Principles of Engineering
COURSE SYLLABUS

Boca Ciega High School — Fall 2020 – Spring 2021
Mr. Medici — Room 9-1, 9-2 & 9-3
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COURSE OVERVIEW

Principles of Engineering (POE) is a foundation course of the high school engineering pathway. This survey course exposes students to some of the major concepts that they will encounter in a postsecondary engineering course of study. Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of materials and structures, automation, and kinematics. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

Students have the opportunity to develop skills and understanding of course concepts through activity-, project-, and problem-based (APB) learning. By solving rigorous and relevant design problems using engineering and science concepts within a collaborative learning environment, APB learning challenges students to continually hone their interpersonal skills, creative abilities, and problem solving skills. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education.

COURSE RESOURCES

- School Binder
- Powerpoints
- Handouts
- Computer/software

STUDENT EVALUATION AND ASSESSMENTS

- Class Assignments – 50%
- Cornell Way Notes – 35%
- Class Notebook (part of the school-wide binder initiative) – 15%
- Final grades for each 9 weeks are calculated using Pinellas County requirements: 90-100% (A), 80-89% (B), 70-79% (C), 60-69% (D), below 60% (F). For example, a student earning 90-100% of all available points for a grading period will earn an A for that grading period.
- All students will be given a semester exam, both fall and spring, and must take it unless the student qualifies for an exemption. A student can only exempt one semester exam in a year long class. Students who do not maintain a 3.0 or above grade point average and have more than the designated number of absences will also be required to take the course final in both terms.
- An end-of-year comprehensive exam will be given following the spring term. **All students are required to take the comprehensive exam at the end of the spring term. This exam is provided by PLTW.**

CORE PHILOSOPHIES AND GUIDING PRINCIPLES

In this course, we will use a variety of instructional methods, including lecture, multi-media, student presentations, collaborative group work, and both large and small group discussions. I am a supporter of "active learning." In this course, that means reading the information presented, completing assignments with integrity, participating in discussions, asking questions, assisting other students to sharpen skills, and studying for exams. My role is to help you learn, but you must take responsibility for your own success.
Essentials for course success:

- **Attendance:** There is a clear correlation between attendance and success in class. The responsibility to come to class is yours and as such, **you are responsible for any material missed due to absence.** Though I am happy to assist in the case of excused absences, it should be noted that attendance, by itself, is not enough to ensure student success; you must be prepared to engage in a meaningful way.

- **Civility and Respect for Learning:** The classroom is a place for serious learning, active engagement, and respect for fellow learners. Please be on time—coming in late is disruptive to both me and your fellow students. Class is over when I am finished. Please don't close your notebook, zip up your backpack, etc until we are completely finished. Please turn off/silence, and put away all cell phones and portable electronic devices (and take ear buds out of your ears), before class begins.

COURSE POLICIES AND PROCEDURES

A. Materials:

- Students should come prepared with writing utensils each day.
- Notebooks will be needed. a 2" to 2.5" 3-ring binder is recommended. They can also be purchased at any location the parent finds suitable.

B. Make-up Work/Attendance:

- Students are expected to attend class each day it comes up on the Blue/Gold rotation.
- It is your responsibility to obtain the work that you missed on the day that you return. You have the number of days equal to the number of days absent to turn in the work. Any work assigned prior to your absence is due on the date you return.
- Tests and quizzes must be made up within one week of the absence and must be made up outside of normal class time.
- If you are absent, please make arrangements with classmates to get any notes you may have missed.

C. Tardiness:

- It is extremely important to be in class on time. The Boca Ciega tardy policy will be strictly enforced. If you are tardy, please check in with me at the end of class to ensure that your attendance is coded correctly. Punctuality is a life skill . . . please work diligently to be on time all the time.

D. Assignments

- All class documents can be found in FOCUS. This is done so the proprietary documents belonging to PLTW can be password protected.
- Assignments are due at the conclusion of class on the designated day placed in FOCUS.
- Assignments should be emailed to my inbox upon completion, at the date due, unless otherwise instructed. My email is MEDICIR@pcsb.org and please place POE in the subject line.
- Late work must be completed, but will be awarded credit in accordance to PCS policy. The assignments must be completed as the skills in one assignment are often included in subsequent assignments. If there are extenuating circumstances, arrangements must be discussed prior to the due date.

E. Resources

- Autodesk Software – Students in PLTW classes can get and use at home, free of charge, the Autodesk Inventor software. We use Inventor Professional 2020 and AutoCAD 2020.
  - www.autodesk.com
- Quizlet – Students in PLTW classes will need to sign up for a FREE account in Quizlet. Once signed up, search for Boca Ciega PLTW.
  - www.quizlet.com
- Facebook – Facebook has some great pages to "Like" by searching for Autodesk while logged in. It is NOT a requirement to use Facebook, it is just a good resource.
- YOUTUBE – This site has some great how-to videos on using Autodesk Inventor.

E. Class Way of Work

- Be in your seat, prepared with the proper tools, and ready to work **when the bell rings.**
- Treat your colleagues, teachers and their personal property with respect.
- Communicate in positive ways- **foul language or put-downs will not be allowed.**
- Come each day committed to giving your best.
- Work together as a team so everyone succeeds.

F. School Rules

- The PCSB Student Code of Conduct will be used to handle discipline issues.

OVERVIEW

- ***Unit 1 – Energy and Power***
  - The goal of Unit 1 is to introduce students to mechanisms, energy sources, and alternative energy applications. Students will gain an understanding of mechanisms through the application of theory-based calculations accompanied by lab experimentation. They will also learn that as energy and power are transferred and transformed, losses to friction in the system will occur. Students will understand that such losses affect the overall efficiency of the system. They will have an opportunity to investigate thermal energy and alternative energy applications. Students will explore and gain experiences relating to solar hydrogen systems and thermal energy transfer through materials. The unit concludes with students working in teams to solve a design problem that focuses on energy and power. They will use the knowledge and understanding built through the previous learning events to create a solution to the problem. It is important for students to understand that an acceptable solution is one that fits the criteria and constraints of the design brief.
- ***Unit 2 – Material & Structure***
  - The goal of Unit 2 is for students to have a more concrete understanding of engineering through materials properties and statics. Students begin by learning about beam deflection and then forces on truss structures. They learn to identify forces acting on those structures and then gain the ability to calculate internal and external forces acting on those structures. The students learn about material properties, which lead students to the ability to properly select a material for a given task. Creating new products to meet a given need or want is not the only concern in this area of study. How to reuse/recycle materials for continued and unique uses is also learned.
- ***Unit 3 – Control Systems***
  - The goal of Unit 3 is for students to recognize the abundance of and infinite variety of computer use in our daily lives. Students learn to control mechanical systems by recognizing computer outputs and gaining an understanding of how to write code to control them. They additionally experiment with various input devices and learn how they can adapt computer code to control computer outputs. Furthermore, students gain an understanding of fluid power, both hydraulic and pneumatic. They begin to recognize the power and control advantages of fluid power.
- ***Unit 4 – Statistics and Kinematics***
  - In Unit 4 students are engaged in learning to use statistics to evaluate an experiment. Later they begin a study of dynamics, specifically kinematics, and apply statistical skills to study freefall motion. Students use theoretical and experimental data as a basis for learning statistical analysis. By collecting, organizing, and interpreting the data, students build the skills needed to understand data results. They further use these new skills and knowledge to design a vehicle that will propel itself. Later, students will address the problem of designing a machine to accurately launch an object a specified distance. Examining projectile motion is at the core of this design problem.