principles of Biology I and II, as well as upper-level courses in the specialty of the new hire. Early conversations among the faculty indicate that the new biologist should be able to teach courses such

as Principles of Biology and Introduction to Biology as well as courses in the biomedical / molecular area such as histology, genomics, statistics, and experimental design.

As stated above, funding has been secured for a new Botanical Research and Herbarium building that will house the UAM Sundell Herbarium, new laboratory space, a library and conference room, and office space. Renovations will also be made to portions of the Turner Neal Museum of Natural History, including upgrades to the climate control system, renovated laboratory space, and revamped office space. Construction will begin during the Fall 2015 semester. These projects will enhance research and education in the biomedical sciences.

The most important improvement planned is a new Science Center. During 2014, a Building Committee was established to work with an architect to submit a proposal for a new Science Center. The Committee and the architect submitted a plan for a three-story building with ample classroom and laboratory space. Estimated cost of the new building is 25 million dollars. The UAM Office of Advancement has begun preliminary efforts to secure funding for the building, and the Administration has declared that the new Science Center is the top priority of the University. A timetable for building the new Science Center is contingent upon funding, but the architect estimated that construction would require about two years. Proposed plans for the new Science Center are included in Appendix I.

**APPENDIX A—BIOLOGY EIGHT-SEMESTER PLANS**

BIOLOGY MAJOR

BIOCHEMISTRY/BIOLOGY DOUBLE MAJOR

ORGANISMAL BIOLOGY

## Biology Major

(120 hours required, with 40 hours 3000-4000 level courses)

Fall Semester, Year 1		Hours	Spring Semester, Year 1		Hours
ENGL 1013	Composition I	3	ENGL 1023	Composition II	3
MATH 1043	College Algebra	3	MATH 1033	Trigonometry	3
CHEM 1121	General Chemistry I Lab	1	CHEM 1113	General Chemistry II	3
CHEM 1103	General Chemistry I	3	CHEM 1131	General Chemistry II Lab	1
BIOL 2041	Principles of Biology I Lab	1	BIOL 2083	Principles of Biology II	3
BIOL 2053	Principles of Biology I *(6)	3	BIOL 2091	Principles of Biology II Lab	1
			*(1)	Fine Arts Apprec. General Ed Req	3
		14	Total		17
Fall Semester, Year 2		Hours	Spring Semester, Year 2		Hours
CHEM 3404	Organic Chemistry I	4	BIOL 2143	General Botany	3
BIOL 2153	General Zoology	3	BIOL 2171	General Botany Lab	1
BIOL 2161	General Zoology Lab	1	CHEM 3414	Organic Chemistry II	4
*(3)	Speech General Ed Req	3	*(4)	Humanities Gen Ed Req	3
*(2)	Social Sciences General Ed Req #1	3	*(5)	History or Gov. General Ed Req	3
			*(2)	Social Sciences General Ed Req #2	3
Total		14	Total		17
Fall Semester, Year 3		Hours	Spring Semester, Year 3		Hours
BIOL 3354	Genetics	4	BIOL 3363	Cell Biology	3
PHYS 2203	General Physics I	3	BIOL 3763	Evolution	3
PHYS 2231	Gen. & Univ. Physics I Lab	1	PHYS 2213	General Physics II	3
	Minor Requirement	3	PHYS 2241	Gen. & Univ. Physics II Lab	1
	Elective	3		Minor Requirement	3
				Minor Requirement	3
Total		14	Total		16
Fall Semester, Year 4		Hours	Spring Semester, Year 4		Hours
BIOL 3-4xxx	Biology Upper Level Elective	4	BIOL 4634	Vertebrate Physiology	4
BIOL 3484	General Ecology	4	BIOL 4741	Seminar in Biology	1
	Minor Requirement	3		Minor	3
	Minor Requirement or Elective	3		Minor or Elective	3
				Elective	3
				Elective as needed to reach 120 hrs	0-3
Total		14	Total		14-17

A student with a good math background may elect to take Calculus I as the first college math course. If this is the case, College Algebra and Trigonometry may be waived; however, additional hours may be needed to reach the 120 hours needed for graduation.

Students required to enroll in remedial courses will need to take additional hours per term, or attend summer school.

