

CEEMS Summer Institute Wraps up with Teacher Showcase

By: Desiré Bennett

With its second year of instruction underway, the CEEMS program is equipping area teachers with tools to impact STEM education in the Tri-state and beyond – and the showcase on August 2, 2013 marks the kick-off to an impactful year.

The University of Cincinnati's College of Engineering and Applied Science (CEAS) is leading an interdisciplinary effort which reaches far beyond the boundaries of the university's campus.

That effort, the Cincinnati Engineering Enhanced Mathematics and Science Program (CEEMS), aims to elevate STEM (Science, Technology, Engineering and Mathematics) education by



First year students learn about program expectations.

building a collaborative, sustainable, education licensure and degree-granting infrastructure throughout the tri-state.

The [CEEMS program](#) was designed to address and meet the growing demand for engineering-educated teachers with a goal of equipping teachers with the skills needed to provide students with opportunities to reach and surpass Ohio New Learning Standards for Science, Common Core Math Standards and the Next Generation Science Standards in addition to providing students with a universal skill set.

Now in its second year, the CEEMS program is shaping up to have a promising future. In 2011 the National Science Foundation (NSF) [awarded CEEMS a \\$9.2 million grant](#) for five years. “You don’t receive this amount of money without wanting to impact student achievement in math and science – which is our ultimate goal,” said Prof. Anant Kukreti, Principal Investigator for CEEMS who directs management and design of the CEEMS effort. “Our way of doing that is not by working directly with the students – we work through their teachers to create a pedagogy change so they can be more engaged in math and science through hands-on projects that have rigor and expose the students to career applications based on math and science – and that’s where the engineering piece comes in.”



Prof. Anant Kukreti,
Principal Investigator for
CEEMS.

Over the course of seven weeks, area educators become students by attending the Summer Institute for Teachers (SIT), which is now entering its final weeks of completion. SIT is one of four professional development pathways for teacher preparedness and is comprised of eight

engineering and science based courses, including five engineering courses: (1) Engineering Foundations, (2) Applications of Technology, (3) Engineering Applications of Mathematics, (4) Engineering Models, (5) Engineering Energy Systems, and three science courses: (1) Modeling and Applications (M&A) in Physical Sciences, (2) M&A in Biological Sciences, (3) M&A in Earth Systems. The engineering courses are taught through CEAS and the science courses



Prof. Dave instructs Applications of Technology students.

through A&S, The College of Education, Criminal Justice and Human Services is also a partner on the project.

Applications of Technology is a core course where problems are presented that allow students to define, design, build and test their solutions. During classes this summer, teams worked together on design projects such as building an 8.5” platform, capable of supporting a large load, with only a (specified) limited amount of materials.

Course instructor and mechanical engineering technology professor Janak Dave, PhD, says that there are many lessons to be learned from challenges like the aforementioned one. “Students will see that planning beforehand is a key component to the challenged-based learning,” he said. “[They will learn] don’t go into the solution with only one solution in mind.”

Applications of Technology student Erick Allen, who teaches math at Withrow University High School and who is in his second year of CEEMS, talks about the changes he has seen in his classroom as a result of his participation in classes such as Applications of Technology. “CEEMS has brought technology into the classroom,” he said. “My students are now better at presenting and are better at doing challenged-based word problems.”



Students build platform capable of supporting a large load.

The Engineering Foundations, another core course, introduces students to the scope of engineering disciplines, basic foundations of engineering science, and engineering design.



Goshen Middle School teachers Kelly Denu and Samantha McConnaughey discuss project.

Working in teams, students implement the design process from the need to the prototype in an open-ended environment. This summer, one of the challenges was to build a turbine air foil and then test it to see how much power it produced.

Goshen Middle School math teacher Kelly Denu is excited about taking concepts like these into the classroom. “I think it’s awesome and I think that being able to bring some of

these engineering designs into my class, so that the kids can apply them, is going to help them learn the math skills and concepts,” she said. “I really enjoy the engineering design process way of thinking and approaching the problem so that the students can become better problem solvers themselves and I also like the collaboration that we [the teachers] get to do and I can see that our kids will get to do that too.”

Fellow Goshen Middle School science teacher Samantha McConnaughey discusses what she says is another positive aspect of the SIT. “Time is golden as a teacher – we never have time to do anything,” she said. “So the time that we have this summer to actually create a full unit and to get feedback from professionals like the resource team and engineers that we’re going to be working with is going to be invaluable.”

The SIT results in each teacher participant producing three learning units that integrate engineering’s challenge based learning processes into secondary mathematics and science curriculum. The showcase is a way to display these units. “This gives the teachers the opportunity to highlight their work and to have some outside perspective to pat them on the back and say ‘job well done,’” said CEEMS project manager Julie Steimle. “It is [also] a celebration of seven weeks of hard work.”



Engineering Foundations students test turbine air foil

Teachers will display a poster which will summarize each of the three units they have created. “The poster session will be a time for the teachers to talk about their units and to get teachers comfortable with presenting their work to adults,” Steimle said. “One of the goals of the project is to create teacher leaders so that not only will they be great in the classroom, but they will spread the word among their colleagues as well.”

The Closing Day Showcase is Friday August 2, 2013 from 8:30 a.m. until 2:30 p.m.

Select for [Closing Day Showcase Agenda](#)

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