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LA-SiGMA and LSU CCT Host Summer Programs to Impact STEM Education in Louisiana

The Louisiana Alliance for Simulation-Guided Materials Applications (LA-SiGMA, a statewide consortium of universities) and the LSU Center for Computation & Technology (CCT) welcomed 20 undergraduate and high school students, along with six high school teachers, to conduct research at the LSU campus this summer. Program participants worked with faculty on cutting-edge research in materials and computational science.

LA-SiGMA and CCT combined their "Research Experiences for Undergraduates (REU)" programs, both funded by the National Science Foundation (NSF). These nine-week programs host undergraduates and high school students from around Louisiana and the country. The students joined research teams and were trained to conduct scientific research. The research projects included enhancing current high performance computing (HPC), designing materials to store hydrogen and to improve electronic devices, improving drug delivery materials, creating an interactive and customizable meta-instrument, interactive digital music applications on mobile devices, and novel tangible interfaces.

In addition, Southern University LA-SiGMA funds sponsored three high school teachers from the Louisiana School for Math, Science & the Arts to participate in a “Research Experiences for Teachers (RET)” program. RET teachers participated alongside REU and graduate students in research projects at LSU. Their projects involved methods of incorporating high performance computing into their high school chemistry, math, and physics classes.

As part of LA-SiGMA's initiative to reach out to high schools, three teachers from LSU's LaMSTI program were supported. The Louisiana Math and Science Teacher Institute (LaMSTI), also funded by NSF, is a “program developed to benefit existing science and math teachers in the East Baton Rouge Parish area and prepare them for service as lead teachers, mentors, and coaches," Professor James Madden, co-director of the LSU Cain Center and director of the LaMSTI program, explained. LaMSTI students receive a Master of Natural Sciences degree after successful completion of the program.

Professors Mark Jarrell and Randall Hall, leads for LA-SiGMA at LSU, stated "computational science and engineering are now recognized by nearly all national and international science societies as a third method of scientific inquiry, coequal with experiment and theory. Computational methods are also an essential part of technology and even manufacturing. As such, it is imperative for the economic future of Louisiana and the nation that we help excite and entice the best and brightest students in Louisiana to pursue careers in STEM disciplines." They continued, "in partnership with the Louisiana School for Math, Science, & the Arts, LA-SiGMA is helping to introduce state-of-the art computational methods in chemistry, physics, and mathematics high school classrooms to build the intellectual infrastructure necessary to position Louisiana as a major player in computational science and technology. LA-SiGMA, through its REU program, is exposing outstanding undergraduates to computational methods in materials science that will help expand their future educational and professional opportunities."

CCT faculty Juana Moreno, Department of Physics & Astronomy, and Brygg Ullmer, Department of Computer Science, leads of the CCT REU program, stated, "there is a great need of attracting more students to careers in STEM disciplines. In particular, computational science will only fulfill its full potential if advances in education and training of the workforce accompany the advances in hardware funded by the NSF cyberinfrastructure initiative. Our program combines individual training with student immersion in a multidisciplinary research group to provide a rich research experience." Moreno and Ullmer added "even though our program only began last summer, our students are winning national recognition. One of our 2010 students received the best poster award in the undergraduate category during the TeraGrid 2010 conference, while another was awarded an NVIDIA internship this summer. We are very proud of our students."

Participants of both the REU and the RET gave rave reviews of their experiences and the quality of learning that was available to them. Overall, the experience has either encouraged them to further their education using some form of computational sciences, or it has opened new pathways for their current curriculum strategies.

Dr. Chris Hynes, chemistry teacher at the Louisiana School for Math, Science, & the Arts, and a LA-SiGMA RET participant, said, "I have a Ph.D. in chemistry and have been teaching for about 20 years. I was not really convinced that HPC could have a sustained, meaningful contribution to how I teach chemistry. But once I experienced the multi-faceted projects that use HPC, I realized it could be used at a variety of levels. Overall, my participation in the LA-SiGMA program has been career altering."

Katelyn Kufahl, senior at the University of Wisconsin and CCT REU participant, said, "I feel that this experience has done nothing less than revolutionize the course of my education. I now recognize that I want to go to graduate school in a computational discipline and continue participating in related research. Here, I have found a wealth of skills and knowledge in the field, met many interesting and successful professionals, and kindled in myself a new interest - even a passion, perhaps. All things considered, the program far exceeded even my wildest expectations."

The CCT REU program "Interdisciplinary Research Experience in Computational Sciences" is funded by the National Science Foundation's Office of Cyberinfrastructure. Funding for LA-SiGMA activities is from a $20 million cooperative agreement between the National Science Foundation and the Louisiana Board of Regents' EPSCoR program. LA-SiGMA member institutions are Grambling University, Louisiana State University, Louisiana Tech University, Southern University, Tulane University, University of New Orleans, and Xavier University. LA-SiGMA hosts REU programs at six of the schools. Staff from the CCT and LA-SiGMA provided valuable support; in particular, Dr. Bety Rodriguez-Milla, Kathy Traxler, Leigh Townsend, and Shelley Lee were crucial for the success of the programs.

For more information about the La-SiGMA program, visit: http://reu.lasigma.loni.org/. For more information on the CCT REU, visit: http://reu.cct.lsu.edu/.

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