Top Story

Undergrads Gain Valuable Experience at CCM

Early in June, almost 50 undergraduate students arrived at the University of Delaware's Center for Composite Materials (CCM), ready to spend the summer gaining valuable hands-on experience in the center's state-of-the-art composites fabrication, characterization, and testing facilities.

Shown above are 32 of the 48 undergraduate students who are conducting research this summer at UD's Center for Composite Materials. Photo by Kathy F. Atkinson

University of Delaware
Center for Composite Materials

COMPOSITES UPDATE
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According to Jack Gillespie, CCM Director and Donald C. Phillips Professor of Civil and Environmental Engineering, the 2009 program involves a record-high number of participants. "We typically have 30 or 35 students, but the success CCM is enjoying in terms of research funding has enabled us to make offers to more students this year," he says.

The students represent not only UD but also Winona (MN) State and Tuskegee (AL) universities in the United States, as well as the Ecole Polytechnique in France.

The popularity of CCM's undergraduate research program, which was established in 1981, is due in part to the multidisciplinary, real-world projects the center offers. "The work here complements what the students learn in the classroom and exposes them to ideas they won't see in textbooks," says Gillespie, who has joint faculty appointments in the Department of Civil and Environmental Engineering and the Department of Materials Science and Engineering.

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"For example," he says, "our Advanced Materials Intelligent Processing Center, a designated center of excellence funded by the Office of Naval Research, provides students with the opportunity to design, fabricate, and work with state-of-the-art automated liquid composite molding systems."

Jeff Knopf

"Similarly," he continues, "in our two Army centers of excellence, students work with CCM and Army Research Laboratory researchers on characterization of lightweight composites for vehicle and soldier protection, multifunctional hybrid composites, and nanomagnetic composites."

In some cases, a summer research project at CCM grows into a senior thesis. Jeff Knopf, who earned an honors degree with distinction in chemical engineering in 2009, began working at CCM as a sophomore. Advised by Norman Wagner, the Alvin B. and Julia O. Stiles Professor of Chemical Engineering, Knopf completed a senior thesis focused on electrospinning, a fiber production technique that uses electric fields to generate continuous polymer nanofibers.

Knopf was co-advised by CCM associate scientist Joe Dietzel, who provided a wealth of information about the process. "He was always available for questions and advice," Knopf says. "I also found it really valuable that CCM itself is so interdisciplinary -- I could ask a question and get a variety of answers from experts with different perspectives."

Munetaka Kubota

Munetaka Kubota, a rising senior majoring in mechanical engineering, is now in his third summer at the center. Advised by Shridhar Yarlagadda, Assistant Director for Research at CCM and Associate Professor in the Department of Electrical and Computer Engineering, Kubota is investigating cure of aerospace-grade adhesives.

"I love the freedom Dr. Yarlagadda has given me," Kubota says. "He guides rather than dictates and allows me to work independently. This has been a great learning experience for me,

TOP STORY (Continued)

and I feel it's prepared me for the workplace, where I'll be expected to respond to 'big-picture' assignments rather than handed specific tasks to follow."

"Our undergraduates have a unique opportunity to interact with scientists and engineers from government and industry," Yarlagadda points out. "The result is that they get a really good idea of how the research done here will actually be used. The experience lets them hit the ground running when they graduate and make a smooth transition from academia to the real world."

John Zerhusen

While Knopf and Kubota have spent a significant amount of time in CCM's research labs, most of the students here this summer are experiencing the center for the first time. John Zerhusen, a rising senior in mechanical engineering at UD, learned about CCM through the Department of Mechanical Engineering.

"I found out that it's one of the leading facilities in the country for this kind of research," Zerhusen says. "It seemed like the perfect opportunity for me, as an undergraduate with little real-world experience, to be able to work here. I really hope that I can get at least a basic understanding of how research is actually conducted. But beyond that, I want to learn as much as I can about the field of composites manufacturing in general. I feel that it could really benefit me when I look for careers in the future."

Kyle Hoffman

Another newcomer this year is Kyle Hoffman, a rising senior at Winona State University in Minnesota -- one of only a handful of schools in the U.S. that offer composite material engineering as an undergraduate major.

"One of my professors used to teach at UD, and he informed me of the CCM program," Hoffman says. "I thought it would be a great opportunity for me to explore the East Coast while also getting some real-world experience in my somewhat specialized field."

Two of the other first-time summer interns are from Tuskegee University, a historically black university in Alabama. Tuskegee and UD have a long-term, multi-faceted research and education collaboration through CCM, organized around joint programs with the U.S. Army.

Keosha Forrest and Emory Head, both rising seniors at Tuskegee, are working on CCM's shear-thickening fluid (STF) project for extremity protection. Co-advised by Wagner and Gillespie, the two are learning how to synthesize and evaluate the materials and will spend some time at ARL toward the end of summer studying the STF-fabric interaction.

Emory Head, left, and Keosha Forrest of Tuskegee University

"Being here has truly been a learning experience for me," Forrest says. "The faculty, staff, and graduate mentors are very supportive and easy to talk to."

Head agrees. "This summer research opportunity has been a great experience thus far," he says. "I'm enjoying the environment and the people surrounding me. The work I do is hands-on and has great depth, and the learning opportunities are endless. UD has truly done a great job with this program, and I am extremely grateful to be a part of it."

According to CCM Associate Director Suresh Advani, who is also the George W. Laird Professor of Mechanical Engineering, the student interns at CCM not only gain research experience but also receive training in a variety of topics from safety to poster preparation. "One of the great things about the center," says Advani, who is currently advising seven summer interns, "is that it's so well-organized, all of the logistics are taken care of, which frees the faculty to advise on the research."

"There's also a tremendous synergy among the summer interns, the grad students, and the postdoctoral researchers," he adds, "which gives the undergraduates a much broader perspective than they would have working alone in a smaller lab. The students really feed off each other in programs like this."

Apparently, the formula works, as CCM has hosted more than 1,000 undergraduates in the 28 years since the program was implemented. "Although CCM doesn't grant degrees," says Gillespie, "the education of students at all levels is a critical component of our mission. Our goal is to complement the efforts of all of our contributing academic departments in training composites engineers for the workplace."

Even the parents of participants have noted the value of the program. "I got an e-mail from one mother," Gillespie says, "thanking me for helping to make this 'wonderful internship opportunity' available to her son. She told me he's so excited about the experience that he's out of bed by 6:30 a.m. and out the door by 7. I like to think that all of our summer researchers are this enthusiastic about their work here and that their parents are equally supportive of their participation."

Article by Diane Kukich

Prof Richard Wool
View Profile

OTHER NEWS

Published in UDaily

Wool discussed green research on Science Friday

1:57 p.m., June 26, 2009----The University of Delaware's Richard Wool, professor of chemical engineering, was a guest of host Ira Flatow on National Public Radio's Science Friday program on Friday, June 26.

Wool appeared during hour one of the program. His discussion was one of three segments in an hour-long program addressing alternative energy. The other two segments addressed wind energy and diatoms as a source of oil.

Wool and Erman Senoz, a doctoral student, have been widely featured in the media after reporting on research concerning the use of carbonized waste chicken feathers to store hydrogen for fuel cells at the 13th annual Green Chemistry and Engineering Conference held June 23-25 in College Park, MD, by the American Chemical Society.

The **Science Friday Web site** offers options for listening to the program, including radio stations with online presence and podcasts.

Please click here for the full audio broadcast of this NPR program.

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