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# 3D Modeling and Printing Resources

This project utilizes *Autodesk Fusion 360* as its 3D modeling software. It is highly advised to continue the project using *Fusion 360*.

## 3D Modeling

### Autodesk fusion

Autodesk Fusion is free for eligible educators and students. Download the education version from

<https://www.autodesk.com/campaigns/education/fusion-360>

### Learn to use Fusion

To get a basic understanding of the toolset available to you in fusion, I suggest looking up videos online from creators explaining to you what the various tools and functions do. They also explain the essential features of fusion that differentiates it from other 3D modeling software.

I suggest following this video series from day 1:   
«[*Day 1 of Learn Fusion 360 in 30 Days for Complete Beginners! – 2023 Edition*](https://www.youtube.com/watch?v=d3qGQ2utl2A)» by [**Product Design Online**](https://www.youtube.com/@ProductDesignOnline).

* Follow along in *Fusion* by yourself!

Then, play around with what you have learned by modifying existing models and creating new ones. Do your own search for tutorials that cover what you struggled with the most. Important keywords here can be *parametric design* and *sketching* in Fusion 360.

### 3D models

Tends to be more functional/technical models. Their intention is not necessarily to be 3D printed instead of professionally manufactured:

<https://www.autodesk.com/community/gallery/>

<https://grabcad.com/library>

These are typically more models that are made to be 3D printed:

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

<https://thangs.com/>

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

## 3D printing

Once you have the models ready, it is time to prepare for the 3D printing process.

### Access to 3D printers

To gain access to 3D printers, you can attend [MAKE NTNUs](https://makentnu.no/) 3D-printer courses. Do it as early as possible in the semester! This will give you access to 9 different 3D printers, 6 *Ultimaker 2+* and 3 *Ultimaker 2+ Extended*, and free [*PLA*](https://en.wikipedia.org/wiki/Polylactic_acid) filament. These have limited availability, but this will be mentioned during the 3D printer courses. Make sure to actively reserve time to use the printers. Keep an eye on the <https://makentnu.no/news/events/> to see the upcoming 3D printer courses.

It is also possible to gain access to more advanced 3D printers, the *Raise3D Pro2* printers. However, they require another course, which you can attend only after completing the first 3D modeling course and gaining some experience in 3D printing. This is necessary if you want to print in a material like [*ABS*](https://en.wikipedia.org/wiki/Acrylonitrile_butadiene_styrene). ABS is a material that has a higher melting point than PLA, and thus a higher heat resistance. However, when melted it can release toxins, so it needs it own specialized printers.

### Slicers

*Slicers* are a software that translates 3D model file formats like “*.stl*” into “*.gcode*” files. The “*.gcode”* files are a blueprint for the 3D printers on how the 3D model is to be printed on the printer. Some is done automatically, yet several parameters can be customized in a slicer, and all will affect the quality of your print.

Using the Ultimaker 2+ printers, I suggest getting to know the slicer *Ultimaker Cura*. This can be downloaded from <https://ultimaker.com/software/ultimaker-cura/> . Very user friendly and easy to understand after some experimentation. The courses at MAKE NTNU will introduce this slicer and its possibilities.

Another slicer available is [ideaMaker](https://www.raise3d.com/ideamaker/) by Raise3D. This slicer offers higher customizability at the expense of user friendliness. But is it necessary to learn this if your ambitions are to utilize other printers than the Ultimakers.

### The printing process

The Ultimaker printers requires the gcode files to be saved to an SD card. This can be done on location at MAKE NTNU Gløshaugen. All the details you need to be aware of during printing will be spoken about in the MAKE NTNU courses.