

BIOLOGICAL SCIENCES

Biological Sciences

Biological Sciences Building

5007 Rockhill Road

<http://sbc.umkc.edu/>

Research facilities and laboratories

Equipment and Core Facilities

Microscope core facility on the ground floor in our building and overseen by the PI houses:

1. Olympus Fluoview 300 confocal laser scanning microscope (CLSM) with DIC optics and four PMT detectors, three for epi-confocal imaging, and one for transmitted-light imaging. Argon 488 nm and He/Ne lasers are installed on the microscope.
2. Nikon upright fluorescence microscope with a GRID confocal imaging device and Metamorph Image acquisition software for real time fluorescence imaging.
3. Nikon inverted fluorescent DIC microscope with APO quality optics, four filter sets, and attached ColorView CCD camera with computer and Analysis software to analyze images.
4. Olympus microscope with a range of objectives and filters attached to a CCD camera linked to a Silicon Graphics O2 loaded with Deltavision software for image acquisition and analysis (deconvolution).

Genomics core facility located on the second floor of the building overseen by a dedicated technician and directed by the PI includes:

- (1) Allegra 25 centrifuge and two tetrad PCR machines for 96-well based applications
- (3) Amersham Storm 860 Imaging System
- (4) Amersham Typhoon 9400 phosphoimager with ImageQuant software

Protein core facility capable of mass spectrometry sample preparation and analysis is directed by Dr. Andrew Keightly and is located on the 4th floor of our building includes:

1. Thermo Finnigan LTQ linear ion trap, equipped with Proxeon nanospray source
2. Voyager DE Pro MALDI MS
3. Eksigent binary nano-LC pump system (1D nanoLC)
4. Eksigent quaternary nano-LC pump system (2D nanoLC)

X-ray crystallographic data are collected at beamlines 22ID and 22BM at the Advanced Photon Source of Argonne National Laboratory. Access to these beamlines is guaranteed for 24 hours on each beamline (three times a year) through our membership to the Southeast Regional Collaborative Access Team (SER-CAT).

Faculty

Rachael Allen²; teaching assistant professor of biological sciences; B.S. University of Bristol, M.Sc. University of Bristol, Ph.D. Northern Illinois University.

Tara Allen²; teaching professor of biological sciences; B.S. (University of Evansville); Ph.D. (University of Missouri-Columbia).

Marshall Anderson, adjunct professor of biological sciences.

Karen J. Bame² graduate programs officer and associate professor of biological sciences; B.A. (University of California-Santa Barbara); Ph.D. (University of California-Los Angeles).

James M. Benevides; teaching professor of biological sciences; B.S. (University of Massachusetts); M.S., Ph.D. (University of Rhode Island).

Grant Bledsoe; teaching assistant professor of biological sciences; B.S. (University of South Carolina-Aiken); Ph.D. (Medical University of South Carolina).

Samuel Bouyain^{2,3}; chair, cell biology and biophysics; associate professor of biological sciences; Diploma of Engineer (École Nationale Supérieure de Chimie de Paris); D.Phil. (University of Oxford).

Stephane Dissel^{2,3}; assistant professor of biological sciences; B.S., M.S. (Universite Louis Pasteur); Ph.D. (University of Leicester).

Leonard L. Dobens, Jr.^{2,3}; director of research and professor of biological sciences; B.S. (Boston College), Ph.D. (Dartmouth College).

Lawrence A. Dreyfus² adjunct professor of biological sciences; B.A. (University of Kansas); M.S. (Michigan State University); Ph.D. (University of Kansas).

Brooke Esquivel, instructor of biological sciences.

Brian Geisbrecht; adjunct professor of biological sciences

Erica Geisbrecht; adjunct professor of biological sciences

Carl Gelhaus; adjunct professor of biological sciences

R. Scott Hawley; adjunct professor of biological sciences; Ph.D. (University of Washington).

Robert Holmes; adjunct professor of biological sciences

Saul M. Honigberg^{2,3}; professor of biological sciences; B.S. (University of Georgia), Ph.D. (Yale University).

Chi-Ming Huang^{2,3}; associate professor of biological sciences; B.S. (National Taiwan University, Taiwan); M.S., Ph.D. (University of California-Los Angeles).

