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MESSAGE FROM THE DEAN

Dear Future Engineer,

Congratulations on your decision to consider engineering as a career, and thank you for your interest in UC Merced. Our School of Engineering shares the prestige of engineering within the University of California, the largest and most comprehensive engineering learning arena in the world. By joining our program, you are about to become an important member of a vast network of engineering leaders and innovators, through which you will discover a satisfying and lucrative professional career.

The UC Merced School of Engineering is a research community devoted to learning, discovery and service. As a major engineering research institution, we are able to provide to our undergraduate students an exceptional technical and professional education that will help you develop advanced problem-solving skills, effective leadership qualities, and the ability to recognize and build on your individual strengths and special interests throughout your career.

At UC Merced, this experience also comes with the personal atmosphere and one-on-one interaction typically found at a small private college. From day one, you will have the opportunity to network with peers and partner with professors in ways that are not available at larger campuses – making connections that will last a lifetime.

A great strength of the UC Merced School of Engineering is its diversity. The school has one of the most diverse faculty and student bodies of any engineering school in the nation. These diverse perspectives foster rich approaches to complex and multi-dimensional social problems, and better solutions to the serious engineering challenges facing the world today.

Our school's "learn by doing" philosophy keeps you engaged in engineering fields where your talents are urgently needed. The cornerstone of this philosophy is the Foster Family Center for Engineering Service Learning, which provides even first-year students the opportunity to engineer solutions to real societal problems faced by real client organizations.

As an integral component of the first American research university of the 21st century, we embrace our mandate to anticipate the future, not mirror the past. Our innovative academic structure empowers interdisciplinary research and eliminates constraints, promoting leading-edge thinking and knowledge creation.

Active students, exceptional faculty and a pioneering spirit combine to make the UC Merced School of Engineering one of the most innovative and exciting places to launch your engineering career.

Explore your options in these pages, and please contact our staff personally with your questions or ideas. You can connect to your future here – and we'll help you along the way. *We hope you'll take this opportunity and join us.*

JEFF R. WRIGHT
Dean, School of Engineering
The University of California, Merced

"My classes are so small compared to my friends at other UC campuses. I know my professors, and they know me."

RUBY GONZALEZ-JIMENEZ
Junior, Environmental Engineering

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ADVISING AND MENTORING

UC Merced is gaining renown as the place you will receive a quality education with the University of California reputation for career success. And you will receive this UC education with the bonus of personal attention from remarkable faculty and academic staff who care about your success. This philosophy is reflected in every aspect of our program, particularly through our personalized student advising.

The academic advisors in the School of Engineering have the engineering knowledge and the people skills to help you find your place – not just on campus, but in the global engineering community.

Unlike most engineering schools, we let you enroll initially as an undecided engineering major. That means you can take some time to decide which field is right for you and your future.

If you have questions about how to choose a major, enroll in classes or find activities to help you round out your resume, or about being an engineering student at UC Merced, contact the advisors in the School of Engineering.

LINDA ZUBKE
E-mail: lzubke@ucmerced.edu

"Engineering is a useful way to incorporate ideas from multiple fields, and I appreciate the interdisciplinary approach that it promotes."

EMILY REED
Alumna, Engineering

Bioengineering

- **How can engineers contribute to health care?**
- **What is nanotechnology and how is it changing the world?**
- **How can we learn the lessons of nature in building innovative devices that serve society?**
- **How are biomolecules being used to build faster, smaller computers?**

UC Merced bioengineering majors will learn the answers to these questions in their quest to improve quality of everyday life.

Bioengineering is an interdisciplinary field in which the skills, devices, materials and resourcefulness of engineers are used to address problems in biology and health care. Over the past 40 years, this synergy has led to a wide range of implantable materials, diagnostic devices, biosensors and molecular characterization techniques, and has produced tools that greatly expedite the sequencing of the human genome.

Alongside these practical innovations has come a rapidly increasing need for personnel with the necessary hybrid skills to capitalize on them. Most recently, convergence between engineering and biology at the nanoscale level – the level of biological molecules, molecular aggregates and cellular processes – has begun to offer rich new areas of study and commercialization.

