College of Science and Mathematics

Dean
Dr. Cynthia Bauerle

Interim Associate Dean
Dr. W. Christopher Hughes

Bioscience Building, Suite 3001 – MSC 4114, 951 Carrier Drive, Harrisonburg, VA 22807
Phone: (540) 568-3508
Website: http://www.jmu.edu/csm

Academic Units Within the College

Department of Biology
Dr. Joanna B. Mott, Academic Unit Head

Department of Chemistry and Biochemistry
Dr. Linette M. Watkins, Academic Unit Head

Department of Geology and Environmental Science
Dr. Stephen A. Leslie, Academic Unit Head

Department of Mathematics and Statistics
Dr. David C. Carothers, Academic Unit Head

Department of Physics and Astronomy
Dr. W. Christopher Hughes, Interim Academic Unit Head
Dr. Ioana Niculescu, Interim Associate Head

Graduate Programs

The College of Science and Mathematics offers the following graduate degrees:

- Biology (M.S.)
- Mathematics (M.Ed.)
Mission

The Biology Department provides outstanding educational opportunities for students through a comprehensive curriculum, scholarly activities, and community engagement that inspire learning, develop skills in critical thinking, communication, and ethical reasoning, and prepare them for successful careers.

The College of Science and Mathematics is dedicated to excellence in undergraduate education and research and to graduate programs in biology and mathematics. Our outstanding programs are student-centered and designed to prepare students for responsible positions at all levels in research, industry, education, medicine and government. We emphasize learning by doing science and provide active learning experiences in a range of settings. We also encourage collaborative research with faculty, internships and other experiences that facilitate transitions to work or graduate/professional education.

We provide the following:

• Foundational understanding of science and mathematics for the educated citizen.
• The educational basis and technical skills to prepare science and mathematics students for the workforce.
• The theoretical and practical foundations for success in professional and graduate programs.
• An exemplary program in mathematics and science for prospective teachers.

Resource and Service Centers

Artificial Stream Channel Facility

Dr. Christine May
Phone: (540) 568-5030
Website: http://www.jmu.edu/biology/people/all-people/faculty/faculty-may.shtml

The biology department’s artificial stream channel facility is equipped with four artificial streams, a variety of holding tanks, hatch boxes and videography in a climate controlled setting for experimentation on stream ecosystems.

Astronomy Park

Dr. Sean Scully
Phone: (540) 568-4511

Located on the east side of campus near the Physics and Chemistry building is a permanent area for sky observing on campus. There are permanent mounts for six portable 10-inch computer controlled telescopes and an area for a portable 14-inch telescope. This site provides a convenient area for sky observing for introductory astronomy students. Students are able to easily see the moon, planets, nebulae, galaxies, star clusters as well as the sun using the appropriate solar filters. The department is also equipped with CCD cameras, spectrometers, a photometer, and multiple solar filters that provide more advanced students with experience in
astrophotography and data collection techniques. The public is invited to attend public star gazes which are held several times each semester.

The Center for Computational Mathematics and Modeling

Dr. James Sochacki
Phone: (540) 568-6614

This cross disciplinary institute for scientific computing, houses state-of-the-art graphics workstations and a 16 PII node beowulf computer system. The beowulf computer system is a parallel computing environment that can be used on large-scale problems. Faculty and students will have access to this "super computer" from the center and from their offices. The center also operates an Immersive 360° Visualization System. The center uses mathematics both to simulate real-world phenomena and to generate visual data.

Faculty members from the sciences, economics and business disciplines interact with mathematicians to model problems that they are researching with undergraduate students.

The Center for Genome and Metagenome Studies

Dr. James Herrick and Dr. Steve Cresawn
Phone: (540) 568-6653, (540) 568-3551

The JMU Center for Genome and Metagenome Studies (CGEMS) supports innovative, leading-edge research and training in the methods and principles of genomics, metagenomics, transcriptomics and bioinformatics for students at all levels. Housed in the Department of Biology, CGEMS supports and fosters collaboration among researchers and students in a variety of departments and colleges. CGEMS also sponsors seminars and provides outreach to other higher education institutions in Virginia as well as area schools.

