

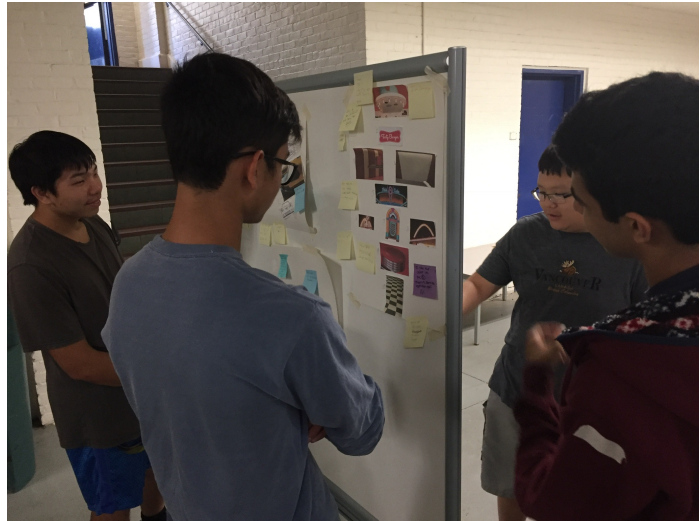
# Engineering By Design

## Engineering, Innovation, & Design Honor

### **Brief Description:**

#### *Engineering By Design*

EBD is a yearlong, project-based course that will expose students to the fundamentals of engineering design and iterative problem solving. Students will develop skills in research, ideation, modeling, project management, and collaboration. Teams of students will collaborate on design challenges. They will learn new skills & increase background knowledge in order to design, prototype, and craft an optimized solution. This course enables students to apply their creative talents as well as their prior science knowledge. Engineering By Design can be taken as part of Engineering Technology Pathway and would be a precursor to Engineering Innovation & Design. Credit can be earned from either the Career and Tech Ed Department or the Science Department.



#### *Engineering, Innovation, & Design H*

EID will provide a student-centered, project-based curriculum that challenges students to interpret real-world engineering and design problems using the engineering design lab—a collaborative setting where students will share their various skills and angles of interest to help each other advance and refine ideas. With an aesthetic lens, students will gain a greater understanding of three-dimensional design through the use of the principles of composition and the formal elements of art. In the engineering design lab, students will create physical products using hand tools, power tools, a sewing machine, a Vacuform machine, 3D Printers, a Laser Cutter, a CNC Router, etc. Their final products will integrate both functionality and aesthetics. This course will empower students by allowing them to develop skills in ideation, critique, design process, fabrication, innovation, presentation, iteration, and reflection. Students will focus on prototyping and the creation of real products (2D & 3D), moving beyond theoretical



ideas. Diverse skill backgrounds complement the collaborative nature of this course. Engineering Innovation & Design can serve as the capstone course in the Engineering Technology Pathway. Credit can be earned from either the Career and Tech Ed Department or the Science Department.

### **Overview of both classes**

They are both designed to focus on problem solving. We try to do it in a collaborative way. So for most of the challenges in both classes, you will be working with your peers. You deal with an overarching problem, in which you and your peers are trying to solve that problem in the best way possible. Both classes include a lot of skill building, so in the process of trying to coming up with solutions, you will learn some background knowledge such as how to 3D print, how to draw in CAD, things like that.

### **Typical Class**

Most days we're in projects, which means students come in and they get right to work. There are very few days in which the teachers stand up and lecture or have a big presentation to give. Most days, students will already have an idea of what they are trying to accomplish or trying to move towards to do, so they will get right to work. When class ends, they clean up and plan what they are going to do the next time.

### **Why take an engineering class?**

In the Engineering and Design pathway, we have course loads that build skills that you don't work on in the majority of your other coursework in high school. The heavy emphasis on collaboration and on risking solutions, seeing how they work, getting critiqued on them, and using that information to move on is a valuable experience. The skills gained in the collaborative environment, in terms of communication and working with other people, are incredibly valuable when you move on from here no matter what profession you take on.

---

### **Engineering by Design**



This class includes a lot of design challenges that include skill building, so we will do things like make stuff with the laser cutter, make stuff with the 3D printer, and do some lego robotics. We'll also design, glue, and build popsicle stick bridges, as well as build these pop-up boats that are like little steam-powered boats.

Grade Level: 10-12

Number of Meetings per week: 4

Full year or half year: Full Year

Number of Credits: 1

Prerequisite/helpful classes?: Physics I required

-----

### **STUDENT PERSPECTIVES**

"I like how the class is really independent; it's up to you to get the work done. We learn a variety of software and techniques, and the teacher is good. It's a great class to take if you are interested in engineering and are good at working in a team."

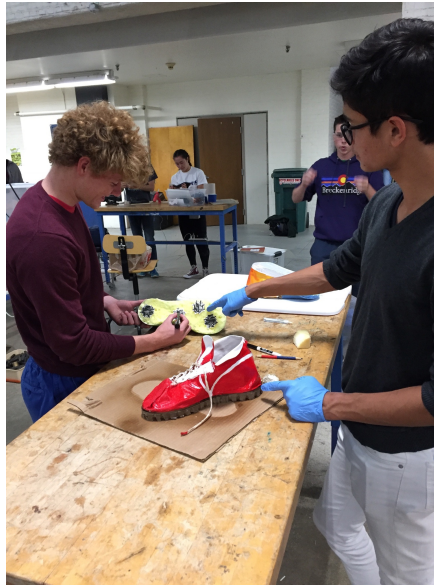
- Sander S. '19

"We designed and built arcade games like air hockey. A big focus is the engineering and design process, planning and collaborating with other people, and making prototypes. It was really fun."

- Camila P. '19

---

## **Engineering, Innovation, & Design**



Students start by making shoes, and then they will do a cardboard chair project. Students will also do a large project that is user-based, so they find a problems that users have and come up with solutions for that. This course takes Engineering By Design further by adding the element of art and trying to bring in fundamental components that make up design. The focus is not only the function (“Does that thing solve the problem?”) but also “How is it perceived by the user?” It’s really caring about the aesthetic and how the user interacts with the solution.

Grade Level: 12

Number of Meetings per week: 6

Full year or half year: FY

Number of Credits: 1

Prerequisites: One of the following sequences: Engineering By Design; Sculpture I & Sculpture II; Woodworking I & Woodworking II; Sculpture I plus two additional Visual Art courses; Drawing I plus two additional Visual Art courses; AP Physics & Sculpture I /Drawing I; AP Physics & Engineering the Future; Portfolio Reviews (students working outside of school present work and written application to instructor) Or Three of the following individual courses: Visual Art ; AP Science; World of Money/Business; Computer Programming; Architecture; Engineering The Future

-----

### **STUDENT PERSPECTIVES**

“You sort of have this insane range of things you can do, working in a workshop and building something that’s actually useful - it’s different from other classes. My favorite project is the chair project. The one I built is sort of flat-packed, like it could be an IKEA chair but it isn’t.”

- Dan S. '19

"I recommend this to someone who is a bit tired of regular science classes. I feel like it is definitely a class that teaches you about collaborating with other people in a different setting. Every person's opinion and what everyone brings to the table is really accounted for, which is different than in a slideshow project or group presentation."

- Richie D. '19