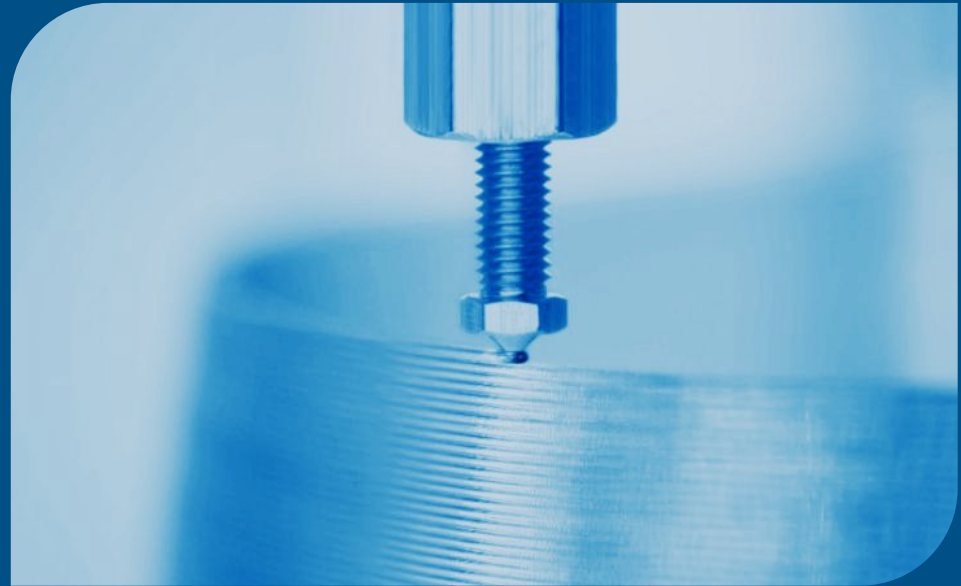


# 3D Printing Overview



# Where can I 3D print at Bates?

The VizLab is located on the ground floor of Coram Library, one of the oldest buildings on campus. The VizLab hosts all sorts of new technologies at Bates, including laser cutting and virtual reality.



Coram Library from above.

# Types of 3D Printing We Support

## FDM Printing

- Accessible and inexpensive
- Melts different types of plastic materials through a hot nozzle on a flat surface, like a hot glue gun
- Wide range of materials available, including wood, metals, silk, elastic, and various hardened plastics

## SLA Printing

- Only for specialized projects with advanced users
- Fires a laser through liquid resin to dry materials upside-down on a plate
- Must take into account drainage holes for excess resin, support structures for hanging objects, removing solid interiors
- Creates small objects with extremely fine detail and almost invisible layer lines

# Types of 3D Printing We Support

## FDM Printing



## SLA Printing



What can I 3D print?

Anything!\*

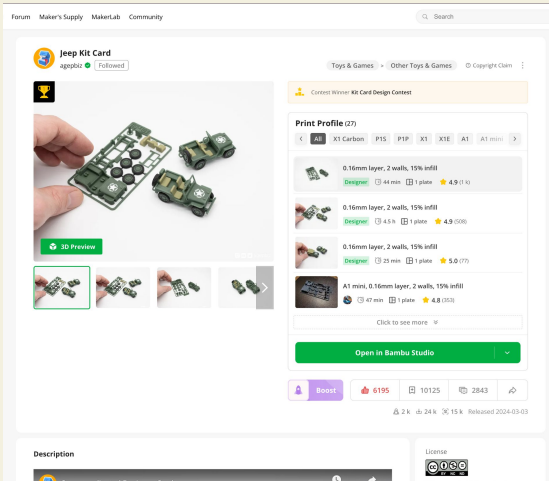
\*must conform to the laws of gravity, be in accordance with the Bates community principles and policies, and not be a complete waste of materials

