SCHOOL OF ENGINEERING
- About Us
- Academic Programs
- Faculty & Research
- Undergraduate Student Support
- Graduate Studies
- Prospective Students
- External Relations
- Contact Us
- Internal
- News
- Events
- UC Merced Home
- News & Events
  - News
    - Engineering Students Light the Way with Senior Challenge Idea
    - UC Merced Dean Jeff Wright Calls for Diversity in Engineering

search

UC Merced Dean Jeff Wright Calls for Diversity in Engineering

Three years before UC Merced is scheduled to open in fall 2005 and almost two months before he officially starts his position as dean in September, Wright is mentally laying the foundation for this engineering division of the future and the personal benchmarks he will use to evaluate its development.

Jeff Wright

Engineering schools must hang out the welcome sign and aggressively pursue women and minorities to keep pace with the climbing demand for the multiple talents of skilled, highly educated engineers, according to Jeff R. Wright, Ph.D., newly appointed Dean of Engineering at the University of California, Merced.

Creating a culture of diversity and conducting early engineering outreach to young students will be top priorities for the Division of Engineering at the nation's first new research university of the 21st century, Wright says.

"We need to reach students no later than the seventh grade, because if they don't make the correct decisions about which math and science courses to take at that point, they are likely to drop out of these vital areas of study before they even start to think about college," he says. "Once they fall behind, they most likely will never catch up, and the door to an engineering career will be closed to them forever."

Below, Wright shares his visions and thoughts about attracting and educating the next generation of engineers, the UC Merced Engineering Division and diversity and other current issues in engineering.

Engineering Division for the Future

Building Blocks for Success

- Primary among his goals is maintaining the University of California's reputation as the premier public university system. "We must stand tall with our sister engineering programs in the UC system, with world-class research accomplishments and a remarkable educational program at the undergraduate level," Wright says. "Hiring top thinkers and providing them with strong support will ensure quality research; a meaningful undergraduate experience will require thoughtful annual evaluation and assessment, and an incentive system that values educational excellence."
- Diversity is another element fundamental to Wright's vision for the division. "The climate for faculty, students and staff must be equally welcoming to both genders and all cultures," Wright says. " We are fortunate to have the opportunity to create from the very start a university culture that values diversity throughout every aspect of the engineering program."
- Internally, Wright plans to develop a vital information infrastructure as one signature characteristic of engineering at UC Merced. He describes the engineering community at UC Merced as working within an information infrastructure that will become an essential component of their responsibilities in teaching, research, outreach and professional activities.

  "I feel strongly that we must use emerging information technologies more effectively to support the mission of engineering research and education, with our needs driving our adoption and use of information technologies. Traditionally, technology has been the driving force," Wright says. "The engineering community at UC Merced will be nurtured by an academic information infrastructure that will enable effective decision-making at all levels. This will consist of a comprehensive database of vital information, with functionality that can be customized as needed by users. Our students will learn from, and grow to rely on, this powerful information framework as they move through our program, and will continue to be supported by it throughout their professional careers."
- Wright says the engineering school also must serve as an intellectual resource for the community and the greater San Joaquin Valley region, which UC Merced has a special mission to serve. "I want the engineering program to be valuable to the people, government, industries and schools in the region. The objective is for these stakeholders to not only take pride in our program, but to benefit intellectually and financially from our regional impact."
- Given increasing globalization, he also believes the campus must prepare engineers to function effectively as global professionals within a complex, diverse society. This "global education" will become an integral dimension of all courses in the engineering curriculum rather than being treated as a separate course or topic unto itself.
- Finally, Wright expects UC Merced's engineering program will empower students to exploit opportunities for change - changes of careers included. "The fact is that engineering students who graduate from the top engineering programs today will change careers several times prior to retirement; careers, not just jobs. Our challenge is to provide them an exceptional engineering education, while at the same time instilling in them skills for effective communication, self-education, retraining, and personal and professional management that prepares them not only to excel as engineers, but to pursue other professional opportunities as they arise."

Disciplines, Faculty, Research and Funding Opportunities

As is typical for universities, the development of research programs, hiring of faculty, and pursuit of funding opportunities will be inextricably intertwined as Wright builds the new engineering program. For UC Merced, he believes it will be especially important to identify research directions based on the needs and strengths of the region and the state, the availability of quality faculty, and funding opportunities.

