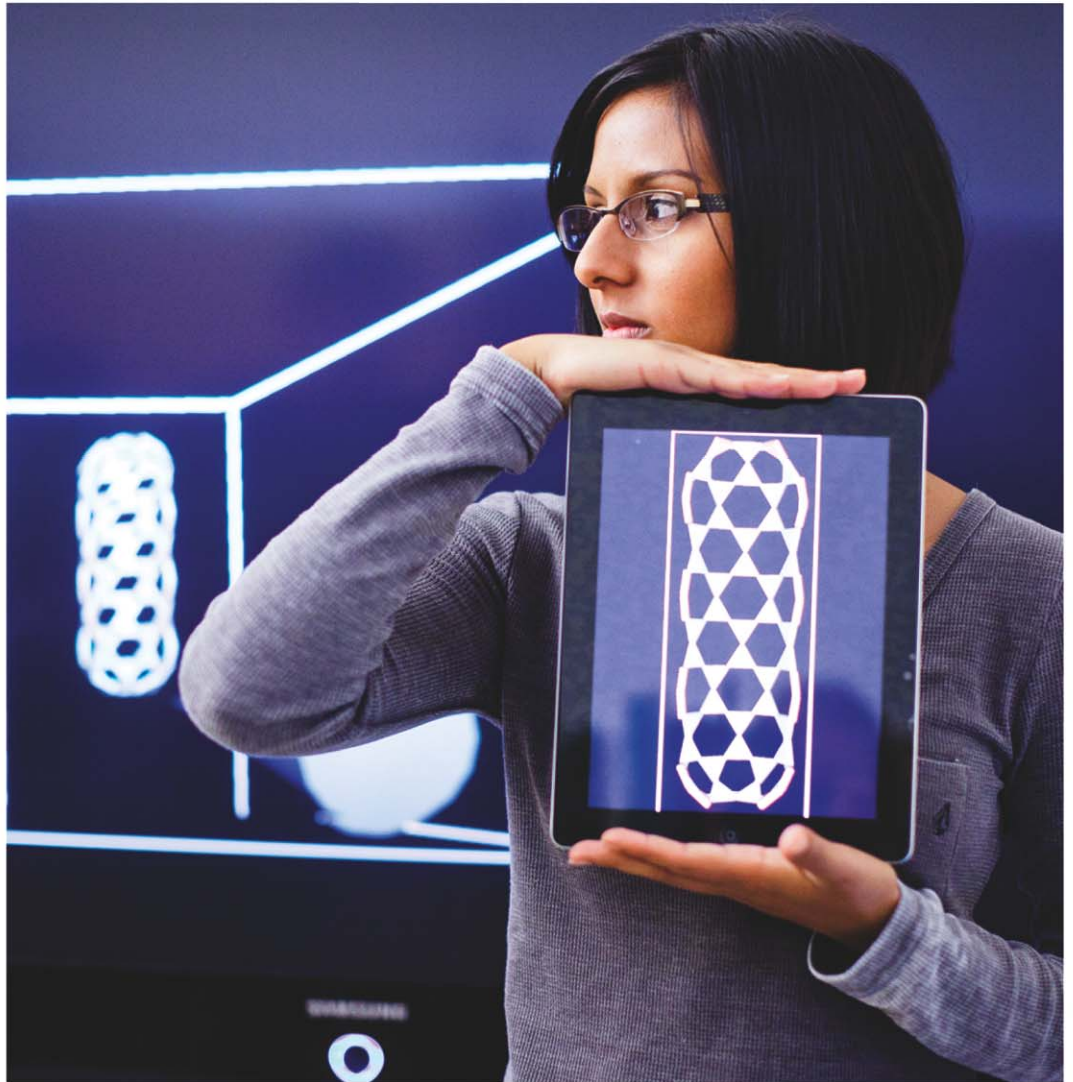


UNIVERSITY
OF
CALIFORNIA
MERCED



STRATEGIC PLAN 2020 SCHOOL OF ENGINEERING



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MISSION AND GOALS

Mission & Goals

The School of Engineering at the University of California at Merced is poised to become the next great UC engineering school. The recent economic climate and our location in the most impacted region of California, represent challenges and important opportunities. The general economic climate has led to more pressure and competition for funding, both from grants, state support, and philanthropic support. However, UC Merced and the School of Engineering have shown in their short 10-year history that they can compete both for excellent faculty and for resources. Moreover, our partners and constituents have shown great support for our new institution and our growing School of Engineering. Also, our local region and environment is rich with challenges that indeed may be our greatest opportunities. Environmental and social sustainability are at stake, and our faculty members are deeply engaged in solving our region's, and the world's, critical engineering and social challenges with respect to water supply, air quality, and public lands. We are fortunate to be a part of building the 21st century's first research university. With an excellent faculty and staff who embrace our opportunities, and form a strong foundation for building additional excellence in educational programs, cross-functional research, and outstanding partnerships and service. Our plans for setting a path into the future are highlighted herein. With the continued support from our stakeholders, we are eager to take advantage of the opportunities presented to us in solving the most important and pressing societal and engineering challenges, and to move the School of Engineering to the next level.

OUR MISSION

The mission of the School of Engineering at University of California, Merced is to change the region and the world through its research and through those it educates and serves. Our highest priority is to create an intellectual environment for research and education that makes UC Merced a magnet for innovative and creative faculty, staff, and students who will collectively have a transformational impact on the society and world we live in.

MISSION AND GOALS

OUR GOALS

1

Our school aims for **excellence through educating** future leaders in engineering who understand the context in which they live and work, and who are comfortable with managing and driving change. We will achieve this by focusing on innovative education that provides deep engineering competence, promotes high ethical standards, and delivers solutions to our challenges in an economically, environmentally and socially responsible manner.

We seek to be internationally recognized for our **cutting-edge, interdisciplinary research** by focusing on select, high profile, areas, and attracting the best faculty and graduate students to build our signature areas of distinction. We will compete with our sister campuses in the UC without duplicating their skills.

