Core Beliefs

• **DIVERSITY DRIVES INNOVATION**

Our nation’s future depends on its ability to be a global leader in innovation, and diversity is a key to innovation. Diversity has already developed into an economic asset for corporations, universities, and other organizations that hire engineers and computer scientists. The innovation advantage created by a diverse workforce includes a diverse set of cognitive tools, and identity diversity (e.g., race and ethnicity) contributes significantly to this cognitive tool set. Moreover, the looming engineering workforce shortage crisis, caused by a combination of baby-boomer retirements and flat engineering enrollments, can be solved by tapping into segments of the population currently under-represented in engineering, including Hispanics.

• **COLLABORATION CREATES OPPORTUNITIES**

The success of our College depends critically on our ability to create opportunities for our faculty, students, staff, and other stakeholders. These opportunities will present themselves through collaborations at the individual and organizational level. Collaborations that we will promote include those among individual faculty members within and external to the College, among departments within and external to the College, between the College and other colleges/units at UTEP, and between the College and external corporations, universities and other organizations.

• **RESEARCH FUELS PREEMINENCE**

The College seeks to be among the national leaders in several key niche areas. Research is the necessary fuel to ignite the growth and further development of our programs. Rigorous research, funded through competitive and peer-reviewed processes, in education and targeted interdisciplinary areas of science and engineering, will ensure the effectiveness of our programs, and will enable the wide dissemination and implementation of our ideas and inventions.

• **BALANCE SECURES SUSTAINABILITY**

A balanced investment portfolio ensures long term growth and sustainability by buffering potential losses in one sector with gains in another. Likewise, the College must invest its time, effort, and resources in an appropriately balanced set of activities that will optimize outcomes by expanding the opportunities available to our faculty, staff, and students. The College will therefore strive to maintain an appropriate balance among teaching, research, and service activities; between opportunities for student learning within and beyond the classroom; and in our funding portfolio of basic, peer-reviewed research relative to commercial-driven applied research and engineering services.
Vision

The UTEP College of Engineering will CHANGE THE FACE OF ENGINEERING as:

- The leading institution in the U.S. for the education of Hispanic engineers, and
- A national model for urban institutions in engineering education innovation and in the integration of education, research, and engineering practice and entrepreneurship as a potent economic stimulator for the institution’s service region.

Mission

The UTEP College of Engineering will serve the region, the nation, and the world by providing ACCESS TO EXCELLENCE through:

- Innovative educational programs that contribute to effective learning for our students, and that prepare graduates to be leaders and innovators in a variety of fields,
- Pioneering research programs that foster the creation of knowledge and invention of new technologies,
- Implementation and commercialization of knowledge and technologies to solve critical engineering and computing problems, and
- Active partnerships and collaborations with educational, government, non-profit, and commercial organizations, maintaining a commitment to diversity.
GOAL 1:
*We will enhance the quality of our graduates.*
One of our primary products is the graduates we produce. Our goal is to provide educational opportunities that adequately prepare our graduates for professional practice.

GOAL 2:
*We will help students, faculty, and staff reach their educational and professional goals through experiences beyond the classroom.*
We believe that a significant portion of educational opportunities afforded to students at UTEP can be found in experiences that occur beyond the four walls of a classroom, that wise and empathetic advising is critical to student success, and that interaction with a knowledgeable and experienced faculty and staff is necessary for both.

GOAL 3:
*We will improve the quality of the workplace for all stakeholders by recognizing and developing competencies.*
The primary asset of the College is the quality of its faculty, staff, and students. We are committed to creating an environment where our faculty, staff, and students can work most effectively, and where innovation and collegiality are the cultural norms.

GOAL 4:
*We will identify and build upon our competitive niches.*
Engineers and the results of their research and product development activities will continue to significantly contribute to what the National Academy of Engineering labels the “four broad realms of human concern” in the 21st century: sustainability, health, vulnerability, and the joy of living. The College’s growing research and education programs, through well-informed investment and implementation strategies, will likewise contribute solutions to these concerns at the local and national level.

To achieve this goal, we will focus our investments of financial and human capital in five fields of study essential to human progress in the next decade. Within each field of study, we will develop a potential niche area where the College can be competitive as a national leader in the next 5 to 10 years.