# Not every 3D file is 3D-printable

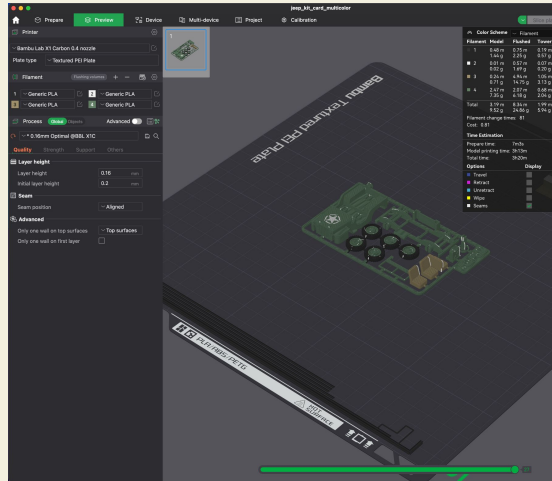
- Extraneous details
- Large areas requiring complex supports
- Models with floating objects



# 3D Printing Workflow



Find or build a model



Translate the model into a format the printer can understand



Print the model

# Download an existing 3D model

.stl, .obj, or .3mf file types

Makerworld

Printables

Thingiverse

Thangs

Sketchfab

Yeggi



# Create your own 3D model

Difficulty: moderate to high

Autodesk Fusion

Blender

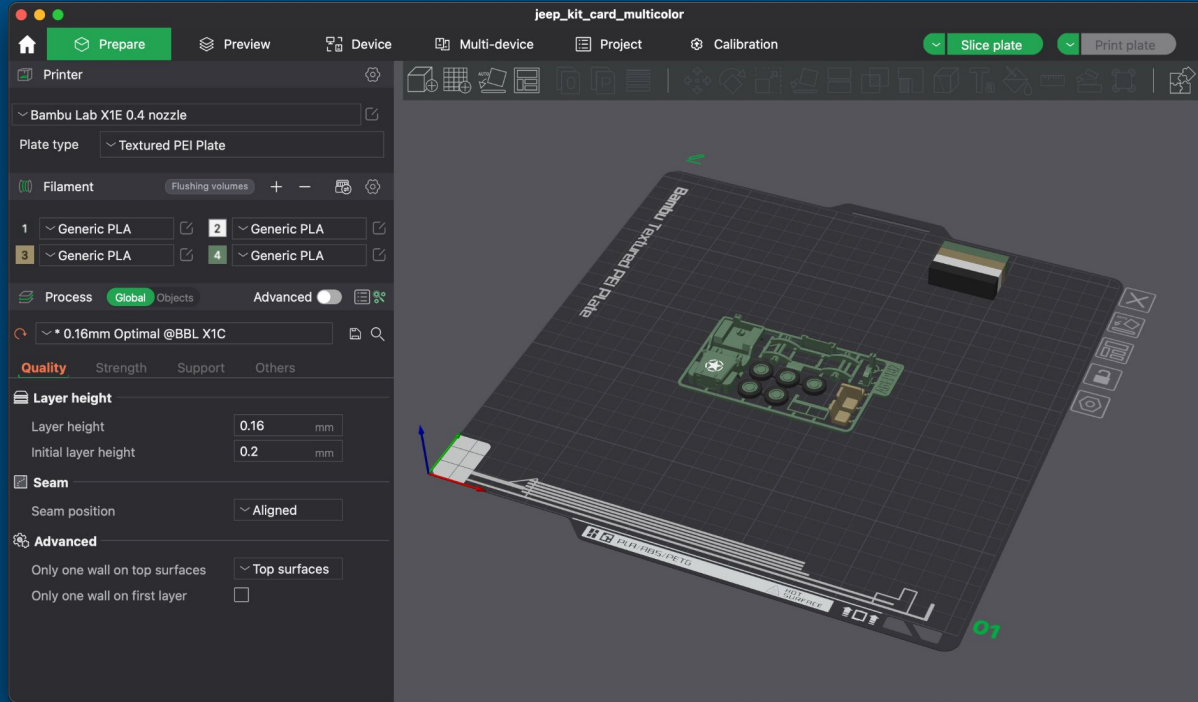
Tinkercad

Sketchup

Onshape

Solidworks

