

**Department of Engineering and Science Education
at Clemson University**
www.clemson.edu/ease



The Department of Engineering and Science Education (E&SE) at Clemson University, established in 2006, is building on the success of a Chemistry Education Ph.D. program, now in its tenth year. The vision of this department is to be an international leader in engineering and science education through discipline-based education research (DBER), preparation of future faculty, and development and deployment of inclusive, evidence-based curricula. Six faculty members have active research projects in the areas of assessment and improvement of problem solving, relationships between motivation and learning, student-centered learning environments, equity and gender issues in STEM disciplines, identity development, modeling of large-scale data, the graduate school experience, and students' academic and career development.

The E&SE department at Clemson has begun to generate qualified researchers in science and engineering education, both as graduates of traditional disciplinary departments, and through our new Ph.D. program, in Engineering and Science Education. Over the past five years, four Ph.D. researchers in chemistry education (two with degrees in chemistry, and two with degrees in curriculum and instruction) and one in engineering education have been graduated. Three of those students have taken faculty positions (two in chemistry departments and one in education) and two are postdoctoral research associates. The E&SE Ph.D. program will build on courses already in place that focus



on pedagogy and instructional theories, education research methods, and preparation of future faculty. We anticipate the new students (to Clemson) will enroll in January 2011. Currently, twelve graduate students are actively conducting education research while pursuing doctoral degrees in engineering disciplines (mechanical, bioengineering, civil, and industrial) and science disciplines (mathematics, computer science and chemistry). In addition, the department offers a Certificate in Engineering and Science Education, for students in traditional disciplines preparing for academic careers. Fifteen graduate students have already completed the certificate, with another 15 students currently enrolled.

Research Activities

Learning and Cognition

Student-centered learning (e.g. cooperative learning, SCALE-UP)
Assessment and improvement of problem-solving
Conceptualization in the laboratory
Use of metacognition
Development of representational competence
Personalized learning and learning motivation

The Learning Environment

Gender and equity issues in STEM curriculum
Recruitment and retention of under-represented students
Students' academic and career development
Teaching assistant interactive and affective behaviors
Graduate school transitions
Practitioner identity development

Materials and Technologies

Tablet PCs to enhance and assess learning (e.g. MuseInk, OrganicPad)
Contextual applications
Lessons to promote affective engagement and identity development

