

Roy G. Perry College of Engineering

Purpose and Goals

The modern mission of the Roy G. Perry College of Engineering, in the new millennium, is to sustain an infrastructure that will attract and maintain a world-class faculty that produces graduates with the highest level of professional standards. These graduates will be prepared for a career of life-long learning that will result in leaders, productive workers, innovators and entrepreneurs who will positively impact the increasingly multi-disciplinary and diverse national economy. The College serves as a value added partner within the University to meet the challenge to excel in education and research in engineering and computer science; and to service regional, national, and global communities.

This mission is accomplished through the following six goals:

1. Strive for excellence in engineering education through the dissemination and interpretation of knowledge through the educational programs.
2. Recruit and retain students who have demonstrated a capacity to excel in an environment that integrates advanced information technology with creativity, critical thinking, and problem solving.
3. Recruit and retain a cadre of world-class faculty effective in every endeavor of student-faculty interaction and committed to maintaining an academic standard that will ensure the students are highly competitive for graduate or professional school or for employment in the private or public sectors.
4. Promote scholarly activities through the continual development of our research centers and other collaborations and further enhancing our incorporation of undergraduate and graduate research activities.
5. Continue strong external relations that cultivate and integrate our corporate and alumni constituents into partnerships with the College.
6. Maintain the appropriate infrastructure and support services necessary to provide an atmosphere conducive to learning.

Instructional Organization

The Roy G. Perry College of Engineering offers the following degree programs:

Program	Degree Offered
Chemical Engineering	BS
Civil Engineering	BS
Computer Engineering	BS
Computer Information Systems	MS
Computer Science	BS, MS
Electrical Engineering	BS, MS, PhD
Engineering	MS
Mechanical Engineering	BS

College Admission and Academic Requirements

High School Preparation for Admission to the Roy G. Perry College of Engineering

For students intending to pursue a major in engineering, the recommended curriculum is defined by the "Recommended Texas High School Program Graduation Requirements" and approved by the State Board of Education in November 1993. The listing below reflects the current State Board recommendation and expands upon the University requirements stated earlier in this catalog:

Suggested High School Course Work

In support of the aforementioned requirements, an additional year of advanced mathematics (e.g., Calculus) is recommended. Chemistry and Physics are foundations for all engineering programs and are strongly recommended. Further, students planning careers in the health or biomedical engineering professions should take one year of biology. Additionally, students are urged to take advantage of advanced placement opportunities and honors programs.

Moreover, a student who enrolls without having completed the above courses will not be optimally prepared and the duration of the student's undergraduate program will likely be extended. In particular, the engineering programs offered by the college are based upon a student being fully prepared to begin study with Calculus and Chemistry for Engineers at the college level. Prerequisites for Calculus and Chemistry for Engineers are considered deficiencies and are not counted toward an engineering degree.

Admission to the Roy G. Perry College of Engineering

Admission to the Roy G. Perry College of Engineering is based on the University's undergraduate admission requirements plus the following additional admission criteria for the Roy G. Perry College of Engineering. A student is admitted directly into a major only if all admission criteria are met.

First-time Freshmen – Engineering and Computer Science Majors

First-time freshmen will be evaluated on the basis of the following admission criteria that are applicable for the student:

1. Students must meet the Prairie View A&M University admissions requirements.
2. Students must present a new SAT Reasoning Test score of 950 (based on combined verbal and math scores only) or higher or a composite ACT score of 18 or higher.
3. Must have a cumulative high school GPA of 3.0 on a 4.0 scale

Students Entering with Transfer Credit

Transfer students include those from other units within Prairie View A&M University as well as those from other educational institutions. Transfer students external to Prairie View A&M University must furnish an official transcript to the Office of Admissions for evaluation of all college-level work completed. Transfer students with less than 30 hours of transferable credit are admitted under the criteria for first-time freshmen.

Transfer students with 30 hours or more of transferable credit must meet the following requirements:

1. Students must meet the Prairie View A&M University and the Roy G. Perry College of Engineering admissions requirements.
2. Must have a "C" or higher in all transfer courses.
3. Must have a minimum cumulative GPA of 2.5 on a 4.0 scale in all math, science, and engineering courses.

