

LT 3737/7777: Module Overviews

DF100: Introduction to 3D Printing

Needs lab equipment

In this module, you'll learn all about 3D printing, including finding, downloading, slicing, and printing an item. In order to earn your point, you'll need to download a simple item from Thingiverse, print it out, and show it to one of the instructors.

DF101: Introduction to 3D CAD

Can be done in class or out of class

For this lesson, you'll learn all about 3D CAD. CAD stands for computer-aided design. To make your own objects to 3D print, you'll have to be able to use CAD software. CAD software ranges from free, web-based for beginners (like Tinkercad) to professional-level software suites (like AutoCAD). We'll begin by learning about the history of CAD, and then we'll explore and use Tinkercad. A link to the web-based software is included in the lesson. To complete this module, you'll follow the tutorial to design a wrench, and then upload the design.

DF102: Introduction to Die Cutting

Needs lab equipment

In this module, you'll get a basic overview of digital die cutting, which involves using a machine to cut and/or perforate a sheet of material (usually cardstock) based on a digital design. Our die cutters are called Silhouettes. To complete this module, you'll use a Silhouette to create a model that you'll download.

DF103: Introduction to Die Cutting: CAD

Needs lab equipment

In this module, you'll learn how to develop designs to cut on the Silhouette die cutter using the Silhouette Studio software.

DF104: Introduction to Laser Cutting

Needs lab equipment

In this module, you'll be introduced to a laser cutter and its capabilities. To complete this module, you'll take a quiz based on what you've read and you'll cut an object using the machine. Laser cutters can be dangerous, so be sure to pay attention to the safety information!

DF105: Introduction to Laser Cutting CAD

Needs lab equipment

This module introduces you to how to take a computer file, generated by computer-aided design (CAD) software, modify it, and send it to a laser cutter.

DF106: Machine Sewing

Needs lab equipment

A sewing machine is a powerful making tool. In this module, you'll learn about the parts of a sewing machine and how to sew two pieces of fabric together. The module concludes with a sewing challenge.

DF200: Advanced 3D Printing

Needs lab equipment

In this module, you'll learn more about 3D printing, including how to import and set up prints for the Formlabs printer. To complete this module, you'll need to print an item using the Formlabs printer and show it to one of the instructors.

DF201: Advanced 3D CAD

Can be done in class or out of class

This module builds on the design foundation you established in DF101 using a more advanced piece of CAD software.

DF202: Project: Die Cutting

Needs lab equipment

This project asks you to create a 3D artifact using two or more die cut pieces.

DF250: 3D Printer Maintenance

Needs lab equipment

Unfortunately, 3D printers aren't quite to the plug-and-play, or set-it-and-forget-it level yet. They require some upkeep and maintenance. In this module, you'll learn how to maintain the 3D printers and troubleshoot some common issues. To complete this module, you'll show an instructor the ways that you have learned to maintain a 3D printer.

DF300: Project: 3D Printing

Needs lab equipment

This project asks you to create a 3D printed artifact using two or more pieces.

DF304: Project: Laser Cutting

Needs lab equipment

This project asks you to create a laser cut artifact using two or more pieces.

MC100: Introduction to Circuits

Needs lab equipment

In this module, you'll learn all about circuits, and then create your own using some supplies you'll find in the lab. Learning how to create simple circuits—like the one in this module that lights up a small light bulb—can lead to creating more complex electronics.

MC101: Introduction to Coding

Can be done in class or out of class

You'll explore the process of programming, or coding, in this module. Instead of the typical text-based environment, we'll focus on block-based coding, a more user-friendly coding environment.

MC102: Introduction to Microcontrollers

Needs lab equipment

Microcontrollers are credit card-sized computers that give people the experience of building electronic devices and understanding the mechanics behind the powerful technology that they use every day. In this module, you will create circuits using a microcontroller.

MC200: Advanced Circuits

Needs lab equipment

In MC100 you created a simple circuit using wire, a battery and a small LED. You'll use what you learned in that module and expand your knowledge to create a parallel circuit. Now, it's time to dig into some more complicated circuits. In this module you'll be learning about parallel circuits then you'll create your own circuit project using supplies that you find in the lab.

MC201: Advanced Coding

Can be done in class or out of class

So far, you've primarily coded using block-based coding environments, like Scratch. Scratch was designed to teach the fundamentals of coding. Now that you've gotten a good handle on the fundamentals, you're ready to start programming in more typical, syntax-based coding environments. Our friends at Georgia Tech have created software called Earsketch that's designed to teach students either (or both!) of two programming languages: Python and JavaScript. The fun part is that you learn to code while creating excellent digital music. So grab some headphones and get coding!

MC202: Advanced Microcontrollers

Needs lab equipment

In this module, you'll learn all about how to use the Makey Makey, a toy that allows you to use everyday objects as a keyboard and mouse.

MC203: e-Textiles

Needs lab equipment

Welcome to the module on e-Textiles! In this module you'll learn how to use the LilyPad, a sewable microcontroller, and conductive thread to create your own "soft circuits." To complete this lesson, read through the materials, watch the videos, and then complete the experiment.

MC210: App Development

Can be done in class or out of class

This module uses a software platform called App Inventor to teach you how to build simple mobile apps. Like Scratch, App Inventor is a block-based coding environment, which means you'll build your code by dragging-and-dropping blocks. If you want to be able to test your app on an actual smartphone, you'll need an Android phone. If you do not have one, you can borrow one from the lab.