# Slicing 3D Objects in BambuStudio



# Slicing 3D Objects in BambuStudio

## Printer

- Bambu Lab X1E 0.4 nozzle
- Bambu Lab A1 Mini 0.4 nozzle

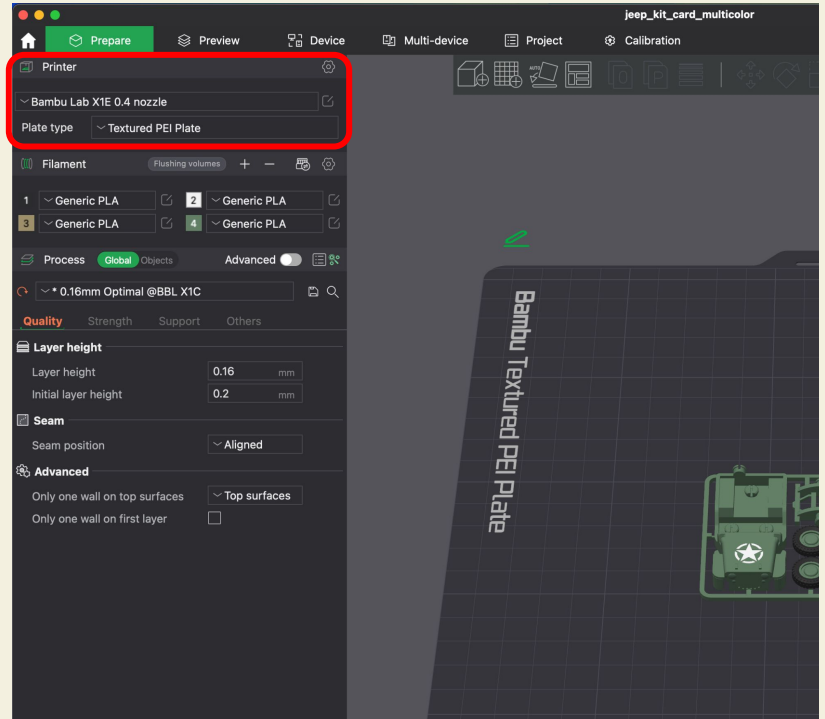
*Caution! Do not slice a 3D object for the X1 Carbon, P1S, etc. and then attempt to print on our X1E or A1 Mini printers.*

*Default Nozzle is 0.4mm. Occasionally we may set a printer up with a 0.2mm or 0.6mm nozzle, but it will be labelled as such.*

## Plate Type

- Textured PEI Plate (default)
- Smooth Plate can also be useful

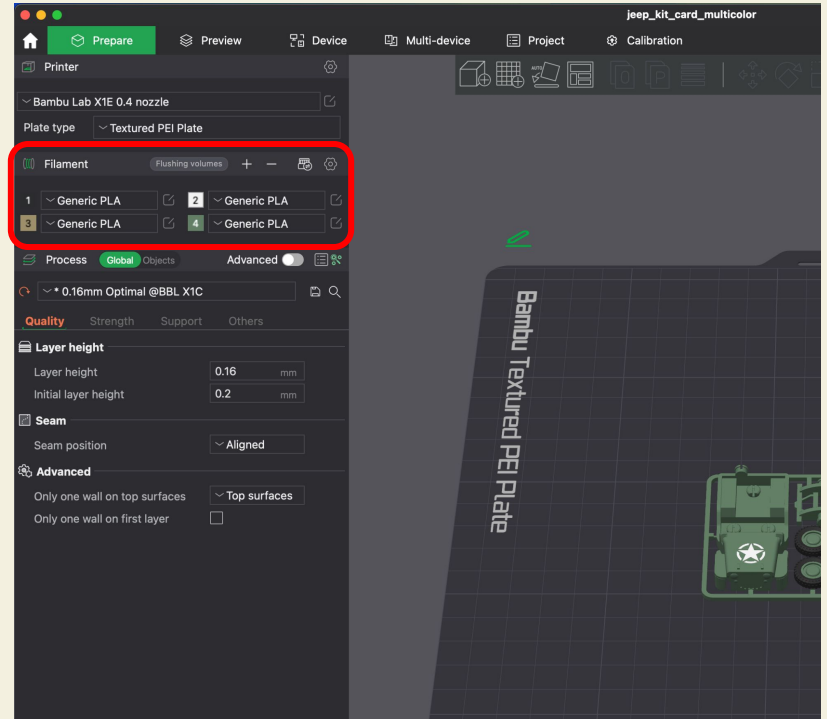
*Caution! Do not print an object with the wrong plate in the printer. The printer will stop the print if the wrong plate is detected.*