A minor is required for this major. Any minor may be chosen; however, the most common minors selected for this major are chemistry, natural science, or physics. Some minors may require more than 18 hours. Some minors may be completed with fewer hours since some courses are listed as biology supportive requirements. See the current catalog and your advisor for specific minor requirements.

\*See the reverse page for courses that are marked with an asterisk and a number for possible course selections.

\*(1) Fine Arts Appreciation can be either ART 1053 Art Appreciation or MUS 1113 Music Appreciation

\*(2) Social Sciences Gen Ed Requirements can be filled with two courses of the following **from two different disciplines:**

ANTH 2203 Cultural Anthropology, CJ 1013 Introduction to Criminal Justice, ECON 2203 Principles of Macroeconomics, ECON 2213 Principles of Microeconomics, GEOG 2213 Geography I, GEOG 2223 Geography II, HIST 1013 Surv of Civ I, HIST 1023 Survey of Civ II, PSY 1013 Introduction to Psychology, SOC 2213 Introduction to Sociology, SWK Introduction to Social Work. If you are applying to medical school at UAMS and other colleges of medicine, you should take PSY 1013 Introduction to Psychology, and SOC 2213 Introduction to Sociology to complete your social science electives. These courses will be required courses at most colleges of medicine and material from these courses will be on the MCAT exam. It may be a good idea to take PSY 2203 Statistical Methods as a general elective to help prepare you for material that will be on the new MCAT exams.

\*(3) Speech General Ed Requirement can be: COMM 1023 Public Speaking, COMM 2283 Business and Prof. Speech, or COMM 2203 Interpersonal Communication

\*(4) Humanities General Ed. Requirement can be: ENGL 2283 World Lit I or ENGL 2293 World Lit II

\*(5) History or Government General Ed. Requirement can be: HIST 2213 American History I, HIST 2223 American History II, or PSCI 2213 American National Government

\*(6) The prerequisite to enter Principles of Biology I is a composite ACT = 22 or greater, or completion of BIOL 1063, Introduction to Biological Sciences with a grade of C or higher.

## Biochemistry/Biology double major

**Common course work for Pre-Med, Pre-Dentistry, Pre-Pharmacy, and other professional programs.** No minor is required.

This course plan exceeds most professional school's entrance requirements; however it gives you the best chance of being accepted and also being successful in the professional program. It is a good idea to keep in contact with the schools to which you plan on applying. If you would like a different major, see your pre-professional advisor.

Fall Semester, Year 1		Hours	Spring Semester, Year 1		Hours
ENGL 1013	Composition I	3	ENGL 1023	Composition II	3
MATH 1043	College Algebra	3	MATH 1033	Trigonometry	3
CHEM 1121	General Chemistry I Lab	1	CHEM 1113	General Chemistry II	3
CHEM 1103	General Chemistry I	3	CHEM 1131	General Chemistry II Lab	1
BIOL 2041	Principles of Biology I Lab	1	BIOL 2083	Principles of Biology II	3
BIOL 2053	Principles of Biology I *(6)	3	BIOL 2091	Principles of Biology II Lab	1
			*(2)	Social Sciences General Ed Req #1	3
		14	Total		17
Fall Semester, Year 2		Hours	Spring Semester, Year 2		Hours
CHEM 3404	Organic Chemistry I	4	BIOL 2143	General Botany	3
BIOL 2153	General Zoology	3	BIOL 2171	General Botany Lab	1
BIOL 2161	General Zoology Lab	1	BIOL 3553	Microbiology	3
MATH 2255	Calculus I	5	BIOL 3561	Microbiology Lab	1
*(3)	Speech General Ed Req	3	CHEM 3414	Organic Chemistry II	4
			*(5)	History or Gov. General Ed Req	3
Total		16	Total		15
Fall Semester, Year 3		Hours	Spring Semester, Year 3		Hours
PHYS 2203 or PHYS 2313	General Physics I or University Physics I	3 or 3	PHYS 2213 or PHYS 2323	General Physics II or University Physics II	3 or 3
PHYS 2231	Gen & Univ. Physics I Lab	1	PHYS 2241	Gen. & Univ. Physics II Lab	1
BIOL 3354	Genetics	4	BIOL 3363	Cell Biology	3
CHEM 3314	Quantitative Analysis	4	BIOL 3763	Evolution	3
*(2)	Social Sciences General Ed Req #2	3	CHEM 3424	Elements of Physical Chemistry	4
Total		15	Total		14
Fall Semester, Year 4		Hours	Spring Semester, Year 4		Hours
BIOL/CHEM	Biology or Chem Upper Level Elective *cannot count toward both majors	3-4	BIOL 4634	Vertebrate Physiology	4
BIOL 3484	General Ecology	4	BIOL 4741	Seminar in Biology	1
CHEM 4633	Biochemistry I	3	CHEM 4643	Biochemistry II	3
*(4)	Humanities Gen Ed Req	3	CHEM 4731	Biochemistry Lab	1
*(1)	Fine Arts Apprec. General Ed Req	3	CHEM 4724	Advanced Lab Techniques *(7)	2
				Electives as needed to reach 120 hours	2-6
Total		16-17	Total		13-17