Marisa James; adjunct professor of biological sciences

Tamas Kapros; teaching professor of biological sciences; B.S., Doctor Universitatis in Genetics, Ph.D. (Jozsef Attila University of Sciences, Szeged, Hungary).

J. Andrew Keightley; research associate professor of biological sciences; B.S., Ph.D. (University of New Mexico-Albuquerque).

Margaret Kincaid²; teaching associate professor of biological sciences; B.A. (University of Missouri – Columbia); M.S., Ph.D. (University of Missouri – Kansas City).

Loretta Klamm; instructor of biological sciences; B.S. Creighton University, M.S. Creighton University.

Peter Koulen^{2,3}; professor of biological sciences; M.S., Ph.D. (Johannes Gutenberg University, Germany).

Lee Likins²; assistant teaching professor in biological sciences; B.S. (University of West Florida-Pensacola); M.A. (University of Kansas); Ph.D. (University of Missouri – Kansas City).

Lara Mabry; adjunct professor of biological sciences

Jessica Magana, assistant teaching professor of biological sciences.

Hillary McGraw^{2,3}; assistant professor of biological sciences; B.A. (University of Oregon); Ph.D. (University of Washington).

Thomas M. Menees² associate professor of biological sciences; B.S., M.S. (University of California Irvine); Ph.D. (Yale University).

Ryan Mohan^{2,3}; assistant professor of biological sciences; Ph.D. University of Western Ontario.

Michael O'Connor^{2,3}; professor of biological sciences; B.A. (Trinity College Dublin); Ph.D. (National University of Ireland).

Anthony Persechini^{2,3}; chair, molecular biology and biophysics; professor of biological sciences; B.A. (University of New Hampshire), Ph.D. (Carnegie-Mellon University).

Jeffrey L. Price^{2,3}; professor of biological sciences; B.S. (College of William and Mary), Ph.D. (Johns Hopkins University).

Jane Rachel; adjunct professor of biological sciences

Aaron Reed²; director of course development and assessment and associate teaching professor of biological sciences; B.S. (Kansas State University); M.S. (University of Memphis); Ph.D. (Kansas State University).

Jon Robertus; adjunct instructor of biological sciences.

Julia Snyder, adjunct professor of biological sciences.

Nicole Stanton-Wilson; Instructor of biological sciences

Karyn Turla²; teaching professor of biological sciences; B.S. (Pennsylvania State University); Ph.D. (University of Michigan).

Shizhen Wang^{2,3}; assistant professor of biological sciences; B.S. (InnerMongolia University for Nationalities); M.S. (Nanjing Agricultural University); Ph.D. (Tsinghua University).

Tammy S. Welchert²; director of student affairs and academic advising and associate teaching professor of biological sciences; B.S., M.S. (Southwest Missouri State University); IPh.D. (University of Missouri-Kansas City).

Theodore C. White^{2,3}; division director, Marion Merrell Dow professor in biological sciences; B.S. (Cornell University); Ph.D. (University of Michigan).

Gerald J. Wyckoff^{2,3}; professor of biological sciences; B.S. (Cornell University); Ph.D. (University of Chicago).

Xiaolan Yao^{2,3}; associate professor of biological sciences; B.S., M.S. (Zhengzhou University, China); Ph.D. (Iowa State University).

Yu, Xiao-Qiang(Sean)^{2,3}; professor of biological sciences; Ph.D. (Kansas State University).

EMERITUS

Raymond L. Burich, Gerald M. Carlson, Bibie Chronwall, Alfred F. Esser, Edward P. Gogol, Ana J. Iriarte, Ronald A. MacQuarrie, Marino Martinez-Carrion, Denis Medeiros, Henry M. Miziorko, William T. Morgan, Lynda Plamann, Michael Plamann, G. Sullivan Reed, Garth E. Resch, Ann Smith, George J. Thomas, Jr., Jakob H. Waterborg, Marilyn D. Yoder

¹ Associate or Adjunct Graduate Faculty

² Members of UMKC Graduate Faculty

³ Members of UMKC Doctoral Faculty

Undergraduate Undergraduate Programs

- Minor in Biology (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/minor-biology/>)
- Bachelor of Arts in Biology (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-arts-biology/>)
- Bachelor of Science in Biology (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-biology/>)
- Bachelor of Science in Biology, Bioinformatics Emphasis (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-bioinformatics/>)
- Bachelor of Science in Biology, Biomedical Sciences Emphasis (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-biomedical-sciences/>)
- Bachelor of Science in Biology, Biotechnology Emphasis (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-biotechnology/>)
- Bachelor of Science in Biology, Cellular and Molecular Basis of Health and Disease Emphasis (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-cellular-molecular-basis-of-health-and-disease/>)
- Bachelor of Science in Biology, Clinical Laboratory Science Emphasis (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/bachelor-of-science-clinical-laboratory-science/>)

