

SEED SYMPOSIUM: FALL 2021

Project Course Descriptions and Presentations

9TH GRADE: MECHANICAL ENGINEERING

Instructor: Cheetiri Smith, Teaching Assistant: Manasi Vaidiya, Charlene Xia

In this course, students will explore the field of mechanical engineering to gain exposure to the many areas in which mechanical engineers can work through lectures, a panel discussion with industry professionals, assignments, and a final design and fabrication project. Students will work in small groups as design teams to ideate, prototype, and build a toy using materials provided by the class. Additionally, students will explore specific areas within mechanical engineering and identify a mechanical engineering career that is relevant to personal interests.

Presentations

“Sharp Shooters”

The goal of our toy is to shoot a rubber band at fast speeds and have it safe enough to play with it. The toy can be used in different play styles and shouldn't be limited to one thing. The toy should be used in an appropriate way and shouldn't be used in a negative way, or it may cause an injury so using the suit is recommended.

“The Straw Hats”

The classical Angry Birds game in real LIFE! Build structures to protect your piggies using the various blocks provided. When you've prepared your structure, grab your slingshot, and use the various types of birds we've made to shoot the piggies down. Fun Fact: The Slingshot was created in inspiration of Usopp's slingshot from the anime *One Piece* in reference to our team name. If you don't feel like playing alone then

bring a friend! Use the blocks to build your own separate structures, roll the dice to decide how many times each player gets to shoot at their opponent.

“The Ballers”

Abdul Alamatu, Malachi Sonderreger, Steven Miall

Our project is three minigames in a box. There is a box, and inside there are three games you can play, basketball, football, and wall ball. The basketball minigame will have a hoop to shoot in, and a ball too. Football is where there is a field goal post and it comes with a football. And the last one is wall ball, where a ball comes with the box, and you can bounce it off the box for fun.

9th Grade Toy Demonstrations

10TH GRADE: COMPUTER SCIENCE

Instructor(s): Mirna Gouda, Teaching Assistant(s): Shulammite Lim, Joy Domingo-Kameenui

The SEED Computer Science project course introduces code and computer programming in Python to any beginner. No background in Computer Science or programming is needed. Code and programming are central to so many fields beyond computer science. We will cover important basics of programming in Python including control flow, variables, functions, dictionaries, logic, decomposition, good programming style, whole-program structure, debugging, and performance. Python is a huge language with many advanced features, this course does not cover all of Python's features. The course teaches the important core features, and students are able to solve real programming problems with just this course.

Presentations

“Rock, Paper, Scissors”

The game Rock, Paper, Scissors is a hand game that is usually played with two people. Using python, we created a computer version where the user plays against the computer.

“Word Guessing Game”

This is a text-based python version of the Hangman game. When the user plays our game, the computer first selects a secret word at random from a list built into the program and the user has to guess!

“Astrology Quiz App”

This is a game that analyses your astrology personality based on your answers to a quiz.

“Unit Converter”

Conversion of various quantities between unit systems is a very common engineering task. In this python project, we created a program that does unit conversion for the user.

“Speed Typing Game”

Have you played a typing speed game? It's a very useful game to track your typing speed and improve it with regular practice. We were able to build your own typing speed game in Python

11TH GRADE: DATA VISUALIZATION

Instructor(s): Ira Ceka, Teaching Assistant(s): Matt Boyd, Gianfranco Yee

The goal of this course is to provide students with experience in Data Visualization using Python. This course will expose students to critical Python concepts, such as variables, functions, for and while loops, list comprehension, and dictionaries. Students will employ data visualization techniques through introductory methods such as bar charts, histograms, scatter plots, and more intermediate concepts like heatmaps and word clouds. Students will gain familiarity with Python packages and libraries such as Pandas, Matplotlib, and Seaborn. After 6 weeks of interactive instruction, students will be presented with various datasets and will formulate groups for a final group project. They will study these datasets and employ the proper techniques to answer analytical questions regarding data trends.

Presentations

“Uber Dataset”

Visualizing number and location of Uber trips in New York City.

“COVID Tweets”

Visualizing sentiment, number of tweets over time, language distribution.

“Heart Disease Dataset”

Visualizing correlation between different physical statistics.

“UFC Dataset”

Visualizing correlation between different player attributes.

“Premier League Dataset”

Visualizing game statistics.

“Insurance Dataset”

Visualizing correlation between stats like BMI and costs.

12TH GRADE: ENGINEERING DESIGN

Instructor(s): Andres Velarde, Teaching Assistant(s): Prem Sagar, Xamier Ferran

The purpose of *Engineering & Design for Problem Solving* is to introduce students to design-thinking frameworks that will enable them to transform new ideas into tangible or actionable solutions for real-world problems. This course will serve as part of a **Capstone Project** where students will combine the substantive knowledge they have gained from previous SEED Academy courses (e.g. MatSE, CivE, CS, EE, MechE, BioE, etc.) with fundamental design practices to develop a compelling solution for *problems that exist within cities*. Students are strongly encouraged to identify and tackle issues that have significance in their own lives or communities. As a starting point, this class will explore aspects of [City Science](#) currently being investigated by researchers at the MIT Media Lab. Namely, students may seek inspiration from focus areas such as: (1) Places for Life/Work; (2) Urban Modelling, Simulation & Prediction; or (3) Mobility on Demand. Examples of problem areas may include: affordable housing, sustainable buildings, city agriculture, food waste, education, social equity, etc. Over the course of the semester, instruction will serve five main learning objectives -- presented in logical order and culminating with an end-of-semester symposium. In brief, these learning objectives pertain to:

1. Finding the Problem & the People
2. Ideation, Refinement, & Letting Go
3. Prototyping & Iteration
4. Branding & Image
5. Storytelling & Public Narrative

Presentations

“Cheapr”

Students are developing a mobile app to help people from low-income households make the most of food supplies in their area. The proposed functionality of the application includes: store and foodbank locators, recipe algorithms, and nutrition information about various sources of food in their neighborhood or community.

“The Game of Life”

Students are designing an interactive table-top board game that enables players to understand and empathize with the implications and impacts of systemic racism and socio-economic disparity in American society. Inspired by *The Game of Life*, this new board game recreates the lived experiences of marginalized people rather than those of the privileged.

“The Commuter Rail of the Future”

Students are rethinking the design of Boston’s commuter rail. They are exploring the principles of magnetic levitation and propulsion to create a futuristic locomotion solution. In addition, they are thinking of ways to improve the quality and accessibility of train stations for those underprivileged commuters who most rely on public transportation.

“Breathe Easy”

Students are building an online community of mental health professionals to help people manage and maintain their mental health. Like Discord or Slack (online communication platforms), their website also allows people to support each other by sharing their own stories on mental health. Most importantly, this website seeks to give people who struggle with mental health a voice and validation.

“TheraFuzzies”

Students are designing plush toys that are programmed to guide through various diaphragmatic breathing exercises and other forms of stress-relieving mediation. The proposed toys will also interface with a phone application to help people facilitate and track their own personal mediation routines.

“Green Spaces in School”

Students are designing an interactive greenspace and learning environment for deployment in school environments/buildings. In addition to being a greenhouse, the space is also designed to employ state-of-the-art controlled growth equipment (automated watering, lighting, soil pH, etc.) to enable students to grow their own gardens and learn about flora from all over the world.