A student with a good math background may elect to take Calculus I as the first college math course. If this is the case, College Algebra and Trigonometry may be waived; however, additional hours may be needed to reach the 120 hours needed for graduation.

Students required to enroll in remedial courses will need to take additional hours per term, or attend summer school.

A minor is not required for this major.

\*See the reverse page for courses that are marked with an asterisk and a number for possible course selections.

\*(1) Fine Arts Appreciation can be either ART 1053 Art Appreciation or MUS 1113 Music Appreciation

\*(2) Social Sciences Gen Ed Requirements can be filled with two courses of the following **from two different disciplines:**

ANTH 2203 Cultural Anthropology, CJ 1013 Introduction to Criminal Justice, ECON 2203 Principles of Macroeconomics,

ECON 2213 Principles of Microeconomics, GEOG 2213 Geography I, GEOG 2223 Geography II, HIST 1013 Surv of Civ I, HIST 1023 Survey of Civ II, PSY 1013 Introduction to Psychology, SOC 2213 Introduction to Sociology, SWK Introduction to Social Work. If you are applying to medical school at UAMS and other colleges of medicine, you

should take PSY 1013 Introduction to Psychology, and SOC 2213 Introduction to Sociology to complete your social science electives. These courses will be required courses at most colleges of medicine and material from these courses will be on the MCAT exam. It may be a good idea to take PSY 2203 Statistical Methods as a general elective to help prepare you for material that will be on the new MCAT exams.

\*(3) Speech General Ed Requirement can be: COMM 1023 Public Speaking, COMM 2283 Business and Prof. Speech, or COMM 2203 Interpersonal Communication

\*(4) Humanities General Ed. Requirement can be: ENGL 2283 World Lit I or ENGL 2293 World Lit II

\*(5) History or Government General Ed. Requirement can be: HIST 2213 American History I, HIST 2223 American History II, or PSCI 2213 American National Government

\*(6) The prerequisite to enter Principles of Biology I is a composite ACT = 22 or greater, or completion of BIOL 1063, Introduction to Biological Sciences with a grade of C or higher.

\*(7) Advanced Lab Techniques may be replaced with CHEM 4611, Chemistry Seminar; or CHEM 4691, Senior Research; however, additional hours may be needed to reach the 120 minimum.

## Organismal Biology Major

(120 hours required, with 40 hours 3000-4000 level courses)

Required ACT of 22 or higher, or grade of C in BIOL 1063 Biological Sciences prior to enrollment in Principles of Biology I