College Academic Requirements

Along with meeting the general requirements of the University, students enrolled in the Roy G. Perry College of Engineering must maintain the following performance levels in order to satisfy degree requirements:

1. Earn an overall grade point average of 2.0 or better in courses taken outside of the college and earn a grade of "C" or better in English, Mathematics, and Science courses.
2. Earn a grade of "C" or better in each course taken within the College.
3. Earn a grade of "C" or better in the prerequisite before advancing to the next level course in a sequence for English, Mathematics, and Science courses.
4. Earn a grade of "C" or better in prerequisite courses before advancing to the next level course in College courses.
5. Demonstrate professional standards and ethical conduct.
6. Three-Attempt Rule: A student may not attempt a course in Mathematics, Science, or Engineering in the Roy G. Perry College of Engineering at PVAMU more than three times and apply that course toward his/her degree. Enrollment in a course for a period of time sufficient for assignment of a grade, including a grade of "W", is considered an attempt. After a student failed a course attempt twice by not receiving a grade of "C" or higher, he/she must obtain approval from the Department Head to enroll in the course for the 3rd time.

Students who transfer from other colleges and universities should meet the University's scholastic regulations and additional core curriculum requirements for engineering.

University Core Curriculum For Engineering Programs

The core curriculum concept provides for the portability of a basic element of a college degree between higher education institutions. However, certain programs have specific requirements in their programs that must be satisfied for the purpose of accreditation. For a specific program, the core curriculum may look different to most efficiently satisfy both the core and program-specific requirements. For ABET-accredited engineering programs, for example, the math requirement in the core curriculum is best satisfied if the engineering student takes Differential Equations. The program-specific core curriculum requirements presented for degree programs in the Roy G. Perry College of Engineering represent the suggested University Core Curriculum designed for an engineering student to minimize the coursework required.

Students who undertake a more general core curriculum may require additional coursework. For example, the Roy G. Perry College of Engineering requires a programming language course so that some 3-hour courses that satisfy the University Core Curriculum may not be acceptable for the Roy G. Perry College of Engineering degree programs.

Eligibility to Take Upper Division College Courses

The Roy G. Perry College of Engineering has an eligibility standard for the students to take upper-division college courses. Students must have completed or be currently enrolled in all lower division (1000 and 2000 level) courses in English, Mathematics, Science, and Engineering to be eligible to enroll in upper-division (3000 or 4000 levels) courses in the Roy G. Perry College of Engineering. Students transferring to the Roy G. Perry College of Engineering with 60 or more semester hours from another institution will be allowed a period of one semester to comply.

Supporting Facilities

Research Centers

The Center of Excellence in Research and Education for Big Military Data Intelligence (CREDIT) (<http://credit.pvamu.edu/>)

The CREDIT center is a research center targeting mission-critical big data analytics and platforms with a five-million-dollar seed funding from the US Department of Defense (DOD). The center's research focus includes deep learning, big data analytics, wireless sensor networks, data security, and the Internet-of-Things (IoT). CREDIT center has a multidisciplinary team of faculty researchers from Electrical and Computer Engineering and Computer Science, research scientists and postdocs, and many graduate and undergraduate research assistants. This center is supported by 3 labs: the Deep Learning Lab, the Cloud Computing Lab, and the Wireless Communications Lab. The Deep Learning Lab in this center features four NVIDIA DGX-1 Deep Learning systems totaling 32 Tesla P100 GPUs with 114,688 CUDA cores, 2,752 GB memory, and 244 TB HDD. Each DGX-1 system has eight Tesla P100 GPU accelerators connected through NVLink, the NVIDIA high-performance GPU interconnect, in a hybrid cube-mesh network. Together with dual socket Intel Xeon CPUs and four 100 Gb InfiniBand network interface cards, DGX-1 provides unprecedented performance for deep learning. Moreover, the DGX-1 system software and powerful libraries are tuned for scaling deep learning on its network of Tesla P100 GPUs to provide a flexible and scalable platform for deep learning.

The Center of Excellence for Cybersecurity (SECURE) (<https://securecenter.pvamu.edu/>)

The SECURE Center is focused on developing novel protocols to ensure cybersecurity in multiple environments—communications and networks, power grid, social networking in virtual space, cloud computing, and video analytics. It is also engaged in developing sensitive techniques for malware and virus detection and elimination. The center develops innovative technologies such as hardware/software co-design, novel low-cost security primitives, and AI solutions for malicious behavior detection. Another area of emphasis is information (video, image, text and audio) steganography using discrete wavelet transform and artificial intelligence. This center is supported by 5 labs: Network Security lab, IoT Security Lab, Hardware Security Lab, IP Networking Lab, and Wireless Security Lab.