GOAL 5:
*We will attract talent, funding, advocacy and resources to maximize opportunities for all COE stakeholders.*
In order to invest in these five strategic fields of study, we must first continue to attract the human and financial capital needed to drive these programs forward. As the primary objective of the College aligns with the University’s goal of achieving Tier One status, our human and financial goals need to be focused on those assets that will most directly assist in achieving that objective.
Strategic Research Areas

Infrastructure and Sustainability

Besides the availability of clean and renewable energy, there is no more pressing global need for quality of life than the availability of water. Potential solutions for both reside right here in El Paso. Leveraging a strategic partnership with the largest operating inland desalination plant in the world located in El Paso, the College has the potential to be a world leader in the development of desalination technologies. The College also resides in a region with one of the highest number of sunny days in the nation, and therefore is in a natural position to attract testing sites for solar energy technology and to build a critical mass of activity in this area. With increasing trade and travel between the U.S. and Mexico, human and cargo transport across the border is a major contributor to the national economy, but also a potential vulnerability to threat. Border transportation infrastructure is a third possible niche area for the College.

Biomedical and Health Systems

Technology has had a major influence on the delivery of health care and the diagnosis and treatment of disease over the last century. However, much of that technology has been focused on delivery of health care in very high-resource settings and centralized (tertiary care) facilities. As a result, the health care delivery needs in low-resource and remote settings (primary health clinics in low income and rural areas, military training sites and battlefields) have been neglected. The Paso del Norte region contains both a large population base of economically disadvantaged citizens along with a major military training site and medical center, and therefore provides a unique opportunity to build a competitive niche in biomedical and health technology for low-resource settings. Areas of expertise that will contribute to this include biomedical image and signal processing and instrumentation, rehabilitation and human factors engineering, health informatics, and telemedicine. With new faculty recruits who were involved in the early research that resulted in the unique tissue regeneration methods that have come to be called organ printing, another potential niche for the College is in the area of biofabrication. This area of research promises to revolutionize the processes used for tissue regeneration and lab-on-a-chip technologies.
Information and Security
National security encompasses a broad range of issues including terrorist acts, cyber attacks, pandemics and much more. The capability to manage or counter against such events is necessary in order to sustain quality of life and economic prosperity. Since such events are inherently complex, effective capabilities must draw on a broad range of approaches and technological innovation spanning modeling and simulation, large-scale computing, information assurance, and networking, all of which are strengths in the College. The border region is a particularly vulnerable area due to the combination of location and its criticality in international trade and commerce. Our location on the border provides a unique opportunity for the College to become a national leader in border security research and technological development through applying and leveraging our capabilities in such specific areas as: high performance computing, socio-cultural modeling, semantic web, software engineering, complex adaptive systems modeling, computer vision, information assurance, spoken dialog systems, parallel and distributed computing, remote sensing and sensor networks, social networks, interval computations, and image and signal processing.

Advanced Manufacturing and Materials
Manufacturing has always been the key to wealth generation and economic prosperity for a region or a nation. The U.S. must maintain its leadership in manufacturing through the development of innovative, and perhaps revolutionary, materials and processes that eliminate waste, provide rapid customized response, are capable of production in multiple scales, and make use of information technology. Additive manufacturing fulfills these requirements, and the College has developed world class capabilities in this area with application to 3D and printed and flexible electronics, biomaterials and biomedical device development, and biofabrication. The College will play a leading role in the translation of this technology to large scale industrial use. As the systems developed and produced by many industries (such as aerospace and biomedical) become more complex and fully integrated, the need for interdisciplinary systems engineering techniques for design and product development become more apparent. The College is currently developing capabilities in the areas of model based systems engineering, systems architecture, trade-off studies, reliability analysis, and risk management that may provide the basis for a competitive environment on a national scale.

Engineering Education Innovation
Engineering education is in a period of rapid transition toward improvement of student learning and success, driven primarily by a world-wide movement of the democratization of higher education, globalization of the engineering workforce, recent improvements in accreditation procedures, and the increasing demand for a more diversified workforce in the U.S. UTEP has a long and distinguished heritage of producing outstanding engineering graduates. The College of Engineering values this legacy and seeks to build for the future through strategic innovation in engineering education. For the past decade, the College has been a national leader in educational efforts to support the success of students historically underrepresented in the engineering field. The College now has the opportunity to make an impact nationally by replicating this model to other urban institutions around the country through research dissemination. Research in engineering education enables the College to systematically advance pedagogical practices that ensure the intended program objectives and learning outcomes are being met. Research that contributes to this effort include first year enrichment experiences, academic coaching, pre-professional experiences counseling, peer leader and affinity group development, advising and community college articulation models, academic support centers, curricular innovation, high impact K-12 education outreach activities, and instructional design and assessment.