Fall Semester, Year 1		Hours	Spring Semester, Year 1		Hours
ENGL 1013	Composition I	3	ENGL 1023	Composition II	3
MATH 1043	College Algebra	3	MATH 1073	Compact Calculus (or MATH 2255 Cal I)	3
CHEM 1121	General Chemistry I Lab	1	CHEM 1113	General Chemistry II	3
CHEM 1103	General Chemistry I	3	CHEM 1131	General Chemistry II Lab	1
BIOL 2041	Principles of Biology I Lab	1	BIOL 2083	Principles of Biology II	3
BIOL 2053	Principles of Biology I *(6)	3	BIOL 2091	Principles of Biology II Lab	1
			*(1)	Fine Arts Apprec. General Ed Req	3
		14	Total		17
Fall Semester, Year 2		Hours	Spring Semester, Year 2		Hours
CHEM 2203	Intro Organic and Biochemistry	3	BIOL 2143	General Botany	3
CHEM 2211	Intro Organic and Biochemistry Lab	1	BIOL 2171	General Botany Lab	1
BIOL 2153	General Zoology	3	*(7) BIOL	Presc. Field Course or BIOL Elective	3-4
BIOL 2161	General Zoology Lab	1	*(3)	Speech General Ed Req	3
CIS 2223	Microcomputer Applications	3	*(5)	History or Gov. General Ed Req	3
*(2)	Social Sciences General Ed Req #1	3	*(2)	Social Sciences General Ed Req #2	3
Total		14	Total		16-17
Fall Semester, Year 3		Hours	Spring Semester, Year 3		Hours
BIOL 3354	Genetics	4	BIOL 3363	Cell Biology	3
BIOL 3574 or *(7) BIOL	Comparative Anatomy or Presc. Field Course or BIOL Elective	3-4	BIOL 3763	Evolution	3
PHYS 2203	General Physics I	3	*(7) BIOL	Presc. Field Course or BIOL Elective	3-4
PHYS 2231	Gen. & Univ. Physics I Lab	1	*(4)	Humanities Gen Ed Req	3
*(7) BIOL	Presc. Field Course or BIOL Elective	3-4		Elective	3
Total		16	Total		15-16
Fall Semester, Year 4		Hours	Spring Semester, Year 4		Hours
*(7) BIOL	Presc. Field Course or BIOL Elective	4	BIOL 4634	Vertebrate Physiology	4
BIOL 3484	General Ecology	4	BIOL 4741	Seminar in Biology	1
BIOL 3574 or *(7) BIOL	Comparative Anatomy or Presc. Field Course or BIOL Elective	3-4	*(6) BIOL	Presc. Field Course or BIOL Elective	3-4
SIS 3814	Intro to GIS, GPS, and Remote Sensing	4	*(6) BIOL	Presc. Field Course or BIOL Elective (if needed)	3-4
				Elective	3
				Elective to reach 120 hours (if needed)	0-3
Total		15-16	Total		14-17

A student with a good math background may elect to take Calculus I as the first college math course. If this is the case, College Algebra may be waived; however, additional hours may be needed to reach the 120 hours needed for graduation.

Students required to enroll in remedial courses will need to take additional hours per term, or attend summer school.

A minor is not required for this major.

\*See the reverse page for courses that are marked with an asterisk and a number for possible course selections.

\*(1) Fine Arts Appreciation can be either ART 1053 Art Appreciation or MUS 1113 Music Appreciation

\*(2) Social Sciences Gen Ed Requirements can be filled with two courses of the following **from two different disciplines:**

ANTH 2203 Cultural Anthropology, CJ 1013 Introduction to Criminal Justice, ECON 2203 Principles of Macroeconomics,

ECON 2213 Principles of Microeconomics, GEOG 2213 Geography I, GEOG 2223 Geography II, HIST 1013 Surv of Civ I, HIST 1023 Survey of Civ II, PSY 1013 Introduction to Psychology, SOC 2213 Introduction to Sociology, SWK Introduction to Social Work. If you are applying to medical school at UAMS and other colleges of medicine, you should take PSY 1013 Introduction to Psychology, and SOC 2213 Introduction to Sociology to complete your social science electives. These courses will be required courses at most colleges of medicine and material from these courses will be on the MCAT exam. It may be a good idea to take PSY 2203 Statistical Methods as a general elective to help prepare you for material that will be on the new MCAT exams.

\*(3) Speech General Ed Requirement can be: COMM 1023 Public Speaking, COMM 2283 Business and Prof. Speech, or COMM 2203 Interpersonal Communication

\*(4) Humanities General Ed. Requirement can be: ENGL 2283 World Lit I or ENGL 2293 World Lit II

\*(5) History or Government General Ed. Requirement can be: HIST 2213 American History I, HIST 2223 American History II, or PSCI 2213 American National Government

\*(6) The prerequisite to enter Principles of Biology I is a composite ACT = 22 or greater, or completion of BIOL 1063, Introduction to Biological Sciences with a grade of C or higher.

\*(7) This major requires 8 hours from a group of courses labeled as Prescribed Field Courses, which are:

BIOL	3413	Mammalogy
BIOL	2451	Mammalogy Laboratory
BIOL	3524	Ornithology
BIOL	3384	Herpetology
BIOL	3394	Ichthyology

This major also requires 14 hours Biology electives from the following courses (in addition to those taken as prescribed field courses).

