**CTE Engineering Design and Problem Solving – Course Syllabus**

**Course Title:** Engineering Design and Problem Solving

**Course Description:**

This advanced-level CTE course provides students with opportunities to solve real-world engineering problems using the engineering design process. Students apply principles from physics and mathematics, use industry-standard engineering tools, conduct experiments, analyze data, and develop effective communication and presentation skills. Emphasis is placed on research, innovation, ethical considerations, and teamwork.

**Course Objectives:**

Students who complete this course will be able to:

* Use the engineering design process to define, analyze, and solve complex problems.
* Apply scientific and mathematical principles to engineering solutions.
* Collect, analyze, and interpret data to inform design decisions.
* Develop 3D CAD models and prototypes of engineering solutions.
* Conduct technical research and present findings using professional standards.
* Demonstrate ethical and safety practices in engineering design.

**Units of Study:**

| **Unit** | **Topic** |  |
| --- | --- | --- |
| 1 | Engineering as a Profession & Design Review |  |
| 2 | Problem Identification & Design Criteria |  |
| 3 | Research Methods & Data Analysis |  |
| 4 | Advanced CAD Modeling & Technical Drawings |  |
| 5 | Physics & Math in Engineering Applications |  |
| 6 | Testing, Evaluation & Optimization |  |
| 7 | Ethics, Sustainability, and Engineering Standards |  |
| 8 | Capstone Engineering Project (Team-Based) |  |

Each unit includes design challenges, lab investigations, written reports, and group presentations.

**Instructional Materials & Tools:**

* Engineering Notebook (digital or physical)
* Scientific Calculator
* CAD Software: Autodesk Inventor, Fusion 360, or SolidWorks
* Lab Equipment: Sensors, prototyping tools, multimeters, 3D printer (if available)
* Online Tools: Google Workspace, Desmos, Excel/Sheets for data analysis

**Grading Policy:**

| **Category** | **Weight** |
| --- | --- |
| Projects & Labs | 40% |
| Quizzes & Tests | 25% |
| Classwork & Engineering Notebook | 20% |
| Participation & Teamwork | 15% |

Late work and retake policies follow district guidelines. Project rubrics provided per assignment.

**Classroom Expectations:**

* Follow all lab and safety protocols (PPE required for certain activities).
* Come prepared with materials and a problem-solving mindset.
* Collaborate respectfully and effectively in team settings.
* Maintain your engineering notebook with clear documentation.
* Uphold academic integrity and ethical design practices.