Courses taught in Biology support academic programs within the schools of Nursing, Dentistry, Medicine, Pharmacy and Education, Social Work and Psychological Sciences, and departments within the School of Humanities and Social Sciences. An undergraduate minor in biology and a variety of courses that may interest non-biology majors are available to complement other fields of study, or to satisfy general education requirements of other academic units. A background in biology combined with non-science skills creates many career possibilities.

General Information About Undergraduate Programs

Admission Requirements

Other than University of Missouri admission requirements, there are no special prerequisites for beginning either the bachelor of arts or the bachelor of science program. High school biology and a good working knowledge of algebra and arithmetic are desirable for entering the bachelor of science program. It should be noted that much of the bachelor of science program, and the bachelor of arts program, are highly structured in the order which biology and chemistry courses must be taken. It is assumed that transfer students, Associates degree students, and junior college students should have begun the appropriate course sequence in their previous schools.

Career Implications of a Bachelor's Degree in Biology

Our programs prepare students for a variety of career opportunities. Some students choose careers in the pharmaceutical or biotech industries, while others opt for graduate study in areas such as bioinformatics, forensics, or cell biology. In addition, a biology major is an excellent choice for students planning careers in medicine, veterinary medicine, dentistry, optometry, physical therapy, and other health professions. The bachelor of science in

biology curriculum fulfills the admissions requirements for most medical and dental schools and incorporates intermediate and upper-level biology courses specifically recommended by medical/dental school admissions officers.

Teacher Certification in Biology

Certification as a middle school (grades 5-9) science or secondary (grades 9-12) biology teacher in Missouri requires that a student complete a teacher preparation program. Once you complete a bachelor's degree in biology, you can apply to the School of Education, Social Work and Psychological Sciences for the Master of Arts in Teaching program, which prepares you for the teaching profession and teacher certification. A separate application for the Master of Arts in Teaching program is required. For further information about the program, consult the School of Education, Social Work, and Psychological Sciences section of this catalog or contact the Division of Teacher Education and Curriculum Studies at (816) 235-2245.

Honors Program

UMKC offers an Honors Program for qualified undergraduate students seeking either the bachelor of arts or the bachelor of science in biology interested in pursuing rigorous preparation for advanced professional training and careers. The program requires high levels of academic achievement as well as an undergraduate research experience and other enrichment activities. For further information about this program, consult the School website or Dr. Aaron Reed, Director for Undergraduate Curriculum at (816) 235-2329.

Prerequisites and Co-requisites

A minimum grade of C- or higher is expected for all prerequisite and co-requisite courses for all students taking courses in Biology. Additionally, students must be concurrently enrolled in or have previously completed all co-requisite courses. Course prerequisites are set by the Curriculum Committee of the School program on the level at which a course is taught and the assumed background knowledge necessary for successful completion of the course. Lack of prerequisites, therefore, indicates lack of background knowledge necessary for success in the course. Prerequisites for Biology courses are strictly enforced. In exceptional cases, students may receive written consent to waive one or both of these requirements from the Undergraduate Academic Standards Committee by completing and submitting a detailed petition form to the Undergraduate Programs Office and only if approval of the petition is granted.

Elective Courses for the Non-Biology Major

Students in other academic units are encouraged to select courses in Biology to meet their general education requirements and to complement their major area of study. Suggested courses include:

Code	Title	Credits
BIOLOGY 102	Biology and Living	3
BIOLOGY 102L	Biology and Living Laboratory	1
BIOLOGY 108	General Biology I	3
BIOLOGY 109	General Biology II	3
BIOLOGY 202	Cell Biology	3
BIOLOGY 206	Genetics	3
LS-PHYS 217	Human Physiology	3
Upper-level Courses ¹		

¹ Upper-level courses for which prerequisites have been satisfied are recommended for those students who wish to gain a strong foundation in biological sciences.

Students enrolling in these biology majors' courses should have a solid background in high school biology and chemistry.