BIOL 3384 Herpetology	BIOL 3394 Ichthyology	BIOL 3413 Mammalogy
BIOL 3423 Plant Morphology	BIOL 3434 Regional Flora	BIOL 3451 Mammalogy Lab
BIOL 3503 Marine Biology	BIOL 3511 Marine Biology Lab	BIOL 3524 Ornithology
BIOL 358V Natural History	BIOL 3594 Invertebrate Zoology	BIOL 4724 Aquatic Biology
BIOL 4734 Animal Behavior	BIOL 4753 Selected Topics	BIOL 479V Independent Study
FOR 2231 Dendrology I Lab	FOR 2291 Dendrology II Lab	

**APPENDIX B—UAM GENERAL EDUCATION REQUIREMENTS**

**Composition (6 Credit Hours)**

ENGL 1013 Composition I  
ENGL 1023 Composition II

**Mathematics (3 Credit Hours)**

Mathematics Course, 1000-level or above

**Speech (3 Credit Hours) Choose one of the following:**

COMM 1023 Public Speaking  
COMM 2283 Business & Prof. Speech  
COMM 2203 Interpersonal Communication

**Fine Arts Appreciation (3 Credit Hours) Choose one of the following:**

ART 1053 Art Appreciation  
MUS 1113 Music Appreciation

**Humanities (3 Credit Hours) Choose one of the following:**

ENGL 2283 World Literature I  
ENGL 2293 World Literature II

**U.S. History or Government (3 Credit Hours) Choose one of the following:**

HIST 2213 American History I  
HIST 2223 American History II  
PSCI 2213 American National Government

**Social Sciences (6 Credit Hours) Choose two courses from two different disciplines from the following:**

ANTH 2203 Cultural Anthropology  
CJ 1013 Introduction to Criminal Justice  
ECON 2203 Principles of Macroeconomics  
ECON 2213 Principles of Microeconomics  
GEOG 2213 Geography I  
GEOG 2223 Geography II  
HIST 1013 Survey of Civilization I  
HIST 1023 Survey of Civilization II  
PSY 1013 Introduction to Psychology  
SOC 2213 Introduction to Sociology  
SWK 1013 Introduction to Social Work

**Basic Sciences (8 Credit Hours) Choose eight hours from two 3-hour lecture courses with associated 1-hour labs or two 4-hour courses with integrated labs chosen from the following course groups:**

Earth Science/Lab  
Biology/Lab  
Chemistry/Lab  
Physics/Lab

**TOTAL: 35 General Education Credits Required**

## **APPENDIX C—BIOLOGY MAJOR AND MINOR REQUIREMENTS**

BIOLOGY MAJOR

ORGANISMAL BIOLOGY MAJOR

BIOLOGY/BIOCHEMISTRY DOUBLE MAJOR

BIOLOGY MINOR

<b>Biology Major</b>
<b>Major Requirements: 39 Hours</b>
BIOL 2053 Principles of Biology I
BIOL 2041 Principles of Biology I Laboratory
BIOL 2083 (ACTS BIOL 1014) Principles of Biology II
BIOL 2091 (ACTS BIOL 1014) Principles of Biology II Laboratory
BIOL 2143 (ACTS BIOL 1034) General Botany
BIOL 2153 (ACTS BIOL 1054) General Zoology
BIOL 2161 (ACTS BIOL 1054) General Zoology Laboratory
BIOL 2171 (ACTS BIOL 1034) General Botany Laboratory
BIOL 3354 Genetics
BIOL 3363 Cell Biology
BIOL 3484 General Ecology
BIOL 3763 Evolution
BIOL 4634 Vertebrate Physiology
BIOL 4741 Seminar in Biology
<b>Electives:</b> Four hours of 3000-4000 level biology (BIOL) courses (See catalog)
<b>Supportive Requirements: 29-30 hours</b>
CHEM 1103 (ACTS CHEM 1414) General Chemistry I
CHEM 1113 (ACTS CHEM 1424) General Chemistry II
CHEM 1121 (ACTS CHEM 1414) General Chemistry I Laboratory
CHEM 1131 (ACTS CHEM 1424) General Chemistry II Laboratory
CHEM 3404 Organic Chemistry I
CHEM 3414 Organic Chemistry II
PHYS 2231 (ACTS PHYS 2014/2034) College and University Physics I Lab
PHYS 2241 (ACTS PHYS 2024/2044) College and University Physics II Lab
One of the following pairs of courses: PHYS 2203 (ACTS PHYS 2014) College Physics I and PHYS 2213 (ACTS PHYS 2024) College Physics II or PHYS 2313 (ACTS PHYS 2034) University Physics I and PHYS 2323 (ACTS PHYS 2044) University Physics II
One of the following courses: MATH 1033 (ACTS MATH 1203) Trigonometry and MATH 1043 (ACTS MATH 1103) College Algebra or MATH 1175 (ACTS MATH 1305) Pre-Calculus or MATH 2255 (ACTS MATH 2405) Calculus I
A minor is required for this degree
This major requires 120 hours with a minimum of 40 hours of 3000-4000 level credit