The Smart MicroGrid Advanced Research and Technology Center (SMART) (<https://www.pvamu.edu/smartgrid/>)

The vision of the SMART Center is to create multitude of smart microgrids in the world that are reliable, sustainable, secure and more environmentally safe. The center is focusing on the following areas: (i) enhancing the power quality for the microgrid, (ii) optimizing the electromagnetic compatibility (EMC) of electronic devices in the microgrid, (iii) providing secure and robust data collection and exchange in the microgrid, (iv) designing novel fault detection, protection, and control of the microgrid, and (v) designing a test bed for experimental validation. The center is currently working on the following projects: 1) Modeling and Simulation of Low-Cost and High-Efficiency Solar Cells for the Microgrid, 2) Novel Model Predictive Control for Electrical Machine Drives Considering Circuit Faults, 3) Microgrid Distribution Power Flow Controller (DPFC) Based on Fuzzy and ANFIS Techniques, 4) Maximum Power Point Tracker (MPPT) Improvement for Energy Harvesting Systems, 5) Effects of Electromagnetic Interference on the Smart Grid, and 6) Electric Load Forecasting using Smart Meter Data.

The Center for Computational Systems Biology (CCSB@PVAMU) (<https://ccsb.pvamu.edu/>)

The CCSB center is a multidisciplinary center which studies complex biological processes such as cancer, head injury in football, Parkinson's disease, pulmonary hypertension, and herbicide-resistant weeds, by employing state-of-the-art computational and engineering skills. External collaborations include Translational Genomics Research Institute, Salk Institute, University of Pittsburg Medical Center, and the University of Cambridge. The Center is supported by funds from the CRI, NCI/NIH, Stand up To Cancer (SU2C), NSF, and Michael J. Fox Foundation (MJFF).

Center for High Pressure Combustion in Microgravity (<https://www.pvamu.edu/research/post/college-of-engineering-awarded-3-million-grant/>)

This NASA center consist of a multidisciplinary team of researchers from the College of Engineering, the College of Agriculture & Human Science and the College of Arts & Science focus on the science and engineering of fuel combustion under high pressure in microgravity representative of practical engines. The project, emphasizes both experimental and numerical approaches, is part of NASA's efforts to guide advanced engine designs to improve overall engine performance to keep the nation's leadership in engineering and science areas.

The Center for Energy and Environmental Sustainability (CEES) (<https://www.pvamu.edu/cees/>)

The CEES center was established with seed funding in the amount of \$5M in 2010. The Center for Energy & Environmental Sustainability (CEES) conducts research in the areas of renewable energy and environmental sustainability. An area of focus for this center is biofuels research which include in-depth fundamental studies to understand the reaction pathways of fast pyrolysis and how they affect the final composition of bio-oil and other by-products as process variables are varied in an effort to improve yields and quality of specific chemical species present in the bio-oil.; design of biofuels reactors for process and yield investigation of catalytic pyrolysis of biomass into biofuels and the development of catalytic conversion strategies for upgrading bio-oil to useful fuels. Additional research involves TGA reaction kinetics study of the pyrolysis process for different biomass.

The Center of Excellence for Communication Systems Technology Research (CECSTR) (<https://www.pvamu.edu/cecstr/>)

This center received seed funding from Texas Instruments to conduct comprehensive research in the selected aspects of communication systems, Wavelets and Wavelet Transforms, Compressed Sensing/Compressive Sampling Systems, DSP Solutions, Signal/Image/Video Processing, Mixed

Signal Systems, Communication Control Systems and High Speed (Broadband) Communication Systems. Among other emerging areas of research, it also seeks solutions to the problems that plague both military and commercial satellite and radar-based communication systems.

The Thermal Science Research Center (TSRC) (<http://www.pvamu.edu/tsrc/>)

The TSRC is focused on the design and development of physical models to couple heat transfer measurements and modeling, single-phase and two-phase flow measurements and correlation development, interdisciplinary design and development of enclosed natural convection modeling and measurements, and mixed convection modeling. Research results are of importance to fusion reactions, cooling of electronic components, and other high heat flux applications, such as magnetic fusion plasma-facing components, rocket and propulsion systems.