A Multidisciplinary Foundation

"As we make decisions about areas on which to focus when targeting initial faculty hires, we must identify and take advantage of the strengths and needs of the Central California region," he says. "I wholeheartedly endorse the vision of the UC Merced Engineering Advisory Group which, after extensive and thoughtful study, identified several fertile areas for research programs development: computing and communications, energy/environmental resources engineering, biotechnologies, and nano/microsystems engineering. These are all extremely important research areas, and will represent attractive opportunities for prospective faculty." Faculty recruiting for engineering at Merced will initially focus on developing a strong, multidisciplinary research foundation in disciplines such as these. "Concentrating on a few areas, and hiring quality faculty who can take full advantage of our special resources will allow us to move forward quickly," says Wright. "We are fortunate, for example, to have the Lawrence Livermore National Laboratories nearby, and their very strong research programs and world-class research facilities in these areas will not only help attract top faculty, but will foster joint research projects, as well as truly unique opportunities for graduate students."

Power in Partnerships

Engineering at UC Merced also will capitalize on its association with the top research programs of the other outstanding engineering programs within the UC system. "Our proximity to Berkeley, Davis and Santa Cruz will facilitate joint research in computer science and information technologies," Wright says. "Having been included as a full academic partner within the Center for Information Technology in the Interest of Society (CITRIS) attests to the vision of those involved in the preliminary planning for our program. New faculty and graduate students will find a welcoming and collegial atmosphere that will extend beyond our small but growing campus."

CITRIS is one of four new California Institutes for Science and Innovation proposed by California Governor Gray Davis for development within the UC system with research to be funded by the state and federal governments, and private and industry donations. CITRIS will concentrate initially on areas of energy efficiency, transportation, seismic safety, education, health care, and environmental monitoring.

Wright also anticipates developing research programs at UC Merced aimed at better understanding increasingly complex environmental processes. "A focus on environmental science and engineering will allow us to maximize not only the research excellence at Lawrence Livermore and Berkeley and Davis, but will integrate very well with the vision behind the Sierra Nevada Research Institute. A strong, cross-disciplinary relationship with our colleagues in the science division at UC Merced will give us the intellectual resources we will need to study environmental issues in the Central Valley. Further strengthening science and engineering research in the Central Valley, UC Merced also will house the Sierra Nevada Research Institute, which will foster discovery and dissemination of new knowledge that contributes to sustaining natural resources, and promoting social well-being in the Great Valley and Sierra Nevada regions of California, and related regions worldwide."

Biotechnologies: Scientific Discovery and Innovation in Engineering

The field of biotechnologies offers particularly exciting possibilities for UC Merced, according to Wright. A broad category covering sub-topics that include bioengineering, biomedicine, biomaging, biomaterials and biocomputers/bioinfomatics, he describes biotechnology as "a rapidly emerging field of scientific discovery and engineering innovation likely to have an impact on society equal to that of information technologies in the recent past."

According to Wright, the National Science Foundation, the National Institutes of Health, the United States military, and other major funding agencies for university research have been investing heavily in biotechnologies. He adds that several new research technologies are having a tremendous effect on discovery and innovation in biotechnologies; a term that not only encompasses bioengineering - the field of engineering that applies the principles of engineering design and production to biological systems, including the human body as a mechanical system - but that has come to include processes or devices that interact directly with cells or components of cells, including genetics.

Biotechnology research is being conducted across nearly the complete range of engineering disciplines and examples of technological synergy are becoming commonplace, he says. The University of California is a major contributor to research excellence in this exciting new field.

Environmental Engineering: A Natural Choice for the Valley

Wright also is considering a discipline focus on environmental monitoring and assessment, and environmental modeling. "A concentration on environmental modeling has the potential for strong regional impact and could include a broad range of subareas including environmental protection and remediation, physical infrastructure assessment and management, and global climate change," Wright said. "Environmental research in these areas will take full advantage of a wide variety of emerging technologies and methodologies including sensor technologies, remote sensing and earth observation, spatial analysis and distributed modeling architectures, and the emerging field of shared vision modeling, while leveraging exceptional work being done in these areas at Livermore, and that planned for the Sierra Nevada Research Institute."

Infomatics: Improving Access to Information

Infomatics, including emerging information technologies, is a third program Wright will explore for the engineering division.

"A primary motivation for infomatics research is to improve access to information for people, allowing them to live better lives and to be better citizens," he says.

Encompassed are such varied information technologies as data collection and storage, distributed computing, security and cybertheat, machine learning and new computing/communication architectures, including biochips and biocomputing. Of those technologies, Wright believes UC Merced faculty could really make an impact in what he calls the generally neglected areas of computer security, including protection against cybertheats.

"Biotechnology, environmental engineering and infomatics are just three of the disciplines I think are important for the region and offer the opportunity for us to leverage research and human resources at the Lawrence Livermore Laboratory," he says. "I also am excited about the Sierra Nevada Research Institute, which will benefit from the availability of engineering faculty having expertise in these areas and that will in turn help in the recruitment of engineering faculty. In addition, these fields have been relatively more appealing to faculty and students from traditionally underrepresented populations."