Center for Materials Science

Dr. Chris Hughes
Phone: (540) 568-8069
Website: http://csm.jmu.edu/materialsscience

The educational mission of the Center for Materials Science is to develop and maintain an innovative interdisciplinary and multidisciplinary undergraduate program in materials science that will increase the maturation of students, their research experience and their employment opportunities. The mission includes the integration of undergraduate education with basic and applied research in materials science.

Faculty in the Center for Materials Science have expertise in a wide variety of areas including inorganic and organic synthesis, microfabrication, nanotechnology, thin film growth and surface modification, materials characterization, and modeling and simulation of complex systems. The facilities include a class 10000 clean room, electron beam lithography, and many types of microscopy and other analytical techniques. A more complete description of the instrumentation and facilities is available at http://csm.jmu.edu/materialsscience/facilities.html. Collaborative work is welcome and can
include consultation with faculty, assignment of student projects, or simply access to facilities.

**Department of Chemistry & Biochemistry LC/MS Facility**

Dr. Christine A. Hughey  
**Phone:** (540) 568-6633

The JMU liquid chromatography/mass spectrometry (LC/MS) undergraduate research facility, housed within the Department of Chemistry & Biochemistry, was established in 2010 with two Major Research Instrumentation (MRI) grants from the National Science Foundation.

The LC/MS instruments housed in the facility include: (1) an Agilent 6460 triple quadrupole (QQQ) mass spectrometer coupled to two Rapid Resolution LC pumps and a diode array detector, (2) an Agilent 6224 time of flight (TOF) mass spectrometer coupled to an Infinity UHPLC pump, and (3) an Agilent 6530 quadrupole time of flight (q-TOF) mass spectrometer coupled to an Infinity UHPLC pump. All three instruments are equipped with an electrospray source. The time of flight instruments afford the high mass accuracy and high resolution necessary for identification of unknowns in complex mixtures. The MS/MS capability of the q-TOF affords additional structural information. The sensitivity of the QQQ makes this instrument ideal for small molecule quantitation. Together, these three instruments provide a robust platform for the qualitative and quantitative analysis of biological and environmental samples.

**JMU Greenhouse**

Dr. Heather Griscom  
**Phone:** (540) 908-7294

The biology department’s greenhouse is organized into a head house section and several compartments that can be controlled individually for experimental studies. Each compartment has independent temperature and lighting controls and an automatic watering system. The greenhouse currently contains a collection of plant species used for teaching classes and conducting research, including a population of African violets from an endangered species native to Kenya.

**JMU Herbarium**

Dr. Conley K. McMullen  
**Phone:** (540) 568-3805  
**Website:** [http://csmbio.csm.jmu.edu/biology/mcmullck/Herbarium.htm](http://csmbio.csm.jmu.edu/biology/mcmullck/Herbarium.htm)

The JMU Herbarium, located in Bioscience 1003, comprises 20 full-size and 14 half-size herbarium cabinets that house approximately 18,000 pressed and dried plant specimens. The herbarium is recognized in *Index Herbariorum*, an international listing of the world’s significant herbaria and carries the acronym JMUH. JMUH presently houses a teaching and research collection of bryophytes, ferns and fern allies, gymnosperms, and angiosperms, as well as a small collection of algae. These collections are predominantly from Virginia (particularly the Shenandoah Valley) and West Virginia, although specimens from Hawaii, Poland and the Galápagos Islands are also represented.
Islands are also included. The earliest specimens date from 1825. Also present in the herbarium are a full-size drying oven, upright specimen freezer, three swing-arm dissecting microscopes, 20+ complete plant presses and collecting tools. In addition, JMUH houses a small library that contains a variety of Floras (including *Flora of North America*), botany textbooks, identification keys and journals. The latter include the *American Fern Journal, Botanical Journal of the Linnean Society, Castanea, Rhodora and Systematic Botany*).

