

## SD EPSCoR Unveils Free Curriculum Resource for South Dakota Teachers

SD EPSCoR has launched a free database of curriculum enhancement resources for STEM (Science, Technology, Engineering, and Math) teachers serving middle and high school students. The education portal, located at [sdepscor.org/edportal](http://sdepscor.org/edportal), offers curriculum modules based on current scientific research occurring in South Dakota's higher education institutions and are aligned with the new South Dakota Science Standards.

"We know how busy teachers are," said Dr. Rhea Waldman, Education Outreach Specialist with SD EPSCoR. "Our education portal will help teachers get students excited about STEM and transition to the new South Dakota Science Standards. By bringing local research into classrooms, students experience hands-on STEM, learn about careers in South Dakota, and potentially meet their future mentor."



*Dr. Rhea Waldman*

The curriculum modules were developed by a team of South Dakota STEM teacher leaders and are being tested in their classrooms. The team's goal was to create authentic classroom investigations that are connected to real world scientists and their research. Each conversation and investigation lays a foundation for future discussions with the scientists.



*STEM teacher leaders work to develop the curriculum modules during a writing workshop. The team's goal was to create authentic classroom investigations that are connected to real world scientists and their research.*

Nicole Keegan, one of the lesson plan developers and a Staff Development Manager with the Office of Teaching, Learning and Innovation at Rapid City Area Schools is a strong believer in the connection these lessons create between research and the classroom.

"Research has shown that exposure to STEM-related fields allows students to see and be active in the work of real scientists and researchers. This creates relevance and a genuine excitement for the learning."

Building a strong STEM Workforce will play a vital role in the sustained growth of South Dakota's economy. Strengthening STEM education to get students excited

about these fields is becoming increasingly important to the state's future.

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## CAREER Proposal Development Program Assists Junior Faculty Members

The National Science Foundation's (NSF) Faculty Early Career Development Program (CAREER) is known as one of the best tools for junior faculty members participating in research. Activities pursued by early-career faculty build a firm foundation for a lifetime of leadership in integrating education and research.



SD EPSCoR and the South Dakota Board of Regents have helped generate continued success with the CAREER Proposal Development Program. The program is a series of preparation activities that provide faculty with essential tools to submit highly competitive proposals. A workshop on Nov. 28 at University Center will kick off this year's program.

After the workshop participants will work on proposal drafts that will be reviewed by an external consultant in the Spring. The external consultant review is a major opportunity for faculty members as it is rare to have the funds in their budget to get them done.

"The proposal preparation consultants that we have built a relationship with over the years have extensive experience with NSF and NSF CAREER proposal development," said Mel Ustad, SD EPSCoR Director.

While the consultants assistance can't guarantee that a proposal will be funded, it can guarantee that each faculty member will be submitting the best proposal that they can at this time in their professional development. And if nothing else, they will have gained insights into what is necessary to prepare proposals that are competitive for funding at NSF and other federal agencies.

Visit [sdepscor.org/career](http://sdepscor.org/career) to learn more about the CAREER Proposal Development program and view past workshop videos, a frequently asked questions and links to resources on the web.

### NSF CAREER Proposal Development Workshop

*November 28, 2017*

University Center – Sioux Falls, SD

[sdepscor.org/career](http://sdepscor.org/career)

## Mel Ustad to Serve as SD EPSCoR Director

SD EPSCoR welcomes Dr. Mel Ustad as the organization's new director. Ustad assumes the role from Dr. Jim Rice, who retired in September. As the new director, Ustad will guide SD EPSCoR through its fourth and fifth year of the NSF EPSCoR Track 1 Research Infrastructure Improvement (RII) award and ideally onto another Track 1 award shortly thereafter.



"I look forward to continuing to work with all the people and organizations involved with EPSCoR programs to increase South Dakota's research activities, develop future generations of scientists and technology workers and grow South Dakota's knowledge economy," said Ustad.

