MVLA
2024-25
COURSE INFORMATION SHEET

Course Title: Engineering Technology I
CTE Pathway Sequence: Engineering and Architecture
School: Mountain View High School
UC/CSU requirement: Approved as UC 'D' Science Credit
Textbook and/or other learning resources: None

Course Description:

Engineering Technology 1is the first concentrator course in the CTE Engineering Pathway. It is a requirement for the second course, Engineering Technology 2. It will provide students with a broad and solid foundation for further study in the engineering fields and an expectation of a career in engineering.

Engineering Technology 1 is appropriate for students who are interested in designing, engineering, producing, and marketing projects in the real world. The major focus of the course is to expose students to the engineering design process, research and analysis methods, teamwork, communication skills, global and human impacts, engineering standards, and technical documentation in the engineering profession. It gives students the opportunity to develop professional soft skills and an understanding of engineering technical concepts through activities, projects, and problem-based challenges.

Engineering Technology 1 is designed to get students ready for further courses in engineering and real-world engineering work environments. Students can expect to be treated as novice engineering interns and given considerable autonomy and flexibility. Therefore, students need to act maturely, responsibly, and safely and be proactive in their learning.

Student Learning Outcomes:

By the successful completion of the course students should be able to do the following:

- ✔ Use appropriate professional vocabulary, terminology, and communication in the engineering profession.
- ✔ Follow a product through the entire engineering process.
- ✔ Use industry standard CAD programs to design a product.
- ✔ Maintain an engineering notebook to professional standards.
- ✔ Work with a customer to develop a project from conception to final deliverable product.
- ✔ Showcase products in professional presentations.
- ✔ Work with a team to complete projects according to specifications and on time.
- ✔ Understand budget, material, time, and technical constraints on engineering projects.
- ✔ Have a knowledge of various engineering fields, career options, educational institutions, and professional organizations.
- ✔ Problem solve in real-world type situations.

CTE Industry Standards:

CA CTE Anchor Standards

- **Anchor Standard 1: Academics**
  Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment.

- **Anchor Standard 2: Communications**
  Language Standard: Acquire and accurately use general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the (career and college) readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

- **Anchor Standard 3: Career Planning and Management**
  Speaking and Listening Standard: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

- **Anchor Standard 4: Technology**
  Writing Standard: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments and information.

- **Anchor Standard 5: Problem Solving and Critical Thinking**
  Writing Standard: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, and synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

- **Anchor Standard 6: Health and Safety**
  Reading Standards for Science and Technical Subjects: Determine the meaning of symbols, key words, and other domain-specific words and phrases as they are used in a specific scientific or technical context.

- **Anchor Standard 7: Responsibility and Flexibility**
  Speaking and Listening Standard: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

- **Anchor Standard 8: Ethics and Legal Responsibilities**
  Speaking and Listening Standard: Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the work.

- **Anchor Standard 9: Leadership and Teamwork**
  Speaking and Listening Standard: Work with peers to promote civil, democratic discussions and decision making; set clear goals and deadlines; and establish individual roles as needed.

- **Anchor Standard 10: Technical Knowledge and Skills**

Writing Standard: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

- **Anchor Standard 11: Demonstration and Application**
  Demonstrate and apply the knowledge and skills contained in the industry-sector anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and the career technical student organization.

CA CTE Pathway Standards: Engineering and Architecture

B. Engineering Technology Pathway

- The Engineering Technology pathway provides learning opportunities for students interested in preparing for careers in the design, production, or maintenance of mechanical, electrical, electronics, and computer and electromechanical systems and products. Sample occupations associated with this pathway: Surveyor Research and Development Analyst Engineering Technologist Field Engineer Operations Engineer

