**3D print lab (90 min window for CAD tutorial and design, 45 min window for print demo/everyone sends prints to queue)**

**Summary:** 3D printing is an advantageous technique for rapid prototyping and increasingly for customizable manufacturing.  Assuming there is a computer or laptop for every student the goal is to start with a guided intro to CAD. Then we can have several base files which they can edit and customize before printing- likely soccer themed would be ideal.  We’ll then go through the process of saving the file for printing and they’ll send it to the printer queue or to us so that we can load the cue. We’ll start a print, and then they can take a lab tour once things are printing to see the progress.

**ILOs:**

1. Create printable designs in CAD
2. Know the basic operating principles of a filament 3D printer
3. Operate a filament 3D printer (basically just upload the design and hit go)

**Equipment list:**

* 3D printer and filament (based on individual university availability, but generally recommend printing with PLA)
* Computer per student (access to <https://www.tinkercad.com/>)

**Intro:** 3D printing is an advantageous technique for rapid prototyping and is being used increasingly for customizable manufacturing. There are various different types of 3D printing techniques, including additive printing with plastic filaments and stereolithographic printing. There is increasing research being done on multimaterial printing and new 3D printing applications. We will be using a filament 3D printer.

**Procedure:**

**Start**

To get started, test / play around with the design space to get familiar. The slideshow will also show you how to manipulate objects in the space. When you understand how to change your view to your preference, add and remove objects, and extrude and join, go ahead and move on to the next part.

**Next**

Using the internet, we can find starter files to modify and personalize just for us. (This is optional, and you can choose to completely design your own from scratch, which may take more time.)

Choose between the starter files provided for you:

Start files can be downloaded from : <https://www.printables.com/>

<https://www.thingiverse.com/>

Once you have your starting shape, go ahead and modify it however you like.

Suggestions:

* Add your name, or the name of your favorite club! This is the easiest way to personalize anything, and can be done easily with text.
* Add a location, like home, school, MIT, or somewhere you want to watch a futebol match!
* Add a shape, several shapes, or even invent a new shape!
* Be Creative!

Warnings:

* Remember the size of your souvenir. Details too small or thin may not print well, or print at all.
* Remember how the 3D print process works. Complicated designs without a good base may also be difficult to print or process after printing.

**Lab Handout:**

No, however we recommend making a tutorial on how to do basic steps in tinkercad, such as making, modifying, and editing objects.

**Notes:** Most student projects will require some edits to be printable. For best success, we recommend that instructors slice the objects for printing, along with making any required modifications.