Bioengineering graduates are in demand throughout fields such as health care delivery, medical device development, interdisciplinary research, patent consultancy, materials science, education, food biotechnology, personal care products and government agencies. A bioengineering degree is attractive to employers, because bioengineering students develop and demonstrate abilities to

- **Apply fundamental physics, chemistry, biology and mathematics**
- **Bridge traditional divides between disciplines**
- **Communicate effectively**
- **Thrive in a world where knowledge is being created rapidly**

Environmental Engineering

- **Can we improve the quality of the air we breathe?**
- **How does our society move to energy sustainability while maintaining our quality of life?**
- **How do we maintain the quantity, and protect the quality, of our water resources?**
- **Are we using resources in a way that will enable us to support future needs?**
- **Can we stop global warming and adapt to changes it is already creating?**

Discover solutions to environmental problems as a UC Merced environmental engineering student.

Environmental engineers search for creative and economical ways to use resources efficiently, limit the release of residuals into the environment, develop effective techniques to track pollutants once released, and find efficient methods to remediate degraded resources. They serve as the vital link between scientific discovery, technological development and the societal need for protecting human health and ecological integrity. In the coming decades, environmental engineers will be increasingly called upon to address broader issues of environmental sustainability and the quality of human life.

The undergraduate major in environmental engineering at UC Merced prepares students for careers in industry, business and government service, fulfilling the world's needs in managing water, energy, public health and the environment. It provides a solid foundation for further study in earth sciences, engineering, business, management, law and public health.

Computer Science and Engineering

- **What will be the new computer architectures for the future?**
- **How will new operating systems control hardware that does not exist yet?**
- **What challenges will confront developers of future technologies?**
- **What new frontiers in networking and telecommunications lie ahead?**
- **How do we provide enhanced cybersecurity in an increasingly complex world?**
- **What new markets exist for smaller and more powerful sensor technologies?**
- **What new horizons exist for robotics technologies?**

UC Merced computer science and engineering students will play a central role in helping the United States maintain its global leadership in advanced computer technologies and information systems.

Computer science and engineering (CSE) remains one of the strongest industrial sectors in Northern California and in the nation, offering a broad spectrum of career opportunities. A degree in CSE from UC Merced will prepare you to assume a leadership role in designing, building, and implementing a vast array of powerful new technologies that will continue to advance humankind. As the foundation for innovation in areas ranging from robotics and automation, to informatics and database sciences, careers in computer science and engineering are among the most satisfying and rewarding of any.

The undergraduate major in computer science & engineering (CSE) is designed to provide you with both breadth and depth in the sub-areas of

- **Computer science (focus on software): theory, software design, programming and data structures**
- **Computer engineering (focus on hardware): architecture, design, testing and networking**

CSE students at UC Merced will be exposed to innovation by the top computer scientists and engineers in the world. Our faculty has developed a program of study that combines practical exposure to the most modern technologies available, with a theoretical foundation that will empower students to master future changes and innovation as technologies continue to evolve at an astonishing pace. Our graduates will thus have both tools and insights that will propel them into positions of responsibility and leadership throughout their careers.

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Materials Science and Engineering

- **Why does the nonstick coating on a frying pan stay stuck to the metal?**
- **How can we improve the performance, safety and durability of sports equipment?**
- **What materials are needed to increase the fuel-efficiency of automobiles?**
- **Why do advances in information technology depend on new materials?**

Civilizations have thrived or stumbled according to the materials that they were able to acquire from nature, obtain through trade, or develop through scientific and engineering innovation. Wood, stone, bronze, iron, steel, aluminum, cements, plastics, semiconductors, liquid crystals and quantum dots have successively revolutionized what can be made and what can be done. Nations continue to go to war over access to particular raw materials. The construction of safe dwellings, the conveniences of rapid travel, the efficiency of telecommunications, the calculating and archiving power of computers, the life-prolonging gift of surgical implants, and the dazzling performances of athletes all require dependable materials. Future technological progress of any kind will continue to be limited by the availability and performance new and improved materials.

Materials science and engineering (MSE) applies fundamental principles of physics and chemistry to designing materials with desired combinations of mechanical, optical, electrical, magnetic, electrochemical and other properties. The field of MSE is concerned with the methods by which particular atomic and molecular arrangements (nanostructures and microstructures) are achieved, the overall cost of the ingredients and processes used to produce particular materials, the effects of the environment on materials, the effects of materials and materials processing on the environment, and characterization of materials structure and properties. Materials have become an integral part of all engineered products, processes, and systems, and are central to the maintenance of the human quality of life.

