

Dr. Huang named Interim Chair of Biological Sciences

“DR. HUANG will lead the department as it continues to recruit talented faculty and students, grow its academic programs, contribute to new research and educational ventures with corporate, academic, and government partners, and participate in the planning phase for the Schrenk Hall renovation,” says DR. STEPHEN ROBERTS, vice provost and dean of the College of Arts, Sciences, and Business at Missouri S&T, “I thank Dr. Huang for his willingness to take on such important tasks during this time of transition.”

by Mary Helen Stoltz



Dr. Huang joined the Missouri S&T faculty in 2000 as an assistant professor of biological sciences. He was named associate professor in 2006 and professor in 2012. Before joining Missouri S&T, he was a postdoctoral fellow at Michigan State University from 1998-2000.

First Renaissance Student Award Granted At MS&T

This spring KAILEA TILDON, a 2015 graduate from the Department of Biological Sciences was granted the first Renaissance Student Award in the amount of \$1,000. This new award, developed through the Missouri S&T's Arts, Languages, and Philosophy department, was intended to highlight students who had shown great expertise in multiple unrelated fields.

In addition to earning her degree, TILDON was president of the Dance and Ballet club applying herself to choreography, costuming, set design, lighting, fundraising, music editing, and dancing the a lead role in a production.

Applications for next year's award begin March 1st, 2016.



Bohigian Field Station Under Development

Southwest of Rolla, 10 acres of land once farmed by some of the area's earliest settlers is now being explored by Missouri S&T students, who are themselves pioneers of a sort.

Students who took Field Ecology, Cave Biology or Vegetation of the Ozarks courses over the summer were among the first to spend more time in this outdoor laboratory than inside a classroom. They studied in and alongside three spring-fed ponds, a wetland fen, a nearby stream and countless flora and fauna.

Missouri S&T officials plan to convert the area into a field station that will be used by students in many disciplines – from biological sciences and environmental engineering to history or English.

“This field station idea goes hand in hand with the S&T concept of taking learning out of the classrooms and out of the labs and into the real world,” says STEPHEN ROBERTS, vice provost and dean for the College of Arts, Sciences, and Business.

The area was originally settled by the Yelton family in the 1860s, says GEORGE M. BOHIGIAN, an ophthalmologist from St. Louis who purchased hundreds of acres of the watershed property and donated it to the Department of Conservation. The Yelton family log cabin, built in 1868, still stands on the property, original timber and chinking intact. Connected to that cabin is an

addition built in the 1950s. ROBERTS hopes to turn the addition into classroom and lab space for the field station. But that is only the beginning. He envisions overnight accommodations for classrooms and field trips – even summer camps – to be a part of the field station.

“This is a great learning opportunity,” says DR. DEV NIYOGI from the department of Biological Sciences. “There are some subjects you just can't learn in a lab, and field ecology is one of them.”

by Andrew Careaga





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Missouri S&T to Renovate Schrenk Hall

Missouri University of Science and Technology plans to renovate a portion of Schrenk Hall, the building that houses Missouri S&T's biological sciences and chemistry departments, in part through state capital improvement funding.

"This project will provide much-needed improvements to a building that affects nearly every undergraduate at Missouri S&T," says **DR. STEPHEN ROBERTS**, vice provost and dean of the College of Arts, Sciences, and Business at Missouri S&T. "The project will focus on new spaces that facilitate collaborative learning and research, and in doing so will help strengthen the ongoing growth and impact of programs within the College of Arts, Sciences, and Business."

Nearly all of Missouri S&T's on-campus undergraduate students take introductory courses in Schrenk Hall. That includes the 380 students who are majoring in chemistry or biological sciences.

The original portion of Schrenk Hall was built in 1938. This project will renovate the building's 83,000-square-foot west wing, which was added in 1973. This is the second phase of a multi-phase renovation project. Phase one was completed in 2014 with the construction of Bertelsmeyer Hall, which houses Missouri S&T's chemical and biochemical engineering department. The move freed additional space in Schrenk Hall.

The renovation will address deferred maintenance issues related to safety, energy conservation and infrastructure, including updates to the roof, windows, mechanical and electrical equipment. University officials hope to also repurpose existing space to increase the building's capacity for laboratory space.