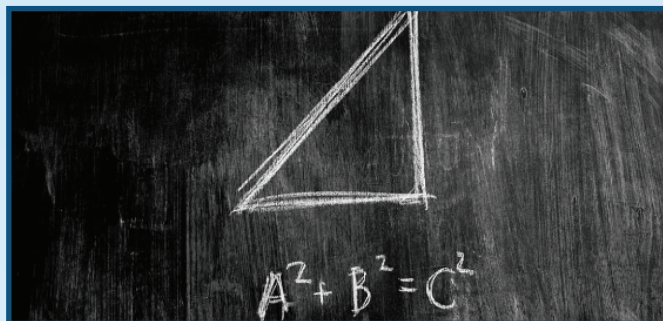
Dr. Ustad has been involved with SD EPSCoR since the early 90's and has served as a co-PI on the last three EPSCoR awards. His duties included leading the Economic Development component of program in his role at the Governor's Office of Economic Development.

## ED BLOG: The Visual Pythagorean Theorem Experiment

The Pythagorean theorem is an important math concept that is applied everywhere in math and technology. The idea is simple in that  $a^2 + b^2 = c^2$  for a right angle triangle that has two sides,  $a$  and  $b$ , and a hypotenuse of  $c$ .

There are many proofs proving this is true using squares, trapezoids, and other triangles that can be found here.

But with all these math ideas and concepts, how are kids really grasping the idea that two sides of a triangle squared added together always equal the longer side squared? For the children that have more visual needs for learning, the Pythagorean theorem model can be a great experiment!



***The easiest way to visually explain the Pythagorean theorem is by the use of three squares, one square matching each side length of the triangle your demonstrating on.***

So a separate  $a$  square,  $b$  square, and  $c$  square are needed. The idea of this demonstration is that the  $a$  square and  $b$  square have the same combined area or volume as the  $c$  square. With these, there are two visuals you can create:

1. The paper cut-outs are the easiest way to demonstrate the proof's origin and understanding. There are pintables available along with video tutorials on how to go over it with children. Basically, the cut up  $a$  and  $b$  squares can be matched up like a puzzle on the  $c$  square, showing that they are equal. This is an easier method since the materials you need are only scissors and the printed pattern, being ideal for classrooms.

2. The water model or sand model can make a cute project for a math and science fair. With the help of a guardian or parent, kids can make this unique project that uses volume to show how the Pythagorean theorem works by tilting the wheel, allowing the volume in  $c$  flow down filling up all of  $a$  and  $b$ . This project can be made by cutting out plexiglass and sealing it with caulking. Mounting it on a wheel allows people to come up and interact, tilting the wheel and watching the water or sand move.

Science, technology, engineering, and math (STEM) are such important fields of study. What better way is there to encourage children to learn than by creating experiments using math and science concepts.

## Education Portal Brings Scientists Into the Classroom

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"I think the ability to bring a scientist into your classroom, even via video conferencing will increase student engagement immensely," said Alison Bowers another one of the lesson plan developers and a Science Teacher at Hanson School District. "Students will be able to show how the concepts they are learning are used in real-world science here in South Dakota, and create cross-over between different branches of science."

Visit [sdepscor.org/edportal](http://sdepscor.org/edportal) to download and start implementing the lesson plans today. Contact Dr. Rhea Waldman at [educationdirector@sd-discovery.com](mailto:educationdirector@sd-discovery.com) or (605) 224-8295 with any questions.

**"Students will be able to show how the concepts they are learning are used in real-world science here in South Dakota, and create cross-over between different branches of science."**

**- Alison Bowers, Hanson School District**

## SD Mines BuG ReMeDEE Team Lands \$6 Million NSF EPSCoR Grant to Study Microbes of the Methane Cycle in Extreme Environments

Researchers at the South Dakota School of Mines & Technology have been awarded a \$6 million grant from the National Science Foundation (NSF) to study the range of microbes that consume methane in deep and extreme environments. The project is named ***Building Genome-to-Phenome Infrastructure for Regulating Methane in Deep and Extreme Environments (BuG ReMeDEE)***. This research (pronounced “bug remedy”) can help scientists better understand the methane cycle in natural extreme conditions, such as under Yellowstone National Park and in the Sanford Underground Research Facility (SURF). The methane cycle is the generation and consumption of methane by various microbes. Researchers will also study how some of these microbes can be used to convert methane into useable products and materials.

