

3D Printing in the Burling Library Digital Studio
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Before Use

For technical specifications and a broad overview, visit <https://bambulab.com/en/p1>.

The printers are free for reasonable academic and co-curricular use to students, staff, and faculty, ideally after receiving instruction from Max Schafer. These stipulations are intended to limit the waste of consumable filament, avoid malfunctions, and to keep them operational.

This guide assumes that you already have a file that you wish to print – sites such as makerworld.com and thingiverse.com allow you to browse and download user-created 3D print files. Read descriptions and community comments before downloading, and bear in mind that we can only print one color at a time.

If you would like to create a 3D object for printing from scratch, please reach out to Max Schafer (schaferm@grinnell.edu) and set up a meeting.

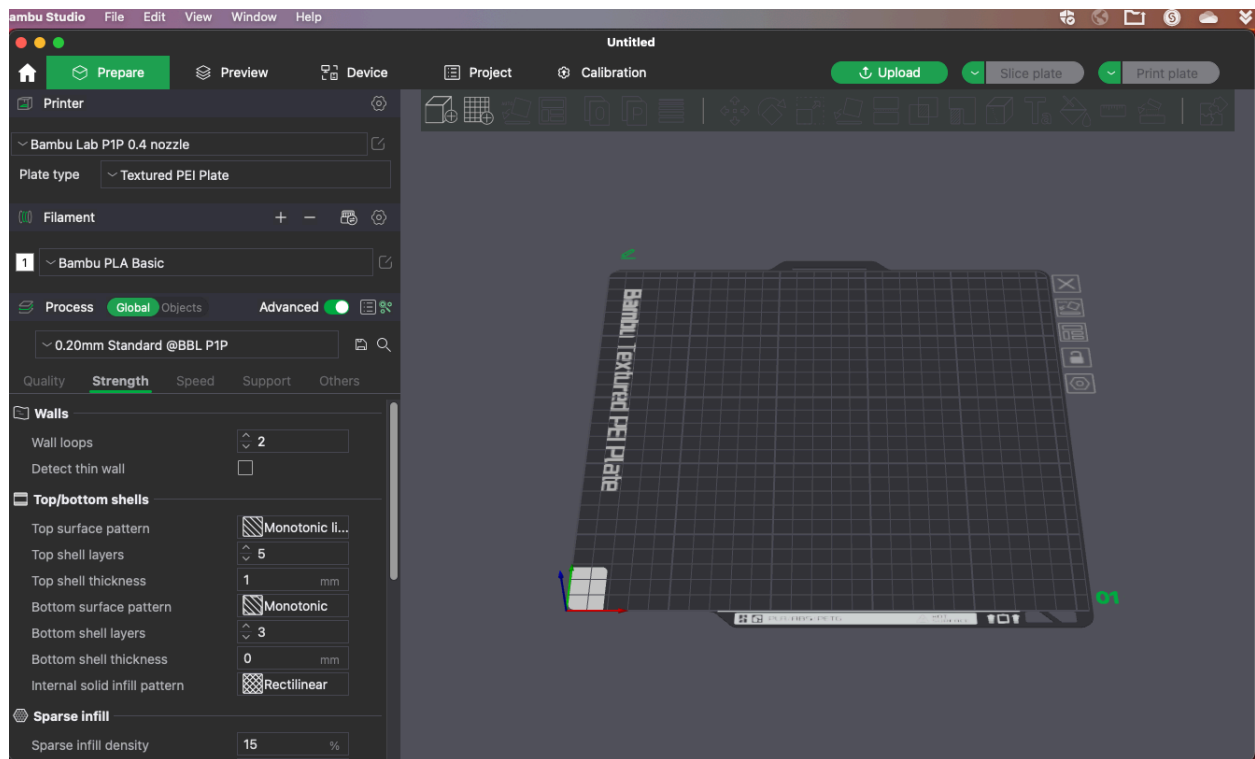
Hardware

The items below are the expected tools for use with the 3D printers. They should be generally present and available in the Digital Studio.



Software

The most important piece of software is Bambu Studio. This program is called a slicer and takes 3D files (STL, OBJ, 3MF, etc.) and turns them into instructions for the printer to print layer by layer.