To fund the project, Missouri S&T will receive \$12,076,451 from a capital improvement bill **GOV. JAY NIXON** signed on Friday, June 5. The University of Missouri System and Missouri S&T will contribute approximately \$6 million toward the project.

University officials plan to select an architectural firm in July 2015 and complete a final renovation plan. That plan will be presented to the University of Missouri System Board of Curators for approval in October. Once approved, construction is expected to begin in September 2016 and be completed by December 2017.

by Mary Helen Stoltz



Bio Files

October 2015

Missouri S&T Department of Biological Sciences

Department Update

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Field Station Under Development
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Renaissance Student Award
Redesigning Cell Biology
Excellence in Teaching Honors
Dr. Huang Named Interim Chair

Upcoming Dates/Events

November 21-29th- Fall/Thanksgiving Break

*Graduation Reception December 18
Havener Center 6-8 PM*

Graduation Ceremony December 19, 10 AM

Biology Education Research at Missouri S&T

Faculty members in the Department of Biological Sciences at Missouri S&T are revamping the Biology curriculum by employing a scientific approach to teaching their courses. Using learning strategies supported by education research literature, the long term goal is to implement the guidelines established in the 2013 Vision and Change in Undergraduate Biology Education document. These guidelines are designed to improve biology education by engaging students in the scientific process and emphasizing concepts, integration, and problem solving over memorization.

KATIE SHANNON and **DAVE WESTENBERG** participated in the National Academies Northstar Summer Institute to learn more about scientific teaching and active learning strategies and shared what they learned with the entire department. Both have also participated in the American Society for Microbiology's Biology Scholars program to develop educational research projects to assess the impact on student learning. They have presented their research at the annual ASM Conference on Undergraduate Education.

The source of funding for including technology in the biology classroom has been the Missouri S&T eFellows program. **KATIE SHANNON**, **DAVID WESTENBERG**, **ADAM MARTIN** and **TERRY WILSON** have all received funding to implement new teaching strategies in both lecture and laboratory courses. These funded projects are having a positive impact on student learning and setting the department on a path to meeting the Vision and Change guidelines.

For laboratory courses, **DAVE WESTENBERG** and **TERRY WILSON** are redesigning the Microbiology and Cell Biology laboratory courses respectively. The redesign is intended to improve student preparation, make better use of limited

laboratory time and provide a more inquiry-based laboratory experience. In addition, **DAVE WESTENBERG** obtained funding from the Missouri S&T mini-grant program offered through the Center for Educational Research and Teaching Innovation (CERTI) for assessing the impact of the redesign. The course designs are based on the "flipped" classroom model in which students in the course watch videos prior to coming to the laboratory. The use of prepared videos provides consistent delivery of course content and close-up demonstrations of techniques. Assessment of the impact of the course redesign on student attitudes indicates a more positive perception of laboratory courses and a greater interest in laboratory research.

For lecture courses, eFellows have used technology to engage students outside the classroom. **KATIE SHANNON** has been instituting "Flipped Fridays" to utilize class time for problem solving activities in Cell Biology (see accompanying article in this issue). **ADAM MARTIN** has been redesigning General Biology as an asynchronous online course to make it more accessible for both in class "face to face" and online distance students.

In addition to the education research within the biology curriculum **DAVE WESTENBERG** has been working with colleagues in Math and Statistics, Physics and Teacher Education on a Department of Higher Education funded project called Science Education and Quantitative Literacy (SEQL). The SEQL program trains elementary and middle school teachers to integrate math and science education. Over the years, participants have gained confidence in teaching science and math and have seen improvements in student performance.

by Dr. David Westenberg

Department Update

BioSci Mission Statement: The Missouri S & T Department of Biological Sciences is an academic community focused on learning and discovery. The S&T BioSci community provides a supportive, collegial, challenging and rewarding environment for its faculty, students, and staff.

Development: Several exciting events are happening. A two-page white paper to establish an interdisciplinary PhD in bioscience program has received approval from the university. A campus-wide committee will soon start to develop a full proposal and submit to the UM-System for approval.

Strategic Plan: To become the school of choice for 450 biology majors by 2020 by offering outstanding learning and research opportunities and career.

Faculty: After 11 years serving as department head, **DR. ROBERT S. ARONSTAM** retired in June 2015. He has accepted the position of the dean of College of Science and Technology at Bloomsburg University in Pennsylvania. Under his leadership and support from faculty and staff, BioSci undergoes tremendous growth and becomes the sixth largest department on campus. His status of professor emeritus has been approved by the university.