MC300: Project: Mechatronics

Needs lab equipment

This project asks you to create something that includes both a microcontroller and a physical object you fabricate yourself.

MC400: Super Project: Mechatronics

Needs lab equipment

This project is the Super Mega Extra version of MC300!

MD100: Introduction to Graphic Design

Can be done in class or out of class

In this module you'll learn about graphic design. Graphic design can be described as the art of creating 2D designs for use in a variety of contexts for specific purposes (for example, to inform, to inspire, or to persuade). In later modules, we'll learn more about other types of multimedia design.

MD101: Sound Mixing

Can be done in class or out of class

Audio mixing, sound design, and sound effects add much to your project, whether it's digital video, animations, or video game. This module will introduce you to the fundamentals of sound mixing and provide opportunities for you to design your own audio, using Audacity, a popular cross-platform, open-source audio editing software.

MD200: Digital Stories

Should be done outside of class

Digital stories are brief videos, usually around two minutes long, that consist of a narration, a series of still images, and a backing soundtrack. Traditionally, they are personal narratives, though I would argue that their utility in the classroom extends beyond the personal narrative to stories that tell an under-appreciated episode from history, or to remixes of classical literature. In this module, you are going to make a two-minute digital story.

MD201: Drawing in 3D VR

Needs lab equipment

Virtual Reality is a computer-generated artificial environment that allows users an immersive digital experience. The most common way for users to experience virtual reality is through wearing a headset which covers the user's entire field of vision with a computer screen. The view on the screen moves in coordination with the user's movement around the physical environment. In this module, you'll learn to draw in a 3D virtual environment using a piece of software called Tilt Brush.

MD203: VR 3D Modeling

Needs lab equipment

You've designed a 3D object in two dimensions (remember [Tinkercad](#)?). While the interface is simple enough, it can be a challenge to use a mouse and a flat screen to visualize a 3D object. Using VR, we can create a 3D object in three dimensions! For this module, you'll learn how to use a piece of software called Blocks to make 3D designs in 3D virtual reality.

MD210: Stop Motion Animation

Can be done in class or out of class

In this module, you'll use materials you have around your home along with a little bit of technology to make a type of physical animation.

MD300: Project: Story Installation

Needs lab equipment

To complete this module, create a personal installation. Your installation should include at least 3 multimedia and multiple medias (like video, sound, 3D printed objects, photos, 3D drawings, etc.).

P&P000: Course Overview

Will be done as a group in class

This is an introduction to the course and course website.

P&P100: Maker Movement Introduction

Will be done as a homework assignment

What is making? Who are makers? What is a makerspace? What is the maker movement? What is its role in education? And, more crucially, how can making be leveraged to support teaching and learning? We'll spend the whole semester developing answers to these questions. This lesson will begin to help you to begin formulating your answers.

P&P200: Intro to Maker Education Theories

Should be done outside of class

In this module, you'll read about some of the theoretical foundations of maker education and how those theoretical foundations are manifested in classrooms. Pay particular attention to discussions of constructivism and constructionism. They're closely related (and sound almost exactly the same), but there are some subtle differences. At the end of this module, be prepared to answer some questions about what you read!

P&P201: Maker Pedagogies

Should be done outside of class

This module introduces you to pedagogies that are consistent with making. These pedagogies provide a structure to consider when thinking about integrating making into formal classrooms.

P&P202: Introduction to Design

Can be done in class or out of class

This module focuses on the process of designing. There are a number of design processes that a creator can employ, depending on the circumstance. In this module, we'll begin with the engineering design process, which forms a basis for our understanding of systematic creation. Then, we'll see how two of the most influential early makers adapted that process to allow for play and creativity. Finally, you'll employ a design process yourself in the construction of a catapult.

P&P300: Adv. Maker Education Theories

Should be done outside of class

The following two theoretical constructs form the foundation of much thinking about maker education. Constructionism describes the relationship between building something and learning, and communities of practice describes how groups of people can construct knowledge.

P&P301: Project: Curriculum Design

Should be done outside of class

The purpose of this project is for you to think about applying maker principles and technologies into learning environments. It's a great opportunity to show off what you know! This is arguably the most important module in *Inventing to Learn*. You will design a piece of curriculum (a mini-unit, a full unit, a whole course, etc.) that leverages making to support student learning. If you have any questions, please don't hesitate to ask an instructor. And feel free to discuss your concepts with your classmates and/or with instructors.

P&P302: Design Thinking

Can be done in class or out of class

In P&P202, you used the Engineering Design Process to solve a simple, engineered and artificial problem. Let's be honest, before that unit, you didn't really need to make a table-top catapult. It wasn't an authentic problem you were facing. But you did see how a cyclical process of designing, prototyping, and testing could improve your work. Now it's time to take those same procedures to real-world problems with Design Thinking. NOTE: To complete this module, you'll need a partner. If you would like help finding a partner, please let one of the instructors know during class.

P&P303: Design Thinking, Part 2

Can be done in class or out of class

In Design Thinking, Part 1, you and a partner practiced the design thinking steps and designed a first draft of a solution related to getting to class. In this module, you will use the design thinking process again on a different scenario. As was the case with P&P302, you'll need a partner for this module. Feel free to work with the same partner if you want!

P&P401: Project: Curriculum Design, Part 2

Should be done outside of class

This module builds on P&P301: Project Curriculum Design, Part 1. The purpose of this project is for you to apply what you've learned through the process of designing a piece of curriculum from P&P301 and to create another piece of curriculum.