

# STEAM Design and Engineering

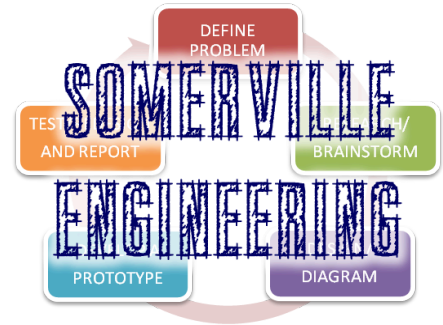
## Teacher Information

Mike Maloney: [mmaloney@k12.somerville.ma.us](mailto:mmaloney@k12.somerville.ma.us)

Website: <https://sites.google.com/site/maloneyengineering/>  
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Office Hours: Mon: 2:45-3:45 or through appointment

Google Classroom Code: p1: [f7z5ldyf](#)



Engineering is designed for students who are thinking about a college career in Engineering/Physics or related subject areas. It is meant to teach students the tools, methods, materials, and processes used by engineers. This class revolves around numerous long-term projects all following the Engineering Design Process, which is similar to the scientific method. It simulates the freshman university engineering experience. Rather than a traditional approach, this course is a project based class involving several different engineering disciplines including aerospace, civil, electrical, environmental, mechanical and structural. As students advance through the different units they will learn problem solving, critical thinking, and design skills as well as other skills that are vital to becoming a successful engineer. The class will also be in cooperation with some CTE Shops and the FabLab, with various projects optionally being designed in the room and manufactured by the shops from student created drawings..

## Objectives

Students will develop the skills of an engineer. These include punctuality, teamwork, responsibility, flexibility, loyalty, meeting deadlines, computer design and technical writing. The students will learn these skills in various ways and at the end of the year will be able to

- Be able to solve problems utilizing the Engineering Design Process
- Integrate science and math principles through design and developmental projects.
- Effectively use resources such as people, materials, tools, information and time.
- Design projects using hand and computer modeling, and create a prototype.
- Document the design process through written and graphical means.
- Make an engineering presentation of a final product.
- Invent, redesign or modify a product to optimize based on certain needs.

## Instructional Strategies

Over the course, students will learn from a variety of sources including:

- Traditional lecture and demonstration
- Guided multimedia tutorials
- Individual and Group Projects
- Group problem solving activities
- Long-term and short-term assignments
- Research Activities

# Projects

As this class is a work in progress itself, this year some of the projects we will do and how they will be done will depend on the students. The major projects will involve several (or all) of the following:

- Tutorial on Inkscape, Fusion 360 and Creo
- Engineering Ethics
- Plane Design
- Bottle Rocket Design, Fabrication and Testing
- Design and Marketing of lasercut Mousetrap Car Toy
- Design and Marketing of a Student Survival Pack
- Reverse Engineering, Redesign and Manufacturing of a Marble Launcher or other Object
- Computer and Physical Bridge Design and Testing (by hand and using FabLab)
- Cantilever Design and Testing
- Robotics Design and Competition with Lego Robotics
- Mechanical Rope Climber/Walker Design
- Windmill Design
- Various Eggdrop Design Projects
- Playground Design, Mockup and Presentation
- Designing Living Spaces and Energy with Green Engineering
- Electronics Design Project (scoreboard, multi-floor house, timer, digital lock, etc)

# Assessment

Students' work and progress will be assessed approximately in the following manner:

- 10% Responsibility (Self Reflection and Rating on School Rubric)
- 25% Practice
  - Daily/Weekly Grades
  - Completing Assignments
  - Smaller Learning Projects
- 65% Assessments
  - Competition Scores
  - Final Project Assessment
  - Post Project Reflections
  - Machine Use Practicals
  - Design Practicals
  - Group Ratings

# Additional Information

This class is highly group oriented therefore it is important to be in class and on time for class as tardiness will affect your whole group. Students are expected to be on time and may have points taken off their grade for excessive absence (unexcused) or tardiness. Students should also be active during class discussions and group work. Any homework should be completed on the day it is due, as the whole class will be building upon it. We may utilize various CTE shops during the year and when in the shops students must be courteous and respectful of the

teachers and students and be mindful of all the safety standards in the shops.

## Open Honors

This class is being offered as "Open Honors" this year. This means that you can take it for College Prep or Honors credit. Please make sure to read the Open Honors Letter sent home and on our website and return or fill out the Google Form. If you are taking this class for honors credit, please make sure to ask your teacher if you are doing the appropriate work if you are unsure. It will usually be marked as Extension or explicitly stated in assignments.