A PhD program in bioscience would significantly advance the mission of our department as well as academic stature of the department. The Bohigian Field Station is under development. This facility will benefit biosci education and research. Schrenk Hall will undergo a phase II renovation in 2016 to address infrastructure issues and increase the building's capacity for laboratory space. The renovation is expected to be completed in December of 2017.

Faculty members continue to actively engage in research activities. **DR. YUE-WERN HUANG** is supported by NIH to study bone repair and regeneration. **DR. DEV NIYOGI's** Mill Creek Watershed Assessment with the US Forest Service has been extended for another year. **DR. WESTENBERG** and three faculty members in mathematics successfully renewed their grant from the Missouri Department of Higher Education to train elementary and middle school teachers in integrated math and science education. **DR. MELANIE MORMILE** received a UM Fast Track grant to study the ability of a bacteria strain to transform glycerol to a polymeric precursor that can be used to product textiles and carpeting. **DR. KATIE SHANNON** received an S&T educational mini-grant for her proposal, "Do flipped lectures increase student engagement with course material?" **DR. WESTENBERG** was selected as a German Academic Exchange Service (DAAD) Research Ambassador. **DR. CHEN HOU** was interviewed live by superhumanradio.com to discuss about mechanisms of aging and development. **DR. YUE-WERN HUANG** and **DR. DAVE WESTENBERG** each received a grant from the S&T Miner Tank. Several external grant proposals from faculty members are pending for review by state and federal agencies.

Many details on our activities are available on our website (biosci.mst.edu). You may also find us on our FaceBook page (Missouri Biology). Your comments, and suggestions, and financial support are always welcome. And of course, I invite you to visit the department for a tour and update.

Students: **CHANCE WALKER, AMANDA BLOOM,** and **ANTHONY BITAR** received Gale-Hufham Scholarship. **ANTHONY BITAR** and **CALEB TRECAZZI** earned second place in the CBSE poster competition. **NATALIE HOLSTE** and **ANTHONY BITAR** earned OURE Fellows awards. **KAILEA TILDON** received the first Renaissance Student Award in the college which highlights student's excellence in multiple unrelated fields. **ANDREW LOTT** was named outstanding Beginning Teachers during MACTE conference. Seventy-eight BioSci Majors were honored on Dean's List.



A handwritten signature in blue ink that reads "Yue-Wern Huang". The signature is fluid and cursive.

Yue-Wern Huang, Ph.D.
Professor and Interim Chair, Biological Sciences

Redesigning Cell Biology: The Science Behind How and Why We Educate

DR. KATIE SHANNON, Associate Research Professor, has been redesigning and evaluating changes to one of the Biological Sciences core courses, Cell Biology. **DR. SHANNON** decided to “flip” one day a week of the class to increase class time available for students to practice solving challenging problems. For the “flipped” class, **DR. SHANNON** made short lecture videos for students to watch before class. Making and editing the videos was supported by **DR. SHANNON'S** participation in the eFellows program. In the eFellows program, faculty work with educational technology staff to bring technology into the classroom to increase student performance. The first semester using the “flipped” design in Cell Biology was in Fall 2013.

“I loved the flipped Fridays very much and it was the only class that provided that space to interact with other students and solve problems together during class time. I was able to make friends in class through the group work in flipped Fridays sessions.”

Comparison of the “flipped” class with the previous semester, which was traditional lecture three days a week, showed no difference in exam averages between semesters. Analysis of student video viewing patterns showed that videos needed to be fifteen minutes or shorter to keep students engaged, and that most students were watching the videos only once on the night before class. Student comments on evaluations indicate that most students liked the “flipped” approach, but there is also student resistance to the method. Many students are more comfortable with lectures, since that is what they are used to, but research shows that students learn more in an active learning environment where they participate rather than passively listen. Some benefits of the “flipped” course were increased student-student interaction, increased faculty-student interaction, and introduction of more challenging problems.