The Future Aerospace, Science and Technology (FAST) (<https://www.pvamu.edu/me/wp-content/uploads/sites/100/fast.pdf>)

The FAST Center is dedicated to the development, processing, and characterization of lightweight and high-temperature structural materials and nanomaterials with emphasis on research, education, and technology transfer. Research activities include the processing, characterization, and environmental simulation of nanocomposites for use in both military and civilian applications.

The Texas Gulf Coast Environmental Data (TEXGED) (<https://www.pvamu.edu/engineering/research/texged/>):

This Center collects data from space through NASA for predicting environmental changes in the region and for developing a methodology for ecosystem risk assessment. The Center also uses remote sensing data in detecting the sea surface temperature in the Gulf of Mexico to study its impact on biological activities. The TEXGED Center aims at collecting and analyzing data regarding environmental problems such as alteration and loss of habitats, water pollution, air pollution, flooding and hurricanes, climatic changes and degradation and loss of green spaces.

The Center for Radiation Engineering and Science for Space Exploration (CRESSE) (<https://www.pvamu.edu/cresse/>)

The CRESSE center is focused on developing materials and technologies that would keep astronauts and their critical electronic equipment safe from the effects of harmful space radiation. The Center carries out research in the area of developing space radiation detection systems in testbed zones during exposures at particle accelerator facilities and obtaining detailed dosimetry data and particle spectroscopy data for use in prediction of risks of space radiation in environment and health.

PAST PERFORMANCE

Several of the research centers have become nationally recognized. All of the center researchers have published papers in peer reviewed journals and conferences at both the national and international levels. The centers have secured funding from industry and various government agencies including NSF, NIH, DOD, DOE, NASA, Apple, .Google, IBM, and Chevron

Combined BS/MS Programs in College of Engineering

The Roy G. Perry College of Engineering follows the University's guideline of combined BS/MS programs to encourage qualified undergraduates to start graduate study before completing their BS degrees. By entering in a combined BS/MS status, a student is eligible to count up to 6 semester credit hours toward both the BS degree and the MS degree.

Admission to combined BS/MS programs

An undergraduate student who intends to enter a graduate program in the College of Engineering through the combined BS/MS program must apply through the College of Engineering Dean's Office. An application form (<https://www.pvamu.edu/engineering/departments/five-year-bsms-programs/>) can be obtained in the Dean's Office or on the homepage of the College of Engineering website (<https://www.pvamu.edu/engineering/>).

Approval of the combined BS/MS programs will primarily be decided by the Program Head/Department Head of the intended graduate program. The following is a guide of allowable combinations between the BS and MS programs:

Allowable Combinations of BS/MS programs in College of Engineering

- Computer Science/Computer Science
- Computer Science/Computer Information Systems
- Computer Engineering/Electrical Engineering
- Electrical Engineering/Electrical Engineering
- Chemical Engineering/Engineering
- Civil Engineering/Engineering
- Mechanical Engineering/Engineering

Special Programs

Engineering Internship/Cooperative Education. The primary goal of an internship or cooperative education experience is to strengthen and enhance the theoretical knowledge gained through classroom or distance education-based experiences. The objectives of internships and cooperative education are to:

1. Provide students with opportunities to obtain professional industrial/government internships.
2. Prepare graduates for immediate professional assignments without further on-the-job training.
3. Provide a closer partnership between employers and the Roy G. Perry College of Engineering.
4. Help students determine which type of organizational structure and corporate culture best suits them.

Students in the program are required to enroll in internship or cooperative education courses while they are employed in industry/government. They continue to be governed by College and University regulations concerning professional conduct during the employment period. Students are normally paid wages/salaries by the employing agency.

The Roy G. Perry College of Engineering Enhancement Institute (CE2I) is an innovative and intensive summer bridge-to-college program designed to prepare students for the rigors of an Engineering, Computer Science, or Technology Curriculum and to aid with the transition between high school and college. The Institute is a five-week residential program, where participants will complete coursework in Math, Science, Technology, and Professional Development Activities. The Institute is math-intensive. A math assessment test will be administered initially to determine the appropriate math placement. The program goal is to achieve a mastery of one math level higher than the student placed when he/she entered the program. The program will also introduce students to basic concepts in chemistry, physics, and computing. Students will experience professional development activities including field trips to area engineering and technology industries; personal and professional development seminars and workshops (i.e. time management, study skills, learning style inventories, effective use of study groups, and seven habits of successful people).