## Biology Major

### Organismal Biology

#### Major Requirements: 39 Hours

BIOL 2053 Principles of Biology I

BIOL 2041 Principles of Biology I Laboratory

BIOL 2083 (ACTS BIOL 1014) Principles of Biology II

BIOL 2091 (ACTS BIOL 1014) Principles of Biology II Laboratory

BIOL 2143 (ACTS BIOL 1034) General Botany

BIOL 2153 (ACTS BIOL 1054) General Zoology

BIOL 2161 (ACTS BIOL 1054) General Zoology Laboratory

BIOL 2171 (ACTS BIOL 1034) General Botany Laboratory

BIOL 3354 Genetics

BIOL 3363 Cell Biology

BIOL 3484 General Ecology

BIOL 3574 Comparative Anatomy and Laboratory

BIOL 4634 Vertebrate Physiology and Laboratory

BIOL 3763 Evolution

BIOL 4741 Seminar in Biology

Prescribed Field Courses from the following group: 8 Hours

BIOL 3413 Mammalogy

BIOL 3451 Mammalogy Laboratory

BIOL 3524 Ornithology

BIOL 3384 Herpetology

BIOL 3394 Ichthyology

**Biology electives: 14 hours** (excluding those used as prescribed field courses)

BIOL 3384 Herpetology

BIOL 3394 Ichthyology

BIOL 3413 Mammalogy

BIOL 3423 Plant Morphology

BIOL 3434 Regional Flora

BIOL 3451 Mammalogy Laboratory

BIOL 3503 Marine Biology

BIOL 3511 Marine Biology Laboratory

BIOL 3524 Ornithology

BIOL 358V Natural History

BIOL 3594 Invertebrate Zoology

BIOL 4724 Aquatic Biology

BIOL 4734 Animal Behavior

BIOL 4753 Selected Topics in Biology

BIOL 479V Independent Study

FOR 2231 Dendrology I Laboratory

FOR 2291 Dendrology II Laboratory

**Supportive Requirements: 23 hours**

CHEM 1103 (ACTS CHEM 1414) General Chemistry I

CHEM 1113 (ACTS CHEM 1424) General Chemistry II

CHEM 1121 (ACTS CHEM 1414) General Chemistry I Laboratory

CHEM 1131 (ACTS CHEM 1424) General Chemistry II Laboratory

CHEM 2203 (ACTS CHEM 1224) Introduction to Organic and Biochemistry

CHEM 2211 (ACTS CHEM 1224) Intro to Organic and Biochemistry Lab

PHYS 2203 (ACTS PHYS 2014) College Physics I

PHYS 2231 (ACTS PHYS 2014/2034) College and University Physics I Laboratory

MATH 1073 (ACTS MATH 2203) Compact Calculus

SIS 3814 Introduction to GIS and Laboratory

<b>Biology Major</b>	
This major does not require a minor	
This major requires 120 hours with a minimum of 40 hours of 3000-4000 level credit	
<b>BIOLOGY / BIOCHEMISTRY double major</b>	
<b>Major Requirements: 35-36 hours Chemistry 39 hours Biology</b>	
CHEM 1103 (ACTS CHEM 1414) General Chemistry I	
CHEM 1113 (ACTS CHEM 1424) General Chemistry II	
CHEM 1121 (ACTS CHEM 1414) General Chemistry I Laboratory	
CHEM 1131 (ACTS CHEM 1424) General Chemistry II Laboratory	
CHEM 3314 Quantitative Analysis	
CHEM 3404 Organic Chemistry I	
CHEM 3414 Organic Chemistry II	
CHEM 3424 Elements of Physical Chemistry	
CHEM 4633 Biochemistry I	
CHEM 4643 Biochemistry II	
CHEM 4731 Biochemistry Laboratory	
<i>One of the following courses:</i>	
CHEM 4742 Adv Laboratory Techniques	
CHEM 4611 Chemistry Seminar	