2

3

As a **diverse** school and campus, we seek to leverage our diversity to be **innovative and distinct**, and apply our knowledge to solving important problems related to our human and natural environments. We achieve this by attracting a dynamic faculty, and grafting sustainability into our culture, education, and research.

We strive to **engage** our **communities**, and to promote a value exchange between our students, our faculty, and our communities. By using the local region as our lab, we aim to solve global problems by finding sustainable solutions to the local challenges, incubate the creation of new enterprises and good jobs, and facilitate prosperity of the San Joaquin Valley.

4

PEOPLE AND PARTNERS

People and Partners

A key milestone for the university will be a School of Engineering that fills its crucial role in a globally competitive and regionally relevant research university of nominally 10,000 students in 2020. We are certain that engineering and other STEM disciplines will be the foundation on which UCM elevates the region, and beyond.

The impact of an organization wholly depends on its people. The School's excellence will be driven by empowerment of our faculty, staff, students, and the engagement of our partners.

FACULTY

Even if the School grows to a point where we have a faculty size commensurate with an exceptional fraction of UCM's students in 2020, our faculty numbers will still be considerably lower than those in our sisters UCs and in our global aspirational peers. We are compelled to have substantive and recognized impact, even in the context of our peer institutions for whom a large and multi-disciplinary faculty is generally a central tenet. To do so the School must exploit its small size by better integrating our activities within the School, and across campus, and with our partners. In order for UC Merced realize its promise to California, the SoE faculty must grow in size from a current headcount of 39 ladder rank faculty (34.5 FTE accounting for joint appointments and subtracting 2 appointed in Management program) to approximately 80 ladder rank faculty in 2020, in part through joint appointments with other Schools in areas of mutual interest. We also seek also to establish 5 named professorship by 2020. As research in the sciences becomes more technology based, it would then allow Merced to be on the cutting edge of applying engineering methodologies to scientific frontiers and economic development. We will do so by building on our disciplinary strengths and leveraging our interdisciplinary focus, sustainability vision, diversity, and service mindset. The faculty will ensure that the hallmarks of our people and our impact are innovation, sustainability and engagement. Along with the right-sized and targeted increase in faculty and staff, we foresee a growth in sponsored projects to \$30 million annually by 2020.