Academic Standing

Academic standing is determined at the end of each semester, fall, spring and summer for each student. Good standing at the university is attained with a University of Missouri (UM) cumulative GPA of 2.0 or higher and with the SSE with a UM biology GPA (major's applicable courses) of 2.0 or higher.

Grade Point Average

In general, the UM GPA is calculated by dividing the total grade points earned in courses on any UM campus by the total number of graded semester hours attempted. If a course attempted within UM is repeated, the previous hours and grade point remain in the student's GPA. Courses taken credit/no credit, courses earning grades of S, P, I or AT, and courses transferred from non-University of Missouri institutions are not included in the UM GPA calculations. See appropriate sections below.

In general, the UM biology GPA is calculated by dividing the total grade points earned in majors courses on any UM campus by the total number of graded semester hours attempted. If a course attempted within UM is repeated, the previous hours and grade point remain in the student's GPA. Courses taken credit/no credit, courses earning grades of S, P, I or AT, and courses transferred from non-University of Missouri institutions are not included in the UM GPA calculations. See appropriate sections below.

Request for GPA Adjustments for repeated courses may be initiated by students and submitted by an Academic Adviser after completion of the repeating attempt. A student's academic standing may be revised after the GPA adjustment is made in Pathway. GPA adjustments may be used for a maximum of 15 semester hours. See the UMKC Repeated Courses policy and GPA Readjustment form for more information.

If a student's UM cumulative GPA and/or UM biology GPA falls below the 2.0 minimum the student will no longer be in good standing. Students who fail to maintain good standing will be placed on Academic Warning, Probation, or will be declared Academically Ineligible to continue.

ACADEMIC WARNING

First Time College (FTC) students with a declared major in Biology will be placed on Academic Warning when their UM cumulative GPA and/or UM biology GPA is between 1.5 and 2.0 at the end of their first semester at UMKC.

A student on Academic Warning will have the same requirements as students on Academic Probation as described below. Students may return to good academic standing by raising their UM cumulative GPA and/or UM biology GPA to the minimum 2.0 required. If the student cannot raise their UM cumulative GPA and/or UM biology GPA to 2.0 or higher after the warning semester, they may be placed on Academic Probation for a maximum of 2 (two) additional semesters. After 1 (one) warning semester and 2 (two) probation semesters, the student must return to good standing or be declared academically ineligible to continue as a student in SSE and/or UMKC.

First Time College (FTC) students with a declared major in Biology will be placed on Academic Probation when their UM cumulative GPA and/or UM biology GPA is below 1.5 at the end of their first semester at UMKC. See Academic Probation below.

Transfer students and continuing students are not eligible to be placed on Academic Warning.

ACADEMIC PROBATION

Students with a declared major in Biology will be placed on Academic Probation if their UM cumulative GPA and/or UM biology GPA falls below 2.0. When a student is placed on academic probation as a result of the previous semester grades, the students will be notified prior to the beginning of the next semester through their UMKC email. The student will be required to enter into an Academic Success Contract designed to provide the student with assistance to support a return to good standing. The contract will specify enrollment requirements and keep the advisor and student in close contact throughout the semester to provide additional support. The contract will outline the student's responsibilities while on probation including, but not limited to the following:

1. Return to good standing by raising UM CUM and/or UM BIO GPA above the minimum 2.0. **OR**
2. If the student cannot return to good standing after the contract semester, they may be continued on probation for one additional semester if they earn a grade of **C- or higher in all contracted courses AND** earn a 2.5 (**B- average**) or higher semester/biology GPA during the contracted semester.
3. Participate in additional activities as listed in the contract.

The contract's requirements may be altered **ONLY** in consultation with the student's assigned academic advisor. The requirements of the contract are binding with or without the student signature.

If a student fails to meet the terms of the contract, they may be declared academically ineligible to enroll in future semesters as a student with a declared major in Biology.

If a student cannot raise their UM cumulative GPA and/or UM biology GPA above 2.0, they may remain on probation one additional semester provided they meet the requirements in #2 above. If a student's UM cumulative and/or UM biology GPA is still below 2.0 after a second semester on probation, they will be declared academically ineligible to continue as a student in Biology. A student may, if eligible (UM cumulative GPA above 2.0), transfer to another academic unit at UMKC.