Preparing a File

To begin a new project, use File>Import>Import [filetype] to load in your print. Along the left you will see a variety of settings. For now, the most important things to check are that under:

- Printer - BambuLab P1P 0.4 nozzle is displayed
- Plate type – Textured PEI Plate is displayed
- Filament – the correct filament type is displayed (the filament’s spool behind the printer will indicate its type)



- Process – 0.2mm Standard @BBL P1P is displayed

These settings may change when a loaded file tries to tell Bambu Studio what parameters to use, but should be reverted. The hardware we have does not support multicolored printing or other nozzle sizes.

Once an object is visible on the printing plate, you may make adjustments via the tools above the plate-viewing area. You may also adjust the camera angle and pan the camera with mouse controls. Regularly used toolbar options are Scale, Rotate, and Arrange.

When the object is to your liking, consider the shape you are printing as it will be built, from the bottommost layer up.

- Are there overhangs or sharp angles that could fall over?
- Is your object tall and thin, and thus at risk for wobbling from the mechanical vibration?
- Is your object laying on its flattest face?

If these apply, or if you aren't sure if they apply, it is recommended that you adjust the support settings. Checking this box will tell Bambu Studio to look over your object before printing and include structural plastic to ensure a smooth print. Support structures are usually printed at a different density to your object, and should separate easily after cooling.

Along the top of Bambu Studio, we will now move from Prepare to Preview. The software will parse your object(s) and all necessary supporting structure to create a plan to print from. A semi-transparent window will open to indicate how much filament will be used and how long different components of the print will take. Your print will also now be color-coded and display support structures to give you an idea of what it will look like on the print bed. In the lower-right corner, a window should also pop up with the message "Slice OK" to indicate the print should be successful.

Printing

Both printers have an inserted microSD card for you to use; remove the card from the printer. It is located behind the printer's screen, and is highlighted in the image below in blue.

Use File>Export>Export G-Code to load your print job into the microSD card. Adapters for regular SD cards, and adapters for regular SD cards to USB slots are available.

The microSD cards have several folders and files, but the place to save your G-Code to is the folder "models." This is the folder the printers check for printable files.



From the printer's home screen, use the arrows and center button to select the file folder-looking icon (highlighted in yellow in the image above). The most recently uploaded files should be near the top, and you should recognize the filename of your print job. Select it, and the printer should begin warming and leveling itself.

Please remember to log off the computer with Bambu Studio when finished – once you have loaded the print file to the microSD card, no further action on the computer is required.

When your print is finished, allow it 10-15 minutes to cool down. This helps your object separate from the hot plate, and helps it hold its own shape better. Once cool (the number circled in pink should be <35°C) the print should be easy to remove with slight wiggling. If not, remove the metal build plate and bend slightly. Your item should pop off. As a last resort, there is a metal scraper kept near the printers that can be used to get leverage – beware though that this can scratch the plate, making future items less able to stick to the build plate.

Things to note

- Check the amount of filament remaining in the spool before printing. Running out mid-print is not the end! A new spool can be loaded and the print resumed. Due to the limited amount and variety of filament kept on hand though, the color is likely to be different.
- Complexity and size are the two biggest factors in how long a print takes. A large project (over 6 hours) reduced to 90% of its original size can save more than an hour of print time.
- Conversely, the smaller an object or one of its components is, the more likely it is to break or look bad. Scaling up the item by 10% is usually enough to stabilize it.

- Painting a 3D printed object is best done by:
 - Washing with isopropyl alcohol and a brush to remove debris
 - Applying a coat of primer
 - Acrylic or spray paints work best (wear goggles and work in a ventilated area)
 - (optional) Use a varnish to protect the paint
 - Let dry completely
- **Do not eat off of or with 3D printed objects. Do not store water-intensive plants in 3D printed containers. Do not subject them to extreme temperatures or significant mechanical stress. Use files and sandpaper if needed to smooth your finished product; do not use acetone to smooth 3D printed objects.**
- For additional safety information, consult the Safety Data Sheets for Polyactic Acid (PLA) or Polyethylene Terephthalate Glycol (PETG)