MSE graduates are in demand in fields like manufacturing, energy, utilities, patent law, finance, construction, transportation, aerospace, computers, sports, consulting, public policy, education and research and many more. Employers appreciate the ability of MSE graduates to relate to colleagues across a broad spectrum of expertise. UC Merced students majoring in MSE will be leaders in a field that dictates the pace of technological progress.

Mechanical Engineering

- **What are the best methods for analyzing what works in a mechanical system?**
- **What is the potential for use of new mechanical devices that are too small to be seen by the naked eye?**
- **How can we design innovative new systems to meet society's needs?**
- **How will manufacturing change in the 21st century?**
- **What contributions can simulations make to mechanical engineering problems?**

Mechanical engineers impact society by developing innovative technologies through the application of analysis for the design and synthesis of mechanical components and systems. Mechanical engineering is an evolving discipline that adapts to the current needs of society. Some of the exciting current areas of research include advanced energy systems, technologies that promote sustainable energy, autonomous vehicles, biomechanics and biosensors, nano/micro-technology, computational modeling of electromechanical and biomechanical systems, design optimization, and complex physical systems.

The innovative curriculum at UC Merced provides hands-on education that exposes students to engineering fundamentals, laboratory and design work, and the use of computational tools to solve realistic engineering problems. The undergraduate major in mechanical engineering provides students with a solid foundation and the necessary skills to assume leadership roles in industry or government agencies. The program also prepares students to pursue graduate work in engineering design or other disciplines.

STUDENT CLUBS AND ORGANIZATIONS

Vanguard

Vanguard is the inaugural engineering student organization at UC Merced and assists the Dean in creating a professional environment around student learning and career development. Vanguard's mission is to

- **Provide an avenue for engineering students to become involved in the continuing development of the School of Engineering.**
- **Advocate for all engineering students at UC Merced.**
- **Organize trips to universities, commercial and industrial facilities and other locations for learning firsthand about the engineering professions.**
- **Sponsor engineering-related group projects and inter-university engineering collaborations.**
- **Establish connections to companies and community members who will help students become educated inside and outside the classroom.**

Society of Hispanic Professional Engineers (SHPE)/Science and Engineering Association

The Science and Engineering Association at UC Merced is a chapter of the Society of Hispanic Professional Engineers, an organization dedicated to the advancement of all science and engineering students. Its mission is to provide interdisciplinary support for science and engineering majors and provide education about Latin cultures.

Society of Women Engineers (SWE)

The Society of Women Engineers provides support and connections for women studying engineering and those already in the engineering field. Its mission is to provide encouragement for women to achieve their full potential as engineers and influential members of society.

National Society of Black Engineers (NSBE)

The National Society of Black Engineers aims to increase the number of culturally responsible black engineers who excel academically, succeed professionally and positively impact the community.

Biomedical Engineering Society (BMES)

The Biomedical Engineering Society promotes education and diversity of the next generation of biomedical engineers and bioengineers, providing guidance and transmitting opportunities for bioengineering students to launch their careers.

American Society of Mechanical Engineers (ASME)

The American Society of Mechanical Engineers is a worldwide organization promoting the art, science and practice of mechanical and multidisciplinary engineering. There are more than 120,000 ASME members, including 20,000 student members in 146 countries.

Engineers Without Borders (EWB)

Engineers Without Borders envisions a world in which all people have access to adequate sanitation, safe drinking water and the resources to meet their other self identified engineering and economic development needs. Students have the opportunity to participate in projects that further this aim.

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SERVICE LEARNING

The Foster Family Center for Engineering Service Learning – A National EPICS Site

- Do you enjoy solving problems and making things work?
- Can you design solutions from theory to production – or do you want to learn how?
- Can you help your community achieve new goals through actual engineering innovation?

Service learning provides UC Merced engineering students with real-world technical experience.