STAFF

A culture of agility, innovation, and impact must be systemic. For the School to meet its responsibilities its staff must be empowered and motivated by continually improving the services and support provided to students and faculty. Pressures on the university will mimic those driving the private sector, and our culture must adapt in order for us to reach our goals. A "can-do" culture of working leaner and smarter will be pivotal, and we are committed to recruiting, providing the necessary tools, and retaining the best staff for this challenging

PEOPLE AND PARTNERS

job. We intend to strengthen our staff through improved training and cross-training, instilling a customer-service mindset, increasing social interaction with all school stakeholders, and to develop and employ new efficient processes and tools where needed. We will continue to grow an effective and efficient staff, and estimate a contingent of approximately 30 staff by 2020.

STUDENTS

The university exists for its students. UCM and its School of Engineering provide unique opportunities for one of the most diverse student bodies in the world. The inimitable composition of its students and their connection to bellwether regional challenges provide the basis for a distinctive challenge and opportunity. We will recruit and retain the best students, and continually improve internal processes to ensure success in their programs of study and in their future careers. By 2020, we aim to house a total of 2,000 students, or 20% of the UC Merced student body target. Of these 2,000 students, 1,600 will be undergraduate students, and 400 will be graduate students. The graduate student base will consist of 300 research-based Ph.D. students, and 100 students in professional masters programs by 2020. The target is to right-size the overall student-faculty ratio to 25 by 2020. The historical and projected student enrollment from 2005 to 2020 is depicted in Figure 1 below.

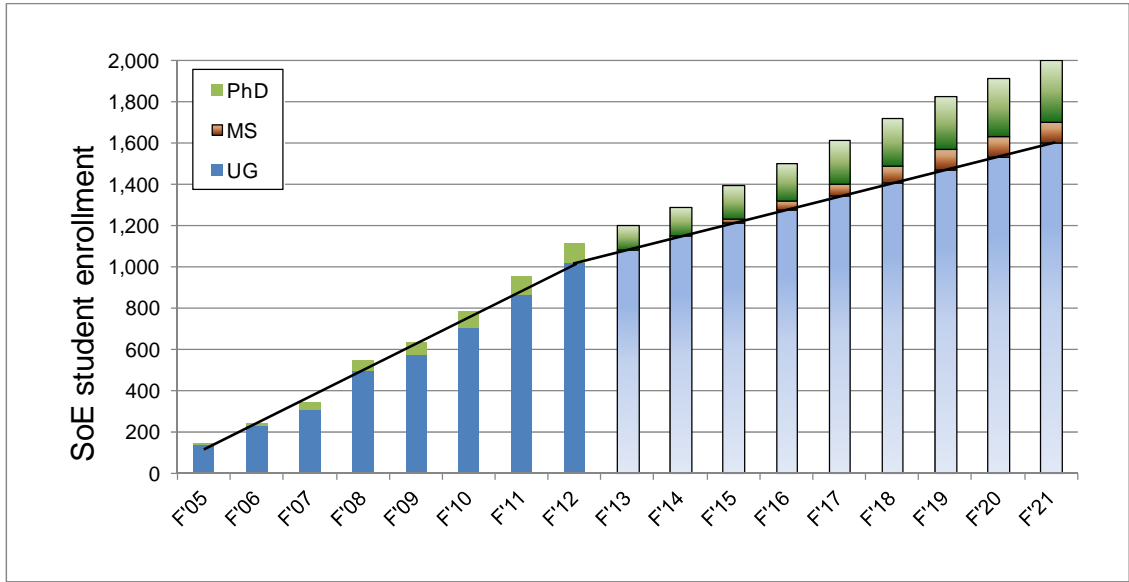


Figure 1. Past and Projected Enrollment in the School of Engineering, 2005- 2020

PARTNERS

In contrast to public funding, our student population and the need for our research is not shrinking. Partnerships have become the key to serving our students and society effectively, and collaborative action with and financial support from private-sector partners will be crucial