DR. SHANNON is currently investigating whether video lectures engage students better than reading the textbook. This study, supported by an Educational Research grant from the S&T campus Center for Educational Research and Teaching Innovation (CERTI), will determine if students are more likely to engage with the Cell Biology material using the online lecture videos than through reading the textbook. Studies have shown that only 25-50% of students do assigned readings. This study will compare data on student viewing of videos to their self-reported textbook reading to determine if providing online lecture videos increases student engagement. This is an important issue, since the flipped model can only be successful when students have engaged with the background material prior to coming to class, and reading the textbook before class helps students understand

material presented in lecture. Increasing student interaction with course materials either by watching videos or increased reading of the textbook should improve their class performance.



Dr. Katie Shannon during her flipped lecture period.

To compare video viewing habits and time spent reading, different types of data need to be collected. The online videos are posted online using the campus course management system, which provides a vast amount of data on student viewing including number of plays and total minutes watched. To collect data on student reading, students are given a short survey at the end of each exam asking how often they read the textbook before class and how they prepared for the exam. **DR. SHANNON** began collecting data in fall 2014 semester (58 students) and spring 2015 (38 students) and is continuing this fall with 58 students. **DR. SHANNON** is interested in using the video viewing data to see if students who get a D or F or withdraw from the class can be identified early in the semester, before the first exam, due to lack of engagement with the assigned course material.

“The problem sets help apply material learned in lecture which you don’t get out of a lot of science courses.”

Preliminary analysis of the data shows that exam performance correlates most frequently to reading and less often to watching the online videos. Multivariate analysis to control for student GPA and ACT score needs to be performed. Engagement was mixed, with approximately equal numbers of students watching videos more vs. reading the textbook more often. **DR. SHANNON** plans to continue this analysis to further improve student engagement in Cell Biology.

by Dr. Katie Shannon

Seventy-eight BioSci Students Honored on Dean's List

Sarah Adams	Dustin Byrd	Corinna Edwards	Elsie Greenwood	Ava Hughes	Madison Mara	Anthony Ragusa
Amnah Alajaj	Melissa Cambre	Chelsea Ehret	Victoria Grill	Sahitya Injamuri	Kaitlyn McDonald	Jenae Rankin
Kwther Albasha	Abigail Lauren	Ethan Engel	Ivana Grimm	Megan Jensen	Matyln Meier	Michelle Rojo
Fatima Alqarous	Alyssa Castro	Logan Featherston	Lisa Gutgesell	Kayln Jones	Kate Menke	Natalie Schriever
Lauren Anderson	Sierra Comer	Elena Fisher	Kelsey Haile	Trevor Karbowski	Samuel Meyers	Elizabeth Thoenen
Jane Arand	Rachel Connell	Claire Friedlund	Erin Harvey	Lisa Kinder	Lauren Moore	Jordan Trager
Carol Baker	Kelsey Crossen	Ari Ginsparg	Charles Hill	Jennifer Koestel	Sarah Mouser	Tara Voyles
Kaleb Bassett	Madison Darnell	Rachel Laverne	Natalie Holste	Rebekah Larimore	Katherine Nelson	Chance Walker
Anthony Bitar	Grace Deitzler	Hannah Goodman	Jordan Hose	Dana Lawson	Mikala Oneill	Alexis White
Damien Bizeau	Delaney Dejanes	Chelsea Gordon	L Rosamond Hoyle	Matthew Liberson	Zachary Paul	Catlin Wilkes
Adrian Black	Cydney Denning	Samantha Greaney	Helena Hudson	Madalaine Mackay	Jamie Phelps	Emily Kathryn Sasha Worthy

Biological Sciences Graduate Honored for Excellence

Two Missouri University of Science & Technology graduates were honored by the Missouri Association for Colleges of Teacher Education (MACTE) for excellence in teaching.

SPENCER TEMPLETON, a 2013 physics graduate who teaches physics and Project Lead The Way in the Ferguson Florissant School District, and **ANDREW LOTT**, a 2013 biological sciences graduate who teaches sciences and coaches at Newburg High School in Newburg, Missouri, were named Outstanding Beginning Teachers during MACTE's spring conference on March 6.

A total of 61 outstanding teachers were recognized for their excellence in serving children during their first two years of service in school districts across Missouri.

by Mary Helen Stoltz



2015 BioSci Graduates

Forty eight Missouri S&T students received a B.A. or B.S. in Biological Sciences during the spring and summer of 2015.



BioSci graduates at the May 2015 commencement ceremony.