



ESSEX HIGH SCHOOL COURSE EXPECTATIONS



COURSE TITLE AND NUMBER: *Designing Solutions to Global Challenges*

TEACHER NAME: Jonathan Stapleton

TEACHER EMAIL ADDRESS: jstapleton@ewsd.org

TEACHER PHONE EXTENSION: 7093

TIMES AVAILABLE TO MEET: A1/2, A3/4, B3/4– in the Science Office (B102). Flex Block – C211.

A days before school in the Science Office (B102). B days before school in C114.

COURSE DESCRIPTION:

Engineering is the application of science to problem solving. Design is the creative expression of knowledge. Engineering Design is an open-discovery art form where the principles of iterative exploration enable us to find solutions to global challenges. Join other Vermont students in this collaboration between the University of Vermont and area high schools. Successful students will earn 1 credit at their own school and may also earn 3 UVM credits through the College of Engineering and Mathematical Sciences. This course is an invitation to all students that believe we can find ways to improve the quality of life for people around the world.

Students in this class are eligible for Dual Enrollment at the University of Vermont in the 2nd semester. Students will need to use a Dual Enrollment voucher in order to earn 3 credits at the University of Vermont as the equivalent of ME001 or EE 001 First Year Design Experience. They will also need a Personal Learning Plan. This will be developed cooperatively by the student, family, teacher and school counselor.

COURSE PROFICIENCIES:

Designing Solutions is based on proficiencies within the Science and Engineering Practices described in the Next Generation Science Standards. These proficiencies include...

- Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
- Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
- Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints (e.g. cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts).
- Use a computer simulation (when applicable) to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Students will develop skills in the following areas...

- Adherence to an iterative design cycle
- Constructing prototypes/solutions using a variety of tools, media, and methods.
- Use of rapid prototyping equipment
- Computer Assisted Design
- Computer Programming / Micro-computer Control

Course Outline:

- Semester 1:
 - Build skills relating to CAD, laser cutter use and 3-D printing, as well as microcontroller programming and use.
 - Practice the iterative design cycle by designing solutions to satisfy the requirements of a variety of contests.
 - Research, brainstorm, and begin planning the solution to a global problem.
- Semester 2:
 - Intensive focus on designing a solution to a global problem.
 - Tentative plan -- Continued group workshops and/or contests

ASSESSMENT/STUDENT EVALUATION:

Quarter Grading: This is a project-based class. Students are responsible for keeping an Engineering Notebook in the form of a Google Site, with sub-pages for individual projects throughout the year. While there may be some skill and knowledge tests relating to the design process, methods, and tools, the bulk of the grade for this class will be determined by documentation of the engineering process.

Mid-year/final assessments: Both the mid-year and final assessments for this class will be project based. The midterm assessment will center around a proposal for your 2nd semester design project. The final assessment will be a presentation of your completed 2nd semester project. Exams count for 20% of the student's semester grade.

Dual Enrollment: Students seeking to earn Dual Enrollment credit for this class will be expected to give presentations coinciding with the end of the spring semester at UVM (probably early May).

Non-Graded Feedback and Contests: Project grades will not be based on the quality of the engineered products that students produce in this class. However, many projects will have contest components that will allow students to gauge their product's success relative to the rest of the class. By succeeding in these contests, students may win nominal prizes or possibly a small amount of extra credit. Students may also receive ungraded, subjective teacher feedback on their performance in the class.

TRANSFERABLE SKILLS AND LEARNING HABITS:

For 2019-2020, one course specific transferable skill and the two school wide learning habits will be scored and reported separately in PowerSchool. For this course, the transferrable skill will be *Creative and Practical Problem Solving*. The school wide learning habits are *Work Completion* and *Engagement in Learning*.

STUDENT RESPONSIBILITIES:

- Treat one another respectfully.
- Handle tools and equipment with care. If you do not know how to use a particular tool, just ask.
- Return tools and equipment to their proper locations.
- Clean up your messes and assist Mr. Stapleton in cleaning up unclaimed messes.
- In the case of an accident (damage to or loss of equipment, an injury to a student, etc.) tell Mr. Stapleton.
- Use electronic devices appropriately or not at all.
- Before you throw something in the trash, consider whether all or part of it can be reused or recycled. Reduce, reuse, and recycle.
- When you are absent, check the class website and make a reasonable effort to keep up with the class.

Please see the [Parent/Student Handbook](#) for additional information related to policies and student expectations.

Please print and sign the last page and return it to your teacher or copy the highlighted line and paste it into an email to jstapleton@ewsd.org.

I have read and understood the expectations for Designing Solutions to Global Challenges at Essex High School.

Student name

Student signature/date

Parent signature/date