PEOPLE AND PARTNERS

to our success. Our most natural partners are the organizations and individuals in the San Joaquin Valley because of our obvious shared goals and the very real limitation of available qualified talent. So we will continue building win-win partnerships with firm and organizations in the region, in part because many of the roughly 1/3 of our students who hail from this area have a natural cultural affinity for making a life here, and to the degree we can help regional companies diversify, grow, and succeed in the global economy we will all benefit for the long term. As a research university the most strategic assistance UCM can provide to these companies is to help them accelerate innovation and breakthrough advances via fundamental science and engineering by sponsored projects and through the graduate STEM students we educate.

We benefit from a world-class advantage due to our proximity to Silicon Valley, known everywhere as the globe's hub for innovation. About half of our Engineering Advisory Board is comprised of representatives from Silicon Valley organizations, and some of them have provided internships and are interested in funding research and graduate education.

We must continually work to convince our public and private sector partners, as well as individuals, that the value created through our student talent, our faculty research, and our technology development is worthy of their support. We fully understand that there are other worthy institutions, but few have the abilities as we do, with a young and entrepreneurial institution within a world-class University, to have the scale of impact that we are fortunate to have at UC Merced.

SHARED VALUES AND VALUE PROPOSITION

Shared Values and Value Proposition

The School of Engineering is guided by principles that engage and enhance the local community, while educating students that are competently able to handle the realities of a changing global society, and addressing our societal challenges by engaging in innovative research. We will observe the following principles in our pursuit of excellence:

- We will drive *innovative*, transformational change and be wary of business as usual
- We will never compromise quality for growth
- Our processes will be transparent, and our decisions tested against resource feasibility to ensure *sustainability*
- *Engagement* will be a hallmark of our future, via shared governance, staff and student participation, and public-private partnerships
- We will be inspired by developing our distinct character in consonance with the UC academic legacy
- Our decisions will comprehend the relationship between impact and resources, and be grounded in data
- We will use the opportunity of adding new faculty, staff and students to broaden our School's diversity of thought
- We will promote and leverage our investments to generate significant philanthropic funding

Our strategy is supported by three conceptual pillars that help drive all of our efforts: **innovation**, **sustainability**, and **engagement**. Figure 1 depicts the School's guiding strategy, and the following paragraphs provide additional explanations.

SHARED VALUES AND VALUE PROPOSITION

Vision: UCM SoE, through its research and those it educates, will change the region and the world

Strategy: Leverage our interdisciplinary focus, sustainability vision, diversity, & service mindset

Innovation

- High-impact Research
- Knowledge and Drive
- Integration and Problem Solving
- Creative & Rigorous Design
- Entrepreneurship

Sustainability

- Fundamentals
- Teams/Partnerships
- Imagination
- Communication
- Ethics
- Economic, Environmental, Social

Engagement

- Signature Initiatives of Region/Global Impact
- Resource Sharing
- Global Solutions
- Adaptability
- Continuous Learning
- Values & Social Impact

Technology Innovation and Entrepreneurship Ecosystem
San Joaquin Valley Economic Development

Figure 2. Guiding Strategy for the School of Engineering Strategic Plan.

