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## Expanding Access to Computational Science Education

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Computational science is integral to all fields of study. Through funding from the National Science Foundation, the Blue Waters and the XSEDE (Extreme Science and Engineering Discovery Environment) projects are working with faculty across the United States to incorporate computational science within all fields of study. This talk will present the strategies that are being pursued to incorporate computational tools, resources and methods into the undergraduate and graduate curriculum.

We recognize that computational science and engineering can be achieved by bringing together a blending of mathematics, computer science, and domain science. While the most productive large scientific teams bring together people with these diverse backgrounds, students with a mix of parallel thinking, quantitative reasoning, and computational skills can be well prepared to advance discovery.

The effort to prepare today's scholars begins with prescribing core competencies that undergraduate and graduate students should learn to be able to conduct computational science and engineering. These competencies have been developed in consultation with people from academic and business and industry to ensure that today's students are learning the skills needed to solve modern day scientific challenges. Our team works with faculty, deans and directors to review the courses offered by departments and colleges to determine how courses may be modified and/or aligned to allow students to gain these competencies. And, when needed, this process helps to identify new courses that may need to be developed.

Through XSEDE and Blue Waters we provide faculty with training sessions and workshops to learn about computational tools, many of which are free or very low cost, that can be used to learn computational tools, concepts and techniques. These projects also offer workshops in which faculty spend time working on strategies to incorporate these tools and methods into what everyone recognizes are already full curriculum. We introduce modules that other faculty have developed that can be used and/or modified to adapt to the needs of particular courses. As faculty modify these modules or develop new modules, we capture their materials, conduct a review of the materials, and then work with the faculty members to make the new modules publicly available for re-use by others.

XSEDE and Blue Waters are offering on-line courses taught by faculty from remote campuses. These MOOCs/SPOCs allow a campus to offer courses not available on their own campus to extend the learning opportunities for the local students, and to allow the faculty to acquire the knowledge to then teach the courses locally.

Our goal is to significantly increase the number of students well prepared to advance discovery in all fields of study.