Energy Engineering as a Minor Field

The Energy Engineering Minor curriculum is designed to prepare students to enter directly into a wide variety of careers in the energy sector serving the greater Houston area, state, national and international communities. Students of all majors are encouraged to enroll in the courses offered through the program. The curriculum is designed to work within the structure of the students' majors.

The Center for Energy and Environmental Sustainability (CEES) is instrumental in developing the Energy Engineering Minor. The goal of this center is to establish research and education focused on energy engineering. The three research themes of the center are biofuels, wind energy and energy, and the environment. More information on the center is available at www.pvamu.edu/cees (<http://www.pvamu.edu/cees/>).

The Energy Engineering Minor has four focus areas:

- Chemical Engineering - Fossil Fuel and Nuclear Energy Focus
- Civil and Environmental Engineering - Energy and Environment Focus
- Electrical Engineering - Generation and Distribution Focus
- Mechanical Engineering – Renewable Energy Focus

Students shall complete the Energy Engineering Minor through satisfactory completion of 18 SCH from the following courses:

Energy Engineering Minor Requirements

CHEG 3311	Introduction to Energy Systems	3
CVEG 4305	Special Topics ¹	3
MCEG 3312	Renewable Energy and Energy Sustainability	3
Electives (select 9 hours from the following options):		9
CHEG 4310	Special Topics in Chemical Engineering ¹	3
ELEG 4301	Electromechanical Energy Conversion	3
ELEG 4302	Power Systems Engineering	3
ELEG 4322	Electronic and Photonic Materials and Devices	3
MCEG 4316	Special Topics ¹	3
Other energy related courses approved by the College		

Total Hours

33

¹ This special topics course may be repeated when the topic varies and is related to broader energy engineering or environmental sustainability or as approved by the advisor.

College Professional and Honor Societies

Among the honor societies designed to support, augment, and supplement the educational and professional development of students are the departmental honor societies and **Tau Beta Pi, National Engineering Honor Society**, through the Texas Kappa Chapter. In addition, the Roy G. Perry College of Engineering sponsors the following chapters of national societies:

The Society of Women Engineers, Prairie View A&M University Student Chapter is a professional society open for membership to female students majoring in an engineering curriculum at the University. The Chapter is affiliated with the national professional engineering body, the Society of Women Engineers. The society fosters the intellectual, professional, personal and social development of student members.

The Society of Hispanic Professional Engineers (SHPE) is a professional society open to all engineering students in the Roy G. Perry College of Engineering. The student chapter at Prairie View is affiliated with the National Society of Hispanic Engineers professional society. The society endeavors to change lives by empowering the Hispanic community to realize their fullest potential and impact through STEM awareness, access, support and development.

The Prairie View A&M University chapter of the **National Society of Black Engineers (NSBE)** is a professional society open to all engineering students in the Roy G. Perry College of Engineering. The chapter fosters intellectual and professional development among its members and promotes growth and entry of more minority persons into the engineering profession.

The Prairie View A&M University (PVAMU) **Engineers Without Borders (EWB)-USA** Student Chapter was established in September 2020. The PVAMU EWB-USA Student Chapter's mission is to build a better world through sustainable development projects that empower communities to meet their basic human needs. Volunteer professionals from outside the PVAMU campus have been recruited to serve as prospective project mentors, thus ensuring that the Chapter's technical knowledge and resources are available to solve the world's most pressing challenges faced by vulnerable domestic and international communities. PVAMU EWB-USA Student Chapter is open to undergraduate and graduate students representing a variety of backgrounds, interest, and skill sets from the various academic majors offered at PVAMU. These majors include engineering, medicine and public health, sociology, language, business, and other areas.

The Chemical Engineering, Civil Engineering, Computer Science, Computer Engineering, Electrical Engineering, and Mechanical Engineering programs are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

The Computer Science program is accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org>.

For more information about specific programs see the links below.

- Chemical Engineering Accreditation (<https://www.pvamu.edu/cheg/accreditation/>)
- Civil Engineering Accreditation (<https://www.pvamu.edu/cee/accreditation/>)
- Computer Science Accreditation (<https://www.pvamu.edu/engineering/departments/cs/undergraduate/accreditation/>)
- Computer Engineering Accreditation (<https://www.pvamu.edu/ece/accreditation/>)
- Electrical Engineering Accreditation (<https://www.pvamu.edu/ece/accreditation/>)
- Mechanical Engineering Accreditation (<https://www.pvamu.edu/me/accreditation/>)