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Learning Without Grades:

A research laboratory's links to the traditional university

By Marybeth McAlister, Center for Applied Energy Research, University of Kentucky

Unlike most buildings at the University of Kentucky, you will never hear a bell ring, signaling the start or end of a class at the Center for Applied Energy Research (CAER). That doesn't mean there aren't students here.

The mission of CAER mirrors the University of Kentucky's historic land grant mission of instruction – public service and research. In this respect, CAER shares and contributes to the university's fundamental goals of scholarship, leadership, and stewardship.

The center is primarily involved in energy research with most of our funding and time devoted to this endeavor. CAER's principal research emphasis is on the resources of the state, including coal, coal bed methane, oil shale, and biomass.

Outside of its primary thrust, CAER contributes to the university's mission of instruction, impacting stu-

dents at the undergraduate, graduate, and post-graduate levels. CAER has supported an average of 75 students each year since its inception in 1977.

CAER brings to its research a multidisciplinary focus on finding novel solutions and cutting-edge technologies that are suited to today's complex problems, few of which are bounded by traditional, single-discipline approaches. Some of our educational outreach efforts are described below.

Undergraduate Co-ops and Student Workers

CAER employs University of Kentucky undergraduates on an informal basis and, in addition, participates in the College of Engineering's Co-op program, where students perform research in their fields prior to graduation. This is designed to take place on alternating semesters

for a total of three terms. Departments include: civil, chemical/materials, mechanical, biomedical, and mining engineering. We also provide work for chemistry, physics and geology majors from University of Kentucky's College of Arts & Sciences.

Fuel Processing Technology Course

There is only one fuel science course offered at University of Kentucky. It is taught every other spring semester by CAER researchers. The course covers energy and fuel-related issues through topical/thematic lectures and assignments. The interaction between fuel, environment and economics are covered for a range of technical options. Energy sources like coal, oil, natural gas, renewables and biomaterials are explored in terms of their nature, processing and applications.



Mining Engineering Scholarships

CAER supports the Kentucky Mining Engineering Scholarship (KMES) program each year. This support enables students to pursue careers as mining engineers. The program was established over 20 years ago by the Commonwealth of Kentucky to assure an adequate supply of mining engineers to meet the needs of the state mineral industries. CAER makes a substantial annual contribution to the scholarship fund.

Graduate Research

CAER offers graduate students opportunities that academic departments alone cannot. We provide interactions with professional colleagues and industry, rather than professors. The relationship of a student to a mentor is different from that of a student and professor. While here, students associate with leading scientists and engineers who are employed in their fields of interest.

At the University of Kentucky, we take our responsibility as graduate student mentors very seriously. Our researchers communicate cutting-edge ideas, develop professional skills in writing (e.g., reports, papers, and grant proposals),

editing (evaluating manuscripts and papers), making presentations, networking, and interviewing.

Students' research activities directly relate to investigations germane to their field of specialization or to a thesis or dissertation topic. Researchers serve on thesis and dissertation committees. Researchers, many of whom hold adjunct positions in departments, develop interdisciplinary research that addresses science and engineering studies.

Initiatives are as varied as the departments. Opportunities are available that marry more traditional programs with specialized initiatives at CAER and facilitate research within departments as well as multidisciplinary research across the university.

Study Abroad Program

Since 1999, CAER has hosted groups of French exchange students from the University of Burgundy's materials engineering school (Ecole Supérieure D'Ingenieurs de Recherche en Matériaux or ESIREM) located in Dijon, France. In this reciprocal exchange, American and French students are able to study abroad, engage in a laboratory practicum and

other experiential education at the University of Burgundy and University of Kentucky campuses. In addition to their studies, the participants also get a chance to live abroad and immerse themselves in the language and culture of another nation. The students conduct research toward completion of a bachelor's degree in materials engineering, which is awarded upon their return to their institution.

Postdoctoral Scholarships/ Fellowships

Postdoctoral Scholarships are limited to students who have completed the requirements for a Ph.D. and otherwise meet the requirements of the University of Kentucky Graduate School. Post-doctorates work under the direction of a research mentor who provides advanced training as a means of preparing the postdoctoral scholar for a research career. The center offers the opportunity for collaborative and independent research and publication of findings, as determined by mutual agreement of the postdoctoral scholar and the supervisor.

So whether it's an undergraduate freshman or a young Ph.D., CAER provides opportunities for these scholars to work in a state-of-the-art laboratory while learning the value of research, experimentation and scientific discovery. There is no substitute for experience-based, hands-on training under the supervision of a senior scientific mentor. ♦

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