VALLEY CHRISTIAN SCHOOLS™
HIGH SCHOOL
"Do it heartily as to the Lord." Col. 3:23

PRINCIPLES OF ENGINEERING (H) – 2024-2025 SYLLABUS

CONTACT INFORMATION

Instructor	**John Crandall**
Email	jcrandall@vcs.net
Office Hours	Wednesday 7:30am-8:00am and Thursday 2:35pm-3:05pm.
Room Number(s)	G137
Zoom Room Link	https://vcs.zoom.us/j/8640564067
Course URL/Moodle Page	http://learn.vcs.net

COURSE OVERVIEW

Course Number	0731
Course Format	☒ Traditional ☐ Online
Credit Hours	10
Dual Credit	☐ Yes ☒ No
Course Prerequisites	Grade C or higher in Intro to Engineering Design
Course Description	This course is for students who are serious about pursuing a possible future in engineering. This survey course exposes students to major concepts they will encounter in a post-secondary engineering course. This survey introduces mechanisms, energy sources, electronic circuits, thermodynamics, statics, material properties, structural design, control systems, and kinematics. Students employ engineering and scientific concepts to solve design problems. Students develop problem-

	solving skills, document their work, and communicate solutions to peers and members of the professional community.
Required Textbook(s) or Apps	PLTW Online curriculum
Additional Materials Needed	• Earbuds or headset when viewing media individually in class • Pencils, large eraser (we'll be drawing) • Scientific calculator (TI84 or similar) • Other materials will be announced ahead of time as needed
Fees	$175 course fee for online curriculum and materials

PERSONAL NOTE FROM INSTRUCTOR TO LEARNERS

Welcome to Principles of Engineering (H). What's more fun than building stuff? Designing and building stuff! If you aren't a builder yet, I hope you will become one with a new sense of excitement, confidence, and appreciation for what it takes to build a working product. Designing is not the same as building. In fact, industry has various models and metrics around the design process cycle for many good reasons. Let's discover and experience these reasons together as you become very acquainted with the design process while solving problems. Even if you have no interest in engineering, you will gain skills for a lifetime because this course is all about solving problems. No doubt you will be called many times in your life to approach a problem and solve it, whether it be in an engineering, business, or other career field. Most of all, I hope that at an intellectual and spiritual level, you will walk away from this course readily able to recognize and appreciate the nature of "design" and all that our Lord, the Grand Designer, has provided us in this beautiful, created world filled with amazing, designed life and held together by laws tightly designed for life.

Tips for succeeding in class

Principles of Engineering (POE) is intended for the following students:

- Those interested in becoming engineers,
- Those that may interface with engineers in their own chosen work field and want to understand more of the engineering design and analysis process.

In POE you will learn a wide range of engineering analysis techniques. Critical thinking and creativity are encouraged. You will learn these many aspects of engineering through activities, projects and problems. You will learn to effectively document work and communicate solutions to peers and members of the professional community.

Use each assignment to build your skills and make your submissions on time. **Show good teamwork** in group assignments. **Demonstrate** the written and verbal communication skills modeled.

If the student is struggling in the class after working diligently, I will work with the student individually and tutor him/her to help him/her bring the grade up. The student can also request an extra assignment as a way to get extra credit in the class. However, it is up to each student to make the personal effort to diligently work for the best grade that they can achieve.

COURSE OUTLINE

Application of scientific, technical, engineering and mathematical knowledge will be emphasized.

Unit 1 Energy and Power

- Mechanisms
- Energy Sources
- Energy Applications
- Mechanisms Design and Calculations
- Bread-boarding and Electronic Components

Unit 2 Materials and Statics

- Statics
- Material Properties
- Material Testing
- Structural Design

Unit 3 Control Systems

- Fluid Power
- Machine Control

Unit 4 Statistics and Kinematics

Overarching Biblical Theme/Verse

Proverbs 9:9-10: Give instruction to a wise man and he will be still wiser, Teach a righteous man and he will increase his learning. The fear of the LORD is the beginning of wisdom, And the knowledge of the Holy One is understanding.

VCHS SCHOOLWIDE ACADEMIC POLICIES

Detailed academic policies are found in the student handbook, including absent work policies, iPad expected use, homework guidelines, testing policies, and academic integrity expectations. All VCHS students and teachers agree to follow these school-wide policies.