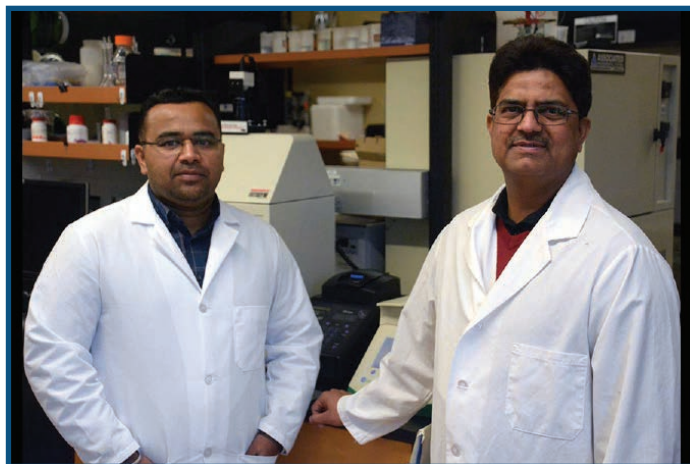
Methane is a powerful greenhouse gas. This research will help scientists better understand the climatological impact of methane generated under places like Yellowstone and in other geothermic and fossil fuel beds.

“This BuG ReMeDEE consortium will garner the world’s attention on the significance of analyzing the methane regulation in deep-subsurface and extreme environments,” says Rajesh Sani, Ph.D., associate professor in the Chemical and Biological Engineering Department at SD Mines and the principal investigator of the initiative.

Researchers will also explore how some of these microbes could be genetically engineered to better convert methane into value-added products or reduce the impact of future methane emissions on the environment. The research could also open doors for new economic development opportunities in industry that can utilize these genetically modified microbes for processing greenhouse gas and converting it to biofuel, biodegradable plastics or electricity.

BuG ReMeDEE researchers will further study how the genetic makeup of these microbes translates to their characteristics and role in the environment. Building this basic understanding of the genotype-to-phenotype relationship in these microbes can help form the foundation for future research and breakthroughs. A diverse team of 21 scientists and engineers including early career faculty, senior faculty, senior personnel and students will participate in this initiative.

This investment is made through the NSF’s Established Program to Stimulate Competitive Research (EPSCoR) program. The BuG ReMeDEE consortium includes industrial partners LanzaTech (USA) and Bijson Innovations Pvt. Ltd. (India). The collaboration of these company partners can help strengthen the gas-based economy. BuG ReMeDEE can also address the critical regional, national and global issues of methane cycling, global warming, renewable energy, and carbon neutrality. The research could lead to advancements across many scientific fields including microbiology, microbial ecology, bioinformatics, protein engineering and environmental engineering.



*Rajesh Sani, Ph.D., (right) associate professor and Saurabh Dhiman, Ph.D., research scientist in the Chemical and Biological Engineering Department at SD Mines are two members of the BuG ReMeDEE team.*

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## Submissions Now Open for the SD Biotech Video Competition

The SD Biotech Video Competition is an annual statewide opportunity for high school students to connect with local biotechnology organizations to explore how biotechnology is a part of their communities.

Participants are asked to create a short video that addresses one of the following topics: **A. How does Biotech Feed South Dakota?** **B. How does Biotech Fuel South Dakota?** **C. How does Biotech Heal South Dakota?**






All submissions are due by January 31, 2018. Start today by connecting with area biotechnology organizations to learn more about what they do in/for your community! Visit [bit.ly/BioVidComp](http://bit.ly/BioVidComp) to learn more and enter today!

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## Important Dates:

- **RII Track I Letter's of Intent Due - Nov. 3**
- **National NSF EPSCoR Conference- Nov. 5 - 8 - Missoula, MT**
- **RII Track II Letter's of Intent Due - Nov. 27**
- **NSF CAREER Development Proposal Workshop - Nov. 28 - Sioux Falls, SD**

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