# Slicing 3D Objects in BambuStudio

## Filament

- Click the drop-down arrow to select a preset, or a loaded filament once the networked printer is selected in *Device*
- Click the edit button next to each filament type to edit the parameters related to that filament (like nozzle temperature and cooling settings)
- Use the + and - buttons to add additional filaments to the list. Filaments can be assigned to objects under *Process*, or painted onto objects with the *Color Painting* tool.



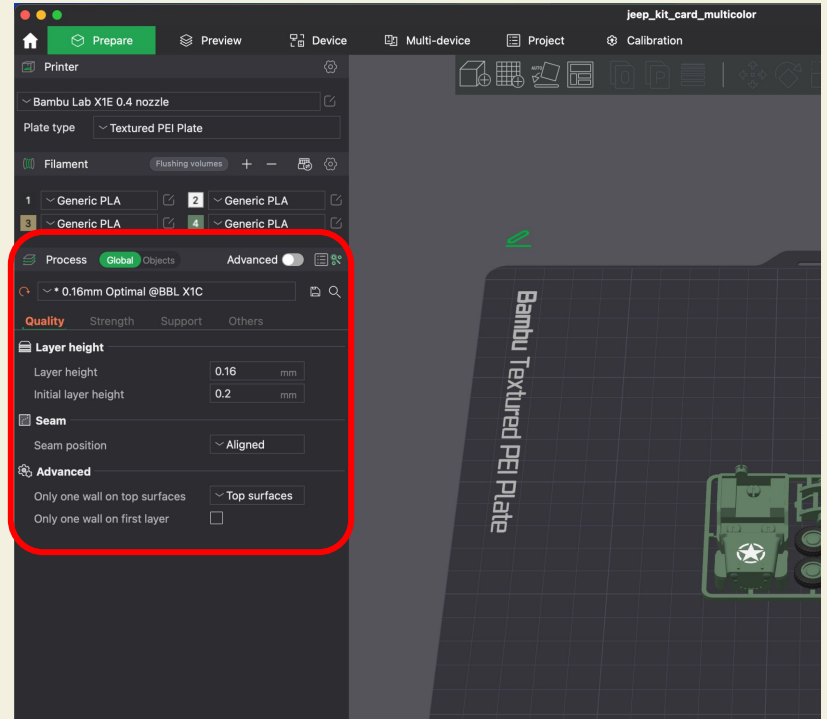
# Slicing 3D Objects in BambuStudio

## Process – Global

- Quality
  - Layer Height
  - Seam
  - Advanced
- Strength
  - Walls
  - Top/Bottom Shells
  - Sparse Infill
- Support
  - Support Type
  - Filament for Supports
- Others
  - Bed Adhesion
  - Prime Tower
  - Flush Options
  - Special Modes

## Process – Objects

- Assigns the same quality, strength, support, and other parameters to specific objects on the plate
- Select primary filament type for individual objects



# Slicing 3D Objects in BambuStudio

The screenshot displays the BambuStudio software interface for slicing a 3D object. The main window shows a 3D model of a green PCB-like object on a textured PEI plate. The interface is divided into several sections:

- Top Bar:** Includes navigation icons and buttons for 'Prepare', 'Preview' (highlighted in green), 'Device', 'Multi-device', 'Project', and 'Calibration'. A red circle highlights the 'Slice plate' button.
- Left Sidebar:** Contains printer settings for 'Bambu Lab X1E 0.4 nozzle' and 'Textured PEI Plate'. It also shows filament selection (four 'Generic PLA' filaments) and process settings (Global Objects, Advanced, 0.16mm Optimal @BBL X1C).
- Right Sidebar:** Displays a 'Color Scheme' and 'Filament' table, 'Time Estimation', and 'Options'.

