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# UW-River Falls faculty receive four grants totaling $511,105

March 29, 2018 – University of Wisconsin-River Falls faculty recently brought in more than half a million dollars in teaching and undergraduate research grants to the institution through four separate proposals.

"We're very happy with the success we've had in obtaining money for worthy projects and programs at UW-River Falls," said Diane Bennett, director of grants and research. "We're especially pleased that so many of the grant proposals helping fund undergraduate research have been favorably considered. Encouraging research is a key university priority and we thank the granting agencies for helping us fulfill this key part of our mission."

Brief summaries follow of the successful proposals.

**WEITQ – Master Teacher Leaders of Secondary Mathematics grant ($101,871)**

Mathematics Professor Erick Hofacker has received a second-year continuation grant from the United States Department of Education, administered by the University of Wisconsin System.

Hofacker's project, titled "Master Teacher Leaders of Secondary Mathematics," began in 2017 and is funded as part of the Wisconsin ESEA Improving Teacher Quality (WEITQ) program. The project provides professional development for 20 secondary mathematics teachers from 13 different school districts in Western Wisconsin.

The project provides teachers an opportunity to deepen and expand their mathematical pedagogical content knowledge, develop mathematical habits of mind, use best teaching practices that promote productive discourse with their students, and create a strong awareness for implementing rich mathematical tasks that promote reasoning and emphasize mathematical modeling in their classroom.

Participants in the project are provided a pathway to earn graduate credits towards a master's degree at UW-River Falls in mathematics secondary education. This provides them an opportunity to take a leadership role in mathematics education not only in their local district, but at the state level. This is evident in the fact that seven of the participants in the project will be presenting their work as part of the project at Wisconsin Math Council annual meeting in Green Lake in May.

Hofacker and his colleagues have been actively providing advanced professional development to K-12 mathematics teachers in Wisconsin with at least one funded project for each of the last ten years. These projects have helped forge partnerships with school districts and teachers throughout Western Wisconsin, which have impacted and strengthened both the undergraduate and graduate mathematics education programs at UW-River Falls.

**National Science Foundation Research Experience for Undergraduates grant ($194,932)**

Associate Physics Professor Surujhdeo Seunarine and Physics Professor Jim Madsen collaborated on ongoing work with the international IceCube Neutrino Observatory and received a National Science Foundation (NSF) Research Experience for Undergraduates (REU) Program Grant that will provide funding for 18 ten-week research internships over three summers.

Each summer for three years, six undergraduates from around the country will come to UW-River Falls to undertake neutrino astrophysics research associated with IceCube. This year, about 100 students from around the country are expected to apply for the six internships.

The IceCube Observatory, located at the South Pole, searches for neutrinos, elusive particles that are produced in very energetic objects in the universe. The telescope could one day help reveal the origin of the highest energy particles in the universe and help resolve questions on dark matter and elementary particle physics. As part of their research experience, students will participate in a one-week software and astrophysics "boot camp" at the Wisconsin IceCube Particle Astrophysics Center at UW-Madison. The NSF award will support student stipends, accommodation, and travel expenses to River Falls.

While about 50 institutions nationwide have physics REU programs, UW-River Falls, which has partnered with the program since 2014, is one of only a handful of undergraduate institutions in the United States to host a physics REU site.

**National Science Foundation Research at Undergraduate Institutions grant ($174,302)**

Computer Science and Information Systems Professor Jacob Hendricks has received a two-year grant totaling just over $174,000 from the National Science Foundation.

The grant, titled "Explorations in the Self-Assembly of Distributed Biological Functions," provides over $90,000 in research stipends for undergraduate and graduate students.

The process of self-assembly is often observed in nature through individual components such as molecules binding to form more complex structures.

"Not only is self-assembly an important process observable in many natural phenomena, but it is also currently being utilized to manufacture nanotechnologies with molecular (if not atomic) level precision," Hendricks said.

Through this grant, students will use mathematical models to study how communication between self-assembled components can yield functionality surpassing that of a single component. Eventually, this research may lead to techniques directly applicable to tile assembly systems which are applications that enable research in the field.

**Wisconsin Space Grant Consortium Grant ($40,000)**

Associate Biology Professor J. Alfred Bonilla and Biology Professor Karen Klyczek have received a grant through the Wisconsin Space Grant Consortium Higher Education Incentives program.

Titled "Space Phage: An Undergraduate Course-Based Research Experience for Investigating the Adaptation of Bacteriophages in the Spaceflight Environment," this program will allow faculty and students to travel not only to the Wisconsin Space Conference in August 2018 and 2019, but also to visit a launch site and make a research presentation at the annual conference of the American Society for Gravitational and Space Research.

The grant supports a pilot study that will identify which bacteriophage and bacterial hosts would be most feasible to send into space. The actual grant to be able to fund sending them to space is to be submitted shortly.

The ongoing study is conducted on the International Space Station and examines bacteriophages to discover possible changes in their physical, chemical, morphological, and genetic properties when exposed to microgravity.

A bacteriophage replicates within microorganisms such as bacteria and archaea. While they are viruses, some bacteriophages have therapeutic and diagnostic use. It's estimated that earth contains more bacteriophages than all other organisms combined.

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