CHEM 4691 Senior Research	
CHEM or BIOL 3000-4000 elec (3 hrs) list below	
BIOL 2053 Principles of Biology I	
BIOL 2041 Principles of Biology I Laboratory	
BIOL 2083 (ACTS BIOL 1014) Principles of Biology II	
BIOL 2091 (ACTS BIOL 1014) Principles of Biology II Laboratory	
BIOL 2143 (ACTS BIOL 1034) General Botany	
BIOL 2153 (ACTS BIOL 1054) General Zoology	
BIOL 2161 (ACTS BIOL 1054) General Zoology Laboratory	
BIOL 2171 (ACTS BIOL 1034) General Botany Laboratory	
BIOL 3354 Genetics	
BIOL 3363 Cell Biology	
BIOL 3484 General Ecology	
BIOL 3763 Evolution	
BIOL 4634 Vertebrate Physiology	
BIOL 4741 Seminar in Biology	
<b>Electives:</b> Four hours of 3000-4000 level biology (BIOL) courses (See catalog)	
BIOL 3553 Microbiology (This is a supportive requirement for the Biochemistry degree)	
BIOL 3561 Microbiology Lab (This is a supportive requirement for the Biochemistry degree)	
<b>Supportive Requirements: 19 hours</b>	
MATH 1033 (ACTS MATH 1203) Trigonometry	
MATH 1043 (ACTS MATH 1103) College Algebra	
MATH 2255 (ACTS MATH 2405) Calculus I	
PHYS 2231 (ACTS PHYS 2014/2034) College and Univ Physics I Laboratory	
PHYS 2241 (ACTS PHYS 2024/2044) College and Univ Physics II Laboratory	
<i>One of the following pairs of courses:</i>	
PHYS 2203 (ACTS PHYS 2014) College Physics I and	
PHYS 2213 (ACTS PHYS 2024) College Physics II	
or	
PHYS 2313 (ACTS PHYS 2034) University Physics I and	
PHYS 2323 (ACTS PHYS 2044) University Physics II	
A minor is not required for this degree	

BIOL 3553 Microbiology (This is a supportive requirement for the Biochemistry degree)

This major requires 120 hours with a minimum of 40 hours of 3000-4000 level credit

## **Biology Minor** Minor Requirements: 22 hours

Choose one of the following three blocks of courses (12 hours) and upper level electives:

(Block 1)

BIOL 2053 Principles of Biology I

BIOL 2041 Principles of Biology I Lab

BIOL 2083 Principles of Biology II

BIOL 2091 Principles of Biology II Lab

One of the following pairs of courses

BIOL 2153 General Zoology

BIOL 2161 General Zoology Lab

or

BIOL 2143 General Botany

BIOL 2171 General Botany Lab

(Block 2)

BIOL 2233 Anatomy and Physiology I

BIOL 2291 Anatomy and Physiology I Lab

BIOL 2243 Anatomy and Physiology II

BIOL 2301 Anatomy and Physiology II Lab

One of the following pairs of courses

BIOL 2153 General Zoology

BIOL 2161 General Zoology Lab

or

BIOL 2143 General Botany

BIOL 2171 General Botany Lab

(Block 3)

BIOL 2153 General Zoology

BIOL 2161 General Zoology Lab

BIOL 2143 General Botany

BIOL 2171 General Botany Lab

One of the following pairs of courses

BIOL 1063 Introduction to Biological Science, and

BIOL 1071 Introduction to Biological Science Lab

or

BIOL 2053 Principles of Biology I, and

BIOL 2041 Principles of Biology I Lab

**Upper Level Electives:** Ten hours BIOL 3000-4000 level.