The mission of the Service Learning program in the School of Engineering is to provide students the ability and motivation to acquire new knowledge for continued career success. Under the advisement of a faculty mentor, you will become part of a team working with an approved community nonprofit organization – your client – to solve real engineering problems. Service Learning builds on the technical experiences you'll acquire in the classroom by providing real-world skills, building effective leadership qualities, and helping you recognize and build on the individual strengths that will carry you throughout your career.

Service Learning will help you prepare for your future as you

- Interact with faculty members one-on-one
- Learn to work as a team
- Communicate with clients, fellow students, and engineering practitioners
- Gain understanding of the society, economic, environmental and ethical impacts of your engineering decisions

Our Service Learning program is committed to creating and maintaining a challenging and supportive community and to fostering the common university enterprise of learning intellectual, social, emotional and practical lessons that will make a difference for the rest of your life. The program provides hands-on, professional experience while you to formulate and achieve solutions to a variety of real and complex problems.

When you get involved with real engineering projects earlier in your education, it's easier to stay engaged and focused on your engineering career goals. That's why Service Learning is a required aspect of the UC Merced School of Engineering curriculum.

Service Learning teams so far are working on

- Building a computer network for a women's shelter
- Assisting local high school students as they prepare for college
- Innovative solar day-lighting for a regional mining and mineral museum
- Efficient new storage options for donated blood
- Exciting and engaging new displays for a children's science museum
- Developing plans for UC Merced's first radio station
- Communications and computer solutions for an animal shelter
- Creating recreation options for young people in the California correctional system

More teams will be formed in the future, so there is sure to be a project you can get passionate about!

UC Merced participates in the Engineering Projects in Community Service (EPICS) program funded by the National Science Foundation and administered through Purdue University. Primary support also comes from the Foster family and from PG&E, who have each donated more than $1 million to establish and support this vital program.

RESEARCH

UC Merced is a CITRIS Campus

Together with our partner programs at UC Berkeley, UC Davis and UC Santa Cruz, UC Merced forms a cornerstone of the Center for Information Technology Research in the Interest of Society (CITRIS). This organization leads computer technologies research supporting areas of

- **intelligent infrastructures (including energy systems and environmental monitoring and control)**
- **health care systems and delivery**
- **services sciences and management**

For more information, **http://visit www.citris.org**.

Bioengineering Institute of California

UC Merced is part of the 10-campus Bioengineering Institute of California (BIC), conducting research and education at the interface of biology, medicine and engineering. This includes exciting new areas of study including molecular and cellular engineering, bioinformatics, biorobotics and tissue engineering.

Sierra Nevada Research Institute

The Sierra Nevada Research Institute (SNRI) is the first of UC Merced's signature interdisciplinary research institutes, uniting outstanding researchers in boundary-crossing collaborations. SNRI capitalizes on the vastness and diversity of the nearby Sierra Nevada and the adjacent Central Valley, where UC Merced is located. These regions, whose natural resources are so closely interwoven, provide unsurpassed opportunities to study forest, grassland, watershed and other systems.

For more information, visit **https://snri.ucmerced.edu**.

Powerful Partnerships

UC Merced has established memoranda of understanding to facilitate studies in Yosemite and Sequoia/Kings Canyon National Parks and collaborations with researchers at Lawrence Livermore National Laboratory. Faculty members have traveled to Mexico, China, India and other global locations building research partnerships. Strong relationships have also grown with other campuses in the 10-campus UC system – the largest public research education institution in the world.

These research partnerships benefit students at every level, from freshman year through graduate school, as professors recruit research assistants and bring their experiences to the forefront of knowledge into the classroom.

"UC Merced is one of the few campuses that is delving into not only the traditional textbooks as a way of teaching, but also uses hands-on research."

JESSICA ZENGER
Junior, Environmental Engineering

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SEE FOR YOURSELF

If you're drawn to engineering, you're probably the kind of person who wants to see for yourself and experience what UC Merced has to offer before you make your decision about where to pursue your education. ***We're ready to show you.***

Schedule a time for a campus tour with the Office of Admissions at (209) 228-7178 or http://admissions.ucmerced.edu. Then call us at (209) 228-4411, and we'll make sure you have a chance to look around the School of Engineering when you visit UC Merced. We're ready to show you how you can form powerful personal connections, benefit from diverse perspectives and find your path to a future of unlimited opportunities.

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