**JMU Regional Undergraduate Laser Facility**

**Dr. Harry Hu**  
**Phone:** (540) 568-8115

Lasers are an essential part of our modern society. They are components of home electronics, manufacturing equipment, surgical procedures, atmospheric monitoring devices, and also are a key piece of technology for chemical research. Lasers have transformed modern chemistry. Currently, chemists are able to use lasers to initiate, control, and watch chemical reactions on a scale that was unimaginable 50 years ago. James Madison University has a large laser spectroscopy laboratory that distinguishes it from other primarily undergraduate institutions. Researchers are able to utilize the Facility’s holdings to perform an abundance of interdisciplinary scientific research.

The JMU Regional Undergraduate Laser Facility has grown through many years of support from the National Science Foundation. Holdings include Nd/YAG, Nitrogen, helium/neon, argon ion, and diode lasers. The facility is also equipped with an array of diagnostic tools for laser spectroscopy including an Agilent Infinium 1 GHz digital oscilloscope, five 25 MHz to 400 MHz digital oscilloscopes, a Jarrell-Ash ½ meter scanning monochromator, a CVI digital monochromator, and a Princeton instrument silicon detector array. On-going research with tools in this facility include the synthesis and characterization of luminescent transition metal complexes for use as molecular probes or reporters.

Most recently, the laser facility has received support from the National Institute of Standards and Technology, the James Madison University Department of Chemistry and Biochemistry, and a Research Corporation Department Development Award. New acquisitions include a variety of tunable single-mode diode lasers including a 75 nm New Focus Velocity laser and five NTT:NEL distributed feedback diode lasers for gas sensing of O2, H2O, CO2, and CH4. Additional diagnostic tools include a Bristol Instruments NIR ±60 MHz wavemeter, a Stanford Research Systems 100 kHz spectrum analyzer, and a temperature-stabilized etalon. Emerging research on precision lineshape measurements, gas-sensing of atmospherically relevant small molecules, and optical properties of particulate matter is now underway in the JMU Regional Undergraduate Laser Facility using photoacoustic spectroscopy and cavity ring-down spectroscopy.

**Medicinal Research Collaborative**

**Dr. Kyle Seifert**  
**Phone:** (540) 568-2286

**Dr. Kevin Caran**  
**Phone:** (540) 568-6632
The Medicinal Research Collaborative is an assembly of researchers who share ideas and pool resources to advance medicinal research at James Madison University. Members come from a variety of scientific departments and represent a diversity of expertise. And since members of the collaborative often team up on research, the MRC presents a set of highly interdisciplinary projects that aim to advance fundamental science that supports medicine. Key liaisons include researchers at SRI — Shenandoah Valley, a non-profit organization with a new research site in Harrisonburg, as well as other members of the JMU community with ties to medicine and intellectual property.

**Electron Microscopy Center**

**Dr. Lance Kearns**  
**Phone:** (540) 568-6421  
**Website:** [http://csm.jmu.edu/materialsscience/microscopy.html](http://csm.jmu.edu/materialsscience/microscopy.html)  

The Electron Microscopy Center serves faculty, staff and students who wish to use the scanning electron microscopy in scientific investigations. The center also provides demonstrations for public school groups and specialized educational programs.

**JMU Meteorite Collection**

**Dr. C. Steven Whisnant**  
**Phone:** (540) 568-2312  
**Website:** [http://csma31.csm.jmu.edu/physics/outreach.html#meteorites](http://csma31.csm.jmu.edu/physics/outreach.html#meteorites)  

The James Madison University Meteorite Collection is a growing collection of the many sorts of meteorites to strike the Earth, and is located on the second floor or the Physics/Chemistry building. The display is open to the public year-round during university business hours, and after hours by special arrangement.

**Microscopy Facility**

**Dr. Kristopher Kubow**  
**Phone:** (540) 568-4521  
**Website:** [http://www.jmu.edu/microscopy](http://www.jmu.edu/microscopy)  

The Biology Department's Microscopy Facility is equipped with several light and fluorescence microscopes, including a Nikon C1 Confocal Laser Scanning Microscope, enabling time lapse imaging, 3-D image reconstruction and fluorescence imaging. The facility has a dedicated staff member who can provide training on the equipment and help faculty and students with any microscopy aspects of their research projects.

