Foundations of Engineering

Foundations of Engineering is a one-credit course designed to offer students an overview of the engineering profession and fundamental skills utilized in general engineering. Students investigate various engineering disciplines and related career paths. They develop communication and teamwork skills as well as increase their understanding of basic scientific and mathematics principles used in problem solving through the engineering design process. Career Cluster Technologies be used as a substitute for this course. Students may take one or the other but not both.

Career and technical student organizations are integral, cocurricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Students will:

1. Demonstrate skills for employment in the engineering field, including preparing job résumés and applications.
   - Researching engineering pathways, including main disciplines, education requirements, job responsibilities, and potential earnings
   - Researching current and future engineering job opportunities
   - Demonstrating interpersonal skills, work habits, and ethical behavior for successful interviewing, employment, and job changes

2. Explain positive and negative impacts of engineering on society, including ethical, professional, and legal considerations.
   - Differentiating between engineering, technology, and science
   - Critiquing significant contributions of leaders in engineering

3. Apply the systems model of input, process, output, feedback, and impact.
   - Analyzing an engineering design brief to determine a course of action
   - Demonstrating team problem-solving skills as they apply to individual and collective responsibilities of each member of an engineering team
   - Developing projects, reports, and oral presentations related to engineering designs
   - Utilizing mathematics concepts in engineering designs

4. Demonstrate the use of analog and digital precision measuring instruments utilized in engineering.
   Examples: micrometers, calipers, indicators, rulers, protractors, multimeters
   - Explaining the purpose and history of measurement systems
   - Defining customary and metric measurement systems
   - Utilizing conversion factors of customary and metric measurements
   - Practicing the use of significant digits
5. Classify basic engineering drawings and their components, including sketches and mechanical and computer-aided (CAD) drafting techniques.
   - Practicing thumbnail sketches, two-dimensional and three-dimensional sketches, and CAD drawings
   - Classifying multi-view sketches and drawings
   - Identifying orthographic and isometric sketches and drawings

6. Practice computer modeling and prototyping for an engineering design.

7. Utilize information technology as it relates to engineering, including spreadsheets, databases, word processing, audiovisual presentations, and Internet research.

8. Describe engineering systems and processes, including mechanical systems, fluid systems, thermal systems, electrical systems, manufacturing processes and materials, and quality assurance.

9. Apply appropriate safety and health procedures for engineering classroom and laboratory situations.
   - Utilizing tools and equipment safely
   - Identifying environmental safety requirements for specific applications
   - Recognizing functional safety concerns in engineering designs

10. Demonstrate leadership and teamwork skills gained through student organization activities.

11. Identify patterns, relations, and functions of an engineering organization or workplace.

12. Identify terminology associated with Engineering pathways.

13. Identify characteristics of sound financial management for engineers and engineering companies.
    Example: preparing a budget