Faculty Recruited to Teach and Research

The hiring of faculty for the engineering program at Merced will begin immediately. By the time that undergraduates are admitted in the fall of 2005, significant research will be under way.
"Our initial focus on these key areas of cross-disciplinary engineering research will enable us to build a strong faculty and a solid foundation for scholarly investigation," Wright says. "But our faculty must also be able to contribute to a strong undergraduate teaching/learning program that is credible from the perspective of traditional engineering disciplines. Quality multidisciplinary research must be based on disciplinary rigor; our faculty will excel at both."

Creating a Culture of Diversity

Indeed, creating a model for diversity in cultures and genders, as well as thought, tops Wright's agenda for the UC Merced Engineering Division. And society demands nationwide recruitment of a diverse - and larger - engineering student population simply to keep pace with the growing need.

Action Needed to Reverse the Trend

According to the U.S. Department of Labor, engineering is one of the nation's largest professions with approximately 1.5 million engineers employed in the United States and continued growth in the field a certainty. Meanwhile, the number of bachelor's degrees in engineering granted by U.S. colleges and universities began to decline in 1987 and Department of Labor projections indicate no significant increases in the total number of engineering graduates through at least 2008.

"UC Merced's engineering division will aggressively work to address this negative trend and, in particular, will pursue diversity and K-12 outreach as means to increase the pool of qualified engineering graduates," Wright says. "The engineering profession in general, and academic engineering programs in particular, have not provided a welcoming environment for women and minorities. Unless we can attract male and female students from all cultures, we will not be able to meet the growing need for engineers."

Statistics cited in a September 2000 Report of the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development plainly illustrate the disparity between the sex and racial/ethnic distribution of the U.S. workforce population and the representation of these groups in the science, engineering and technology (SET) workforce. White males comprised 41.7 percent of the general workforce and 67.9 percent of the SET workforce, while women and minorities represented 58.3 percent of the general workforce but only 32.1 percent of the SET workforce. Excluding Asians, strongly represented in the SET workforce, the numbers are bleaker, with women and underrepresented minorities comprising approximately 54.2 percent of the U.S. workforce but only 21.9 percent of the SET workforce.

"UC Merced and every engineering program absolutely need to attract a diverse student population simply to have enough good minds to address the problems of the future. This will require a strong partnership between industry and all universities having engineering programs."

Attention to Valuing People

The climate of diversity, however, must extend beyond students to include faculty and staff as well, he says. "If we can create that culture, faculty, staff and students will consider UC Merced a more viable place to come, and that will give us a distinct recruiting advantage. Focusing on what engineering Dean Kristina Johnson of Duke University refers to as human plant engineering [bioengineering, environmental engineering, etc.] rather than traditional physical plant engineering will also help in this regard."

"At UC Merced, every major policy discussion within the engineering community will include a consideration of diversity," Wright adds, "not because it will be mandated, but because it will be important to our program. Attention to valuing people will not end with recruitment, but will ensure retention, advancement, and personal and career development. This will be an integral part of the culture within engineering at this campus."

Bridging the Technological Gap

Under Wright's leadership, the engineering school at UC Merced will work to close the growing technology gap that has resulted over the past few decades.

The technological gap to which Wright refers is the growing chasm between society's increasing need for scientists and engineers and the dwindling numbers of students electing to pursue technical careers.

"I view this both as a daunting challenge and an exciting opportunity," he says. "To reverse the decline in numbers of students pursuing engineering will take time. First, we must do a better job of helping students - as well as their parents, teachers and school counselors - understand what engineering is, what engineers do, and what tremendous opportunities are available in the engineering job market. And the current lack of general understanding worsens as engineering become more complex.

We need students from all cultures to perceive engineering as an exciting career choice."

Early Student Outreach

Another key element is connecting with students at an early age - years before they enter high school - so they can get on the right track in time to take the math and science courses required for entry to the engineering program.

"UC Merced will develop innovative programs that reach out to 12- to 14-year-old students, and their parents, and motivate them to study math and science, and to excel in those subjects," Wright says. "One idea is a multi-year summer program, perhaps hiring' students to participate in meaningful engineering experiences that not only help them understand what engineering is, but that do so in a way that is fun, and that will expose them annually to our campus, our people, and the profession. We need to get kids hooked as early as possible, and keep them hooked."

Crucial to the implementation and success of any outreach effort will be partnerships with schools and the community, with sponsorship from the corporations and industries that will eventually employ these students.

"We must engage the communities in realizing the importance of engineering to the region and opening the door on opportunities for their students," Wright says. "With the new UC Merced campus, we have great visibility and a wonderful opportunity to make a difference. The development and university relations teams at Merced are amazing, and their outreach programs are already having an impact. I want to aim these efforts at the special needs of engineering."

Courtesy of the UC Merced News Articles