Filament	Model	Flushed	Tower	Total
1	0.48 m 1.44 g	0.75 m 2.25 g	0.19 m 0.57 g	1.43 m 4.27 g
2	0.01 m 0.02 g	0.57 m 1.69 g	0.07 m 0.20 g	0.64 m 1.91 g
3	0.24 m 0.71 g	4.94 m 14.75 g	1.05 m 3.13 g	6.23 m 18.58 g
4	2.47 m 7.35 g	2.07 m 6.18 g	0.68 m 2.04 g	5.22 m 15.57 g
Total	3.19 m 9.52 g	8.34 m 24.86 g	1.99 m 5.94 g	13.52 m 40.33 g

**Time Estimation**

- Prepare time: 7m15s
- Model printing time: 3h13m
- Total time: 3h20m

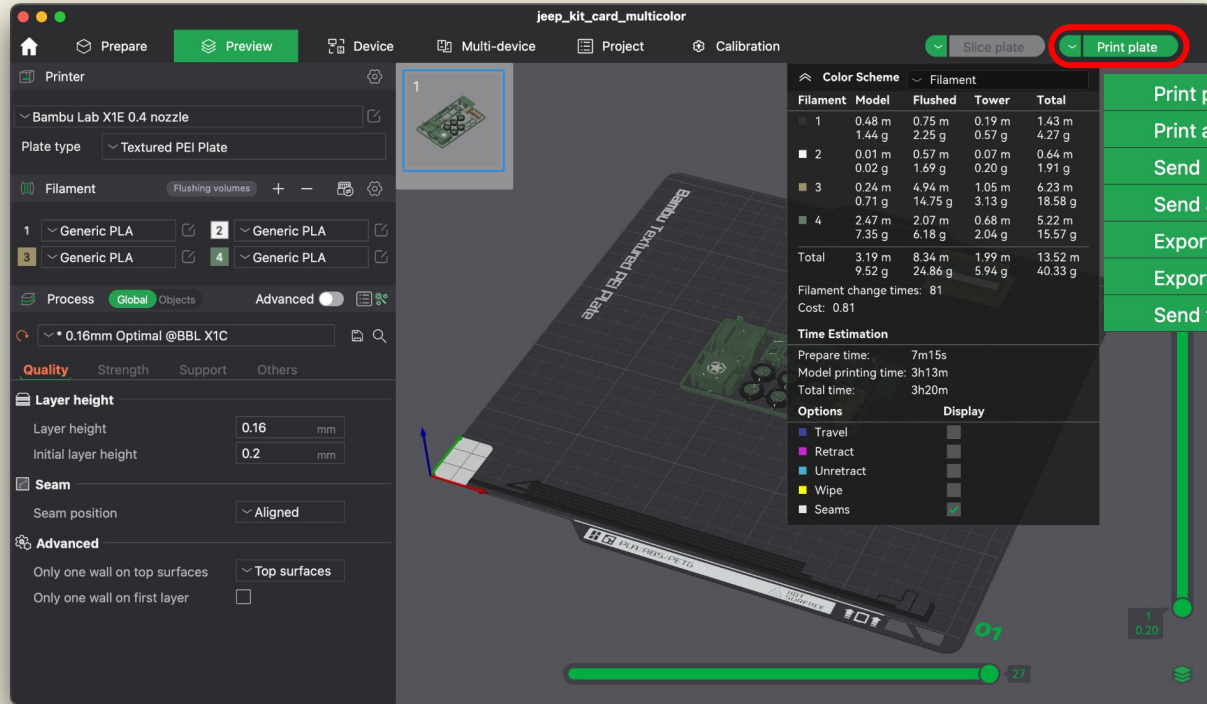
**Options**

- Travel: [checkbox]
- Retract: [checkbox]
- Unretract: [checkbox]
- Wipe: [checkbox]
- Seams: [checkbox]

**Display**

- [checkbox]

# Slicing 3D Objects in BambuStudio



X1E: Print plate and select desired printer

A1 mini: Export plate sliced file to micro SD card

# Common Printing Materials

## PLA

PLA is the most common material, comes in many different varieties, and is easy to print with on all of our FDM printers. Due to its low melting temperature, it's best used for models that won't be under much stress. It shouldn't be used for something you'd leave in a hot car or use in a lab. The glass cover should be removed for PLA printing, as it requires high airflow.