- B1.0 Communicate and interpret information clearly in industry-standard visual and written formats.
  - B1.1 Explain the classification and use of various components, symbols, abbreviations, and media common to technical drawings.
  - B1.2 Describe the current industry standards for illustration and layout.
  - B1.3 Draw flat layouts of a variety of objects by using the correct drafting tools, techniques, and media.
  - B1.4 Organize and complete an assembly drawing using information collected from detailed drawings.
  - B1.5 Create reports and data sheets for writing specifications.
- B2.0 Demonstrate the sketching process used in concept development.
  - B2.1 Understand the process of producing proportional two- and three-dimensional sketches and designs.
  - B2.2 Apply sketching techniques to a variety of architectural and engineering models.
  - B2.3 Present conceptual ideas, analysis, and design concepts using freehand graphic communication techniques.
- B3.0 Identify the fundamentals of the theory, measurement, control, and applications of electrical energy, including alternating and direct currents.
  - B3.1 Understand the characteristics of alternating current (AC) and how it is generated; the characteristics of the sine wave; and of AC, tuned, and resonant circuits; and the nature of the frequency spectrum.
  - B3.2 Analyze relationships between voltage, current, resistance, and power related to direct current (DC) circuits.
  - B3.3 Calculate, construct, measure, and interpret both AC and DC circuits.
  - B3.4 Understand how electrical control and protection devices are used in electrical systems.
  - B3.5 Calculate loads, currents, and circuit-operating parameters.
  - B3.6 Classify and use various electrical components, symbols, abbreviations, media, and standards of electrical drawings.
  - B3.7 Analyze, repair, or measure electrical and electronic systems, circuits, or components using appropriate electronic instruments.
  - B3.8 Predict the effects of circuit conditions on the basis of measurements and calculations of voltage, current, resistance, and power.
- B4.0 Understand the concepts of physics that are fundamental to engineering technology.
  - B4.1 Describe Newton's laws and how they affect and define the movement of objects.
  - B4.2 Explain how the laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.

- B4.3 Compare the effects and applications of heat transfer and thermal dynamic processes.
- B4.4 Explore the fundamentals and properties of waveforms and how waveforms may be used to carry energy.
- B4.5 Analyze how electric and magnetic phenomena are related and know common practical applications.

- B5.0 Understand how the principles of force, work, rate, power, energy, and resistance relate to mechanical, electrical, fluid, and thermal engineering systems.
  - B5.1 Differentiate between scalars and vectors.
  - B5.2 Solve problems by using the concept of vectoring to predict resultants.
  - B5.3 Compare and explore the six simple machines and their applications.
  - B5.4 Evaluate how energy is transferred and predict the effects of resistance in mechanical, electrical, fluid, and thermal systems.
  - B5.5 Formulate and solve problems by using the appropriate units applied in mechanical, electrical, fluid, and thermal engineering systems.
- B6.0 Employ the design process to solve analysis and design problems.
  - B6.1 Understand the steps in the design process.
  - B6.2 Determine what information and principles are relevant to a problem and its analysis.
  - B6.3 Choose between alternate solutions in solving a problem and be able to justify the choices made in determining a solution.
  - B6.4 Translate word problems into mathematical statements when appropriate.
  - B6.5 Demonstrate the process of developing multiple details, within design constraints, into a single solution.
  - B6.6 Construct a prototype from plans and test it.
  - B6.7 Evaluate and redesign a prototype on the basis of collected test data. EA | California Career Technical Education Model Curriculum Standards
- B7.0 Understand industrial engineering processes, including the use of tools and equipment, methods of measurement, and quality assurance.
  - B7.1 Know the structure and processes of a quality assurance cycle.
  - B7.2 Describe the major manufacturing processes.
  - B7.3 Use tools, fasteners, and joining systems employed in selected engineering processes.
  - B7.4 Estimate and measure the size of objects in both Standard International and United States units.
  - B7.5 Apply appropriate geometric dimensioning and tolerancing (GD&T) practices.
  - B7.6 Calibrate precision measurement tools and instruments to measure objects.
- B8.0 Understand fundamental control system design and develop systems that complete preprogrammed tasks.
  - B8.1 Identify the elements and processes necessary to develop a controlled system that performs a task.
  - B8.2 Demonstrate the use of sensors for data collection and process correction in controlled systems.
  - B8.3 Perform tests, collect data, analyze relationships, and display data in a simulated or modeled system using appropriate tools and technology.
  - B8.4 Program a computing device to control systems or process.
  - B8.5 Use motors, solenoids, and similar devices as output mechanisms in controlled systems.
  - B8.6 Assemble input, processing, and output devices to create controlled systems capable of accurately completing a preprogrammed task.
- B9.0 Understand the fundamentals of systems and market influences on products as they are developed and released to production.
  - B9.1 Understand the process of product development.
  - B9.2 Understand decision matrices and the use of graphic tools in illustrating the development of a product and the processes involved.
- B10.0 Design and construct a culminating project effectively using engineering technology.
  - B10.1 Use methods and techniques for employing all engineering technology equipment appropriately.