INNOVATION IN RESEARCH

Innovative research ideas generally transcend the scope of a single discipline. Interdisciplinary research provides a framing that often leads to new knowledge. Interdisciplinary graduate groups/programs are a hallmark of UC Merced. The SoE faculty is self-organized in interdisciplinary graduate groups/programs, aligning their research interests with the school's educational programs. The school has five disciplinary undergraduate degree programs:

1. Bioengineering
2. Computer Science and Engineering
3. Environmental Engineering
4. Materials Science and Engineering
5. Mechanical Engineering

The School of Engineering oversees four interdisciplinary graduate groups/programs:

SHARED VALUES AND VALUE PROPOSITION

1. Bioengineering and Small-Scale Technologies (BEST)
2. Environmental Systems (ES)
3. Mechanical Engineering and Applied Mechanics (MEAM)
4. Electrical Engineering and Computer Science (EECS)

The principal research areas of our school are: 1) Environmental Systems, 2) Thermo-Mechanical Systems, 3) Biomedical-Inspired Technologies, and 4) Intelligent Systems. Sustainability is woven throughout our programs and is reflected in the proposed faculty hires. Every individual faculty has the potential to span graduate groups and undergraduate majors. Engineering has demonstrated its ability not only to span graduate groups, but to support faculty members whose interdisciplinary research spans schools. We have several faculty members who have cross-school hires with both Natural Science and Social Sciences, and a number of Engineering faculty are members of other UC Merced graduate groups outside of Engineering. A fifth emphasis area, Technology Management, has been initiated by the hire of two new faculty members, one of whom is negotiating a cross-school appointment with SSHA. Based on these successful cases, we anticipate that Engineering will continue to fully embrace interdisciplinary research.

INNOVATION IN EDUCATION

Innovative education programs in Engineering prepare students for careers in academia, industry and government agencies. A hallmark of our program will be how faculty in this program swiftly, but thoughtfully, engage with new innovations and information technologies that will revolutionize how we communicate, who we teach, and what data we access. Integrated into all teaching and service activities is the common theme of sustainability. Faculty and students in this program are continually asking how they can meet current needs without compromising our ability to meet the future needs.

The Innovation and Design Clinic (IDC) is an example of educational innovation that also impacts the three missions of teaching, research and service. The IDC is UC Merced's version of the senior capstone engineering projects course, required for ABET accreditation. It integrates skills from all student learning outcomes, and is the venue where many academic and professional skills are developed. By involving companies and organizations as clients, and practicing engineers as mentors, the IDC Capstone experience serves as a proxy for internships that are missing among most of UC Merced's students. Students and faculty from BIOE, ENVE, MGT, ME, and MSE are involved in 27 projects in spring 2013, 18 of which come from 12 external partners, including Alta Health Clinic, Aquacue, Children's Hospital Madera, UCSF Fresno, E&J Gallo, Grundfos Pumps, Hilmar Cheese, Sunrise Growers, PG&E, and CA Division of Water Resources.

SHARED VALUES AND VALUE PROPOSITION

A FOCUS ON SUSTAINABILITY

Our educational and research programs involve consideration of diverse large scale societal questions, e.g. renewable energy sources, robotics, innovative materials and water supplies. The shared theme of sustainability enhances connections with other researchers and educators who are driven to address the grand challenge of sustainable development. The Engineering program leverages research and teaching to serve San Joaquin Valley and California. Faculty in the program mentor interdisciplinary student groups in engineering service learning projects that directly benefit the environmental sustainability goals of regional community organizations. The program is based on a culture that embraces the extraordinary diversity of our students and prepares these students to provide the future of engineering and scientific leadership in the San Joaquin Valley and beyond.

EXCELLENCE IN ENGAGEMENT

The School of Engineering at UC Merced will distinguish itself via the intensity and quantity of our scholarship and service engagements with communities. The community starts in our nearby neighborhoods, extends throughout the San Joaquin Valley, and beyond. It includes professional communities as well proximate towns . But beyond that our SJV serves as a harbinger for the future of our nation and of many regions around the globe by virtue of our demographics and geography.

By bringing science, engineering and management thinking to problems at the nexus of food energy, and water, air pollution, and health care services we aim to solve local problems that will have global impact.

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