Fairfax Collegiate

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Intro to 3D Printing 5-6 Syllabus

Course Goals

1 Learning the Design Process
Students become accustomed to the multi-stage process of converting ideas into products, and the designing, prototyping, and redesigning that are inherent along the way.

2 Meeting Design Specifications
Students create products to fit specific, predetermined criteria, and gain experience making optimizations within their bounds.

3 Invention
Students gain confidence in their ability to creatively design and invent new things, or make innovative modifications to existing designs.

Course Topics

1 Demystifying 3D Printing
Students learn the inner workings of the hardware and software of the 3D Printing design pipeline, deobfuscating the process from CAD to physical object.

2 Mathematical Understanding
Students grow accustomed to conceptualizing and designing objects in 3-dimensional (x, y, z) space.

3 Ethical Consideration
Students develop a thoughtful consideration for the ethical questions and impacts associated with commonplace 3D printing technology.

4 Software Skills
Students learn to use relevant tools in the form of Tinkercad and other design software.

5 Confidence in Troubleshooting
Students are given direct (but supervised) agency in determining where mistakes were made and how to rectify them, building technical independence.

6 Design Challenges
Students create products to address specific design challenges.

7 Marketing
Students pitch products for faux-investor approval, designing presentations and answering questions to demonstrate a thorough understanding of their product.

Course Schedule

Day 1

Introductory Topics
Students are familiarized with the basics of 3D Printing, as well as the fundamentals of the design process.

3D Printer Upkeep and Maintenance
Students learn about how to take care of their machines.

Sample Print
Students learn the process of printing an object in .gcode form.

Introduction to 3-D Design
Students explore a mathematical overview of design in 3-D space.

Tinkercad Tutorial
Students complete an introductory tutorial to TinkerCAD.

Day 2

Printer Setup
Students ensure the printers are ready after setting them up.

Introduction to GCode
Students learn the basics of GCode, the machine code for the printer.

Tinkercad Lessons
Students learn more advanced tools for working with Tinkercad.

Day 3

Introduction to Cura
Students learn how to slice with Cura.

Full Print, Start to Finish
Students step fully through the 3D Design and print process.

Replicating an Object
Students recreate existing designs from memory.

Design Challenge: Nameplate
Students design a desk object with their name on it, as an introductory design challenge.

Day 4

Printing Objects
Students print out objects from their past designs.

Learning Cura
Students learn some of the finer details of working with Cura.

Design Challenge: Chess Piece
Students design a custom chess piece.

Day 5

Printing Objects
Students print out objects from their past designs.

Pros and Cons of 3D Printing
Students learn about some of the physical limitations of 3D printing.

Printer Upgrades
Students research enhancements they can make to the printing experience.

Design Challenge: Nature
Students make a design inspired by the natural world.

Day 6

Printing Objects
Students print out objects from their past designs.

Scanning
Students scan, modify, and replicate everyday objects.

Design Challenge: Cities
Students design an object to fit a booming metropolis.

Day 7

Printing Objects
Students print out objects from their past designs.

Painting and Finishing
Students stylize their objects.

Design Challenge: Refactoring
Students modify a previous design.

Day 8

Printing Objects
Students print out objects from their past designs.

Ethics of 3D Printing
Students have a discussion about topical questions in the field of 3D Printing.

Painting and Finishing
Students stylize their objects.

Design Challenge: Problem Solving
Students work in groups to design, print, and test solutions to a given design challenge.

Day 9

Printing Objects
Students print out objects from their past designs.

Bridge Building Competition
Students design, print, and test their own bridges.

Day 10

Shark Tank
Students research, design, and "pitch" their own inventions to the teacher, mimicking the popular television series of the same name.

Updated on 4/4/2022