- B10.2 Apply conventional engineering technology processes and procedures accurately, appropriately, and safely.
- B10.3 Apply the concepts of engineering technology to the tools, equipment, projects, and procedures of the Engineering Technology Pathway.

- B11.0 Understand the methods of creating both written and digital portfolios.
  - B11.1 Develop a binder or digital portfolio representative of student work for presentation.
  - B11.2 Give an effective oral presentation of a portfolio.

Assessment and Grading (BP 5121 / AR 5121):

1. **Grading categories and their percentage weights:**

Standards Based Categories (above)
Anchor Standards 1-4 (50%)
Technical Standards B1.0-B11.0 (50%)

*Highest score for the term is accepted.

2. **Achievement evidence collected within each grading category:**

The course is centered around major projects that each focus on a different facet of engineering. Project areas include architectural design, automotive engineering, aerospace engineering, robotics, and mechatronics. Every project will require students to demonstrate competency in each grading category.

3. **Grading scales:**

Grading Scale
A > 3.5
B 3.0-3.4
C 2.5-2.9
D 2.0-2.4
F < 2.0

4 – Thorough Understanding
3 – Adequate Understanding
2 – Partial Understanding
1 – Minimal Understanding
0 – No Understanding Evident

4. **Homework/outside of class practices** (AR 6154):

Homework is to ensure class project work is completed by the due date. This may require coordinating with team members outside of class.

5. **Excused absence make-up practices** (Education Code 48205(b)):

Make-up work must be arranged with the teacher and determined on an individual basis.

6. **Academic integrity violation practices** (LAHS Academic Integrity Policy / MVHS Academic

Integrity Policy):

Cheating, lying, and plagiarizing are not acceptable.

· *Plagiarism* is the practice of copying words, sentences, images, or ideas for use in written or oral assignments without giving proper credit to the source.

· *Lying* is not telling the truth or whole truth for the purpose of evasion.

· *Cheating* is defined as the giving or receiving of prohibited help on anything that has been determined by the teacher to be an individual effort.

· **First Violation** – You will receive a zero for the assignment.

· **Second Violation** – You will receive an F grade for the course.

7. **Late work practices:** All work is required to be submitted by the project end date. Any exceptions need to be pre-arranged with the teacher.

8. **Revision practices:** Students may re-submit work an unlimited number of times for teacher review. The highest mark is recorded.

9. **Extra credit practices:** None

10. **Additional grading practices:** None

Instructors' email addresses:

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Additional information:

This is not a traditional academic high school course. It is part of a Career Technical Education (CTE) Pathway. The primary goal of CTE is to prepare students for further advanced studies and/or careers in specific industry sectors. The Engineering and Architecture Pathway standards are ambitious, challenging, and applicable. Therefore, students will experience stimulating real-world type scenarios that will give them a preview of the engineering sector. This type of learning is usually new to students and will find it both challenging and rewarding. However, the course format requires students to embrace the experience by being engaged, prepared to make mistakes, willing to take risks, a team player, and serious about the course. I am here to mentor them along the journey. Enjoy the process! Please reach out to me if you have any concerns. Thank you.