Students who have been placed on academic probation and have returned to good standing may be placed on academic probation again if their UM cumulative and/or UM biology GPA fall below the minimum 2.0 required.

ACADEMIC INELIGIBILITY

Students on academic probation or warning that do not meet the terms of their Academic Success contract become academically ineligible to enroll for future semesters as a student with a declared major in the Biology. Students declared academically ineligible will be notified through their UMKC email prior to the start of the next semester. If the student's UM cumulative GPA is above 2.0 the student may continue at UMKC, but will need to meet with an advisor in a different academic unit to discuss options and declare a major other than biology to do so. Students will have until the date given in the email notification to change their major; failure to make these changes by the date indicated will result in cancellation of their registration with any fees paid refunded. Students who have become academically ineligible may re-declare biology as their major after raising their UM cumulative GPA and UM biology GPA above the minimum 2.0 required.

Graduate Graduate Programs

- Master of Science in Cellular and Molecular Biology (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/master-of-science-cellular-molecular-biology/>)

- Emphasis in Bioinformatics (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/master-of-science-cellular-molecular-biology/>)
- Master of Arts in Biology (<http://catalog.umkc.edu/colleges-schools/science-engineering/biology/master-of-arts-biology/>)
- Doctor of Philosophy Study

Biological Sciences offers programs of study leading to a master of science degree in cellular and molecular biology. In addition, a master of arts degree in biology is offered. The school participates in UMKC's Interdisciplinary Ph.D. program in Cell Biology/Biophysics (<http://catalog.umkc.edu/colleges-schools/graduate-studies/cell-biology-biophysics/>) and Molecular Biology/Biochemistry. (<http://catalog.umkc.edu/colleges-schools/graduate-studies/molecular-biology-biochemistry/>)

Graduates with research experience in cell biology and biophysics or molecular biology and biochemistry may enter careers in many areas, including biotechnology, pharmaceuticals, academia or governmental research involving the environment, agriculture, energy, defense or health.

General Information About Graduate Programs

Admission

Admission to the school's graduate programs is competitive and students are encouraged to apply early. Applications are reviewed by an admissions committee that evaluates students on the basis of past performance and evidence of ability to pursue graduate studies successfully. The school admits students to its doctoral and master's degree programs throughout the year; however, early application (by Feb. 15) is advised to receive consideration for assistantships and other financial support.

Information on admission to master's or Ph.D. degree programs may be found at the Graduate Programs Web site at <http://www.umkc.edu/sbs/graduate/>, in the Graduate Academic Regulations and Information (<https://catalog.umkc.edu/general-graduate-academic-regulations-information/>) section of this catalog, by e-mail to sbs-grad@umkc.edu, or by writing to our graduate programs office at the mailing address at the beginning of this section.

Graduate teaching assistantships, graduate research assistantships and fellowships are available through the school and are awarded on a competitive basis. Currently, all fully admitted, full-time doctoral students receive financial support.

To be eligible for admission to the Biological Sciences' graduate programs, the applicant must:

- Possess a bachelor's degree in biological sciences or a related field with a minimum of 120 credit hours, or possess an advanced degree in a health sciences field.
- Have an undergraduate GPA of at least 3.0.
- Have sufficient background coursework to undertake graduate studies in biological sciences.
- Have acceptable scores in the Graduate Record Examination aptitude tests. Applicants to the MA Biology program (only) may submit MCAT or DAT scores in place of a GRE score.
- Submit three letters of recommendation from individuals familiar with the student's academic performance and scientific abilities.

Students may be admitted with certain deficiencies, with the stipulation that these can be removed early in the course of study.

Advising

New students will be advised by the principal graduate advisor until they have selected their permanent research advisor. The graduate programs office will contact students in advance of their first semester for information about advising and registration.

Students are responsible for becoming familiar with all academic regulations of the campus as outlined in the catalog and in other University documents.

Requirements for Retention

General requirements for retention of graduate students are described in the Graduate Academic Regulations and Information (<https://catalog.umkc.edu/general-graduate-academic-regulations-information/>) section of this catalog. For all graduate students, a 3.0 (B) GPA is required for satisfactory progress. No F grades are permitted.

Any doctoral student who receives more than one C grade in a basic course will be dropped from the doctoral program.

Any master's student who receives more than two C grades or more than one C and one D grade in graduate courses will be dropped from the program.