## PET/PETG

PETG is easy to print with like PLA, but offers a higher melting temperature, making it an ideal choice for labs or other tough environments. The glass lid should be placed on the X1E for printing with PETG filaments.

## ABS

A tough plastic that can be used for real-life applications, but is more difficult to print with, requiring a closed and heated chamber and high printing temps. LEGO is an example of (injection molded) ABS. It can shrink after printing, so it may require more prototyping.

## TPU

A flexible, rubbery material for things that need to bend or stretch. It's difficult to print with and cannot be used in the AMS, it must be loaded on the back of the printer.



# Tips for Using the Bambu Lab X1E



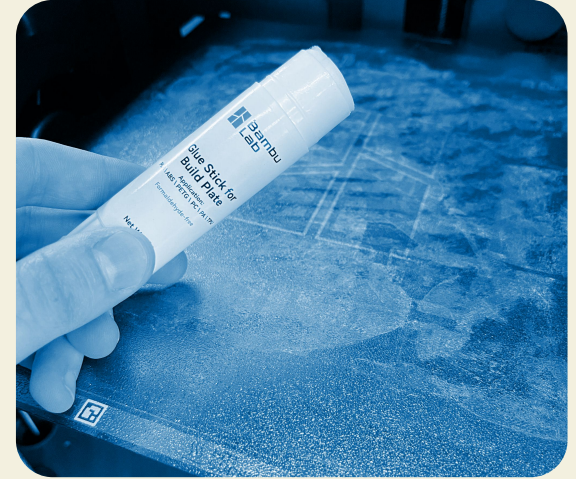
## Build Plate

The build plate must be cleared for each print. Do not attempt to print with any materials still on the build plate. This includes the flow dynamics calibration lines. The plates are magnetic; you can lift it up to remove it, but make sure it is put back correctly and centered.



## Top Cover

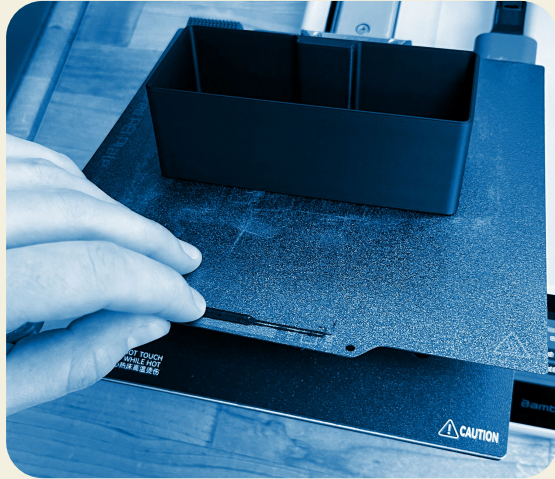
The top cover must be removed for printing with PLA. It is recommended for use with PETG, and required for ABS and other high-temperature materials. It's glass, so be careful with it!



## Glue

To improve adhesion, glue may be used on the build plate surface. It should be cleaned off after printing in the sink with warm water, and should never be face-down on the heated element.

# Tips for Using the Bambu Lab A1 Mini



## Build Plate

The build plate must be cleared for each print. Do not attempt to print with any materials still on the build plate. This includes the flow dynamics calibration lines. The plates are magnetic; you can lift it up to remove it, but make sure it is put back correctly and centered.



## Micro SD Card

This printer is not networked, so all files must be put on the Micro SD card. The card goes upside down into the printer (but rightside up into most computers). Do not remove the card from the printer while a print is ongoing.