**Mineral Museum**

**Dr. Lance Kearns**  
**Phone:** (540) 568-6421  
**Website:** [http://www.jmu.edu/geology/museum.html](http://www.jmu.edu/geology/museum.html)  

Housed with the Department of Geology, the JMU Mineral Museum contains more than 700 exceptionally beautiful display specimens that provide mineralogy students with outstanding visual examples of some of the finest crystals from around the world. Each
year, numerous educational groups, mineralogical societies and individual collectors visit the collection.

**Observatory**

Dr. Jon Staib  
**Phone:** (540) 568-6153

Located at the Stokesville, Virginia Campground, a 14-inch telescope is permanently mounted under a 16-foot dome. A set of 10 piers surround the observatory building and provide easy set-up for the observatory's eight, eight-inch telescopes. This site provides dark-sky observing for introductory astronomy students. A photometer, solar filters and a CCD imaging system provide more advanced students with experience in astrophotography and data collection techniques. During the summer months, public access is regularly available on Friday and Saturday nights.

**Office of Statistical Services**

Dr. Rickie Domangue  
**Phone:** (540) 568-6968

Through this office, statistics faculty members and students provide JMU and the local community with assistance in the design and analysis of statistical surveys and experiments. Students obtain practical experience and an appreciation for the impact of statistical methods on today's society.

**Planetarium - John C. Wells Planetarium**

Dr. Shanil Virani  
**Phone:** (540) 568-4071  
**Website:** [http://www.jmu.edu/planetarium/](http://www.jmu.edu/planetarium/)

Located in Miller Hall, the planetarium serves as a teaching laboratory for both the undergraduates and the local community alike. The facility is used as a resource for introductory astronomy classes and well as welcoming school groups from the region. Several public planetarium shows are offered every month that vary with the seasons. The planetarium is equipped with a GOTO- Chronos/Digistar-3 hybrid planetarium system that offers full dome video as well as exceptionally clear and accurate simulations of the night sky.

**Science and Mathematics Learning Center**

**Phone:** (540) 568-3379  
**Website:** [http://www.jmu.edu/smlc/](http://www.jmu.edu/smlc/)

The College of Science and Mathematics has established a Learning Center for Science and Mathematics located on the second floor of Roop Hall. The center, which is a part of the JMU Student Success Center, provides extra help with math and science for students in general education and beginning science courses. The center is staffed by five full-time coordinators and carefully selected upper level science and mathematics majors.
The Shenandoah Valley Regional NMR Facility was established with grants from The National Science Foundation (9650132) and The Merck Foundation with matching funds provided by James Madison University, Eastern Mennonite University and Bridgewater College.

The JMU NMR Facility is comprised of three NMR spectrometers: 300, 400 and 600. These instruments are housed at JMU and can be accessed remotely by the Regional NMR Consortium. The group is composed of chemists from Bridgewater College, Eastern Mennonite University, James Madison University, Mary Baldwin College and the University of Virginia.

Annual Events

New Graduate Student Orientation

Dr. Janet Daniel
Phone: (540) 568-2322

Every August, the department welcomes incoming first year graduate students with a one-day orientation to the program, faculty, fellow students and departmental procedures. Students will receive guidance in the transition into graduate student life, expectations and responsibilities.

Biology Department Seminar Series

Dr. Corey Cleland
Phone: (540) 568-3454

The departmental seminar series features speakers addressing a variety of research methodologies and programs. They are given by JMU scientists, visiting scientists and graduate students. Every March, first year graduate students give a presentation of their thesis proposal to the department. Seminars are held in Biosciences 1007 12:20-1:10 every Friday during the academic year.

Graduate Student Symposium

Dr. Christine May
Phone: (540) 568-5030

Held each spring, this symposium gives students a chance to present their thesis work to their peers, faculty and undergraduates. As well, students prepare the talk in the format of a 15-minute research conference talk in preparation for future conference attendance.