COURSE POLICIES

Classroom Policy

1. Be on time and prepared for class by having your class tools ready: pencils, eraser, pen, and notebook for note taking in your assigned seat ready to start the class. This includes having the engineering notebook out and dated.
2. Communication is an important part of IED. Raise your hand and be recognized before speaking. Please stand and introduce yourself when making presentations.
3. Follow the instructions regarding the format of the homework.
    a. You must show your work and the units for every problem.
    b. In most cases, sketches are required together with a title and any formula used in your work.
    c. Neatness, including good penmanship, is required in every piece of work submitted.
4. The students are expected to turn in all the work on time, in the format specified at the beginning of each activity, project, homework or problem.
5. Each student is expected to take active part in various group activities and presentations. Groupings will range from two person teams ("elbow partners") to three and four person teams. Peer evaluations of group work may be used in the point system.
6. All tools must be returned to their assigned location at the end of each class.
7. If working on a project, put the project away in the designated area before leaving. Each student is responsible to account for all tools and parts provided.
8. Safety comes first. Do not use any tool in an unsafe manner. If in doubt, ask.
9. Our equipment is carefully selected to support your learning, so please handle it with care and use it only for its intended purpose.
10. Additionally, there are certain areas of the classroom that are off-limits for your safety and to maintain an organized learning space. I trust each of you to follow these guidelines diligently, as they help ensure a productive and safe environment for everyone.

Homework Policy

Most activities and projects will be worked on in class. They may become homework if extra effort is required to meet the completion date. The purpose of homework is to give you an opportunity to assess how well your learned and retained the concept. It is also a good way to apply critical thinking and practice problem solving. Homework and class activities are a way to reinforce the lessons learned in the classroom.

Discipline Policy

Guidelines for behavior

1. Respect yourself, your classmates and your instructor in all of your communications and attitudes.
2. No distractions from safety and learning. Cell phones are forbidden. There will be

times that the class laptops and iPads will be closed to keep all attention where it is required.

3. All iPad and PC use will demonstrate discipline and good digital citizenship.
4. Follow instructions and cooperate with peers especially when you are in group activities.
5. We share G137 with other groups. Do not touch the experiments, projects or tools that are not your own.
6. "Whoever walks in integrity walks securely, but he who makes his ways crooked will be found out." Proverbs 10:9 applies to cheating and plagiarism.

The consequences for failing to meet the guidelines will be appropriate. They will include: verbal warning, meeting with the teacher after school, call to parents, detention, or a referral. At the teacher's discretion, the steps may be escalated for serious problems.

Grade Categories

Classwork/Homework	25%
Projects	30%
Assessments	30%
Final Exam	15%

Late/Make-Up Work Policies

Detailed information about Classwork/Homework Excused passes and the VCHS policy for make-up work after an absence can be found in the VCHS Student/Parent Handbook. Students should read the handbook for (1) details about deadlines for turning in work after an absence, (2) when homework passes can, and (3) to find out how to request work extensions due to extenuating circumstances.

In this course, students receive 1 homework pass per 10 assignments each semester.

PowerSchool Input Agreement

Frequency

- Assignments will normally be input within a week.
- Major exams will normally be input within a week to ten days.
- Major projects may take two weeks to be input.

Redemption Policy

- Homework: You can use your homework passes for late or missing work.
- Projects: You can redeem a 1-day extension per semester on 1 project of your choice.
- Tests: Each semester you can correct one test to bring your score up to 80%. You will have 1 week after receiving your test score to determine if you'd like to take advantage of this

opportunity. As part of test correction, you'll need to provide the correct answer with an explanation.

Course Format

Instructional Methods

☒Lecture
☒Student Collaboration
☒Learning by Teaching
☒Student Demonstrations
☐Workshops
☐Other:

☐Stations
☐Inquiry-based Learning
☒Lab
☒Teacher Demonstrations
☐Peer Tutoring

Role of the iPad

☒Research
☒Communication
☒Formative Assessment

☒Organization
☐Creation
☐Other:

Course Assessments

Formative Assessments

☒Pre-Assessment
☒Written Reflections
☐Polls/Surveys
☐Exit Tickets
☐Class Participation
☒Quizzes

☒Benchmark
☒Class Deliverables
☐Checks for Understanding
☒Homework
☒In-class Activities
☐Other:

Summative Assessments

☒Unit Exams
☒Papers
☐Speeches
☒Portfolios

☒Mid-Term Exam
☒Projects
☒Benchmark
☐Other:

☒Final Exam
☐Performances
☒Presentations

Academic Content Standards

VCS ESLRS *VCS teachers are committed to teaching to these comprehensive ESLRs on a daily basis.*	VCS students will: 1) Discover and develop their unique God-given talents to, as Jesus taught, "Love the Lord your God with all your heart, with all your soul, and with all your mind" and "your neighbor as yourself" through their personal Quests for Excellence. 2) Develop extraordinary success involving Academic Achievement, Artistic Beauty and Athletic distinction to serve God, their families, their communities and the world.
Academic Content Standards *Valley Christian Schools (VCS) sets the highest academic standards for all subjects at all grade levels. Fortunately, as a private school, Valley Christian Schools has the unique opportunity to select and develop K-12 standards and curriculum. While state and national common core standards mandate the skills students are taught in public schools, Valley Christian Schools is not compelled to adopt government curriculum standards.*	• ISTE-S • ACSI-BI