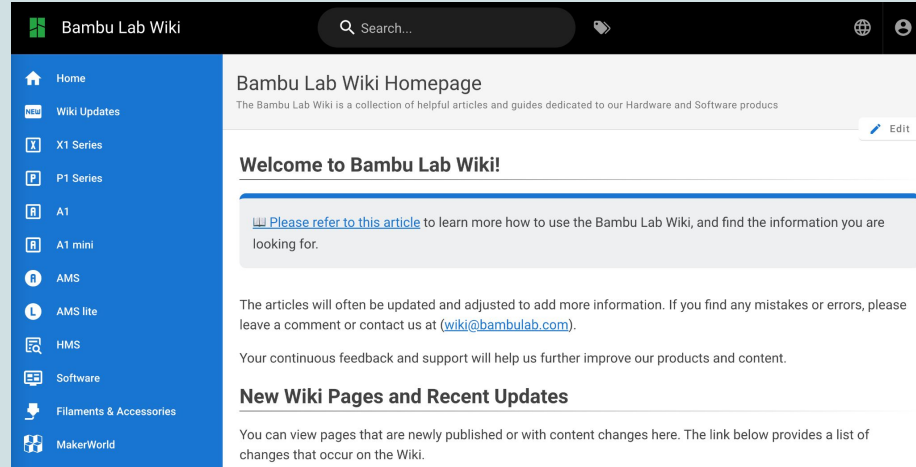
## Glue

To improve adhesion, glue may be used on the build plate surface. It should be cleaned off after printing in the sink with warm water, and should never be face-down on the heated element.

# More Questions?

<https://wiki.bambulab.com/>

\*For more advanced issues, like loading/unloading filament or multicolor printing, or using the SLA printer, please consult a student worker or staff member.



The screenshot shows the Bambu Lab Wiki homepage. The top navigation bar includes the site logo, a search bar, and user icons. A blue sidebar on the left lists various categories: Home, Wiki Updates, X1 Series, P1 Series, A1, A1 mini, AMS, AMS lite, HMS, Software, Filaments & Accessories, and MakerWorld. The main content area features a heading 'Bambu Lab Wiki Homepage' with a sub-description. Below this is a 'Welcome to Bambu Lab Wiki!' section with a link to a guide on how to use the wiki. A note mentions that articles are updated and provides contact information for reporting errors. The final section, 'New Wiki Pages and Recent Updates', offers a link to view newly published or changed pages.

# VizLab Support Staff & Students



**Dale Rothenberg**

Sr. Academic Technology  
Consultant

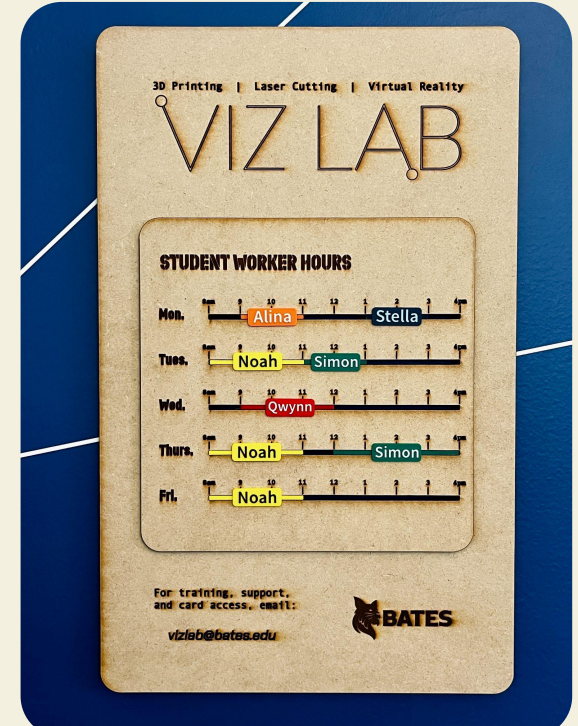
Coram 103B



**Branden Rush**

Sr. Academic Technology  
Consultant

Coram 104



For training, support,  
and card access, email:  
[vizlab@bates.edu](mailto:vizlab@bates.edu)



Student Worker Hours - Winter/Spring 25