


## 3D Printing Guides

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3D Printing


3D Printing at the UA Libraries  
from University of Arizona Libraries PLUS

### What is 3D printing?

3D printers use digital models to fabricate three-dimensional objects one layer at a time. The process has been used in engineering and commercial settings for almost 30 years. Low cost 3D printers, do-it-yourself kits, and open source software are bringing the technology into broader use.

### Why is the library offering this service?

We endeavor to provide the latest technology and tools to enhance research and experiential learning. 3D printers are already starting to be used in departments and programs on campus (such as architecture, engineering, entrepreneurship, information science), but many students and disciplines do not have access to this technology.

### What equipment and materials do you use?

We have two MakerBot Replicator 2 machines at the Main Library (first floor). Both machines print objects up to 11 x 6 x 6 inches in a variety of single colors.

The printers use plant-based, recyclable PLA plastic (#7). PLA does not contain BPA and no safety concerns have been raised about using it with food.

### Who can use this service?

Priority is for UA students, faculty, and staff. Non UA-affiliates may submit requests, but may be backlogged during peak use during the semester.

### What does it cost?

Cost is \$0.10 per gram of filament. Total cost is determined once your order is complete.

Charges are added to your [library account](#) and must be paid before pick up. Non UA-Affiliates pay at the [Express Document Center](#).

### What is the turnaround time?

Printing times vary based on size, complexity, and any backlog. Once you submit your request, we will contact you within two business days with an approximate turnaround time.

### How do I submit a request?

1. Get your [3D model](#) ready
2. Save the model as .stl file (maximum size 50 MB)
3. Submit your [3D printing request](#)

### Where can I get help?

Visit our [3D Modeling Resources](#) for modeling software, design libraries, and tutorials.

Consultants from the Office of Student Computing Resources are available in the [Multimedia Zone](#) (Main Library, first floor) to answer software questions.

### Contact Us

(520) 621-6442

[3D@lib.arizona.edu](mailto:3D@lib.arizona.edu)

Last modified: April 9, 2015



University Libraries



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BYU Harold B. Lee Library

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3D Printing Guide: Home

How to utilize the Lee Library's 3D printer. Includes direction on obtaining or designing files for print and the procedures for preparing and sending for print.

HomeFinding Existing 3D ObjectsSoftware and TrainingPrinting Your DesignPrinting PolicyShowcase

What Is 3D Printing?

CNN Explains: 3-D printing



A 3D printer takes a 3D drawing rendered on a computer and extrudes a plastic filament to "print" the object. The Science & Maps Reference Desk has a 3D printer available for patron use so that you can make your creations into reality.

First, you will need a 3D drawing to print out. You can create your own, or find free designs available online. To ensure that your finished print will be what you expected, make sure to run your file through a print preparation program.


Second, bring the drawing exported as an .stl file on a flash drive to the Science & Maps Reference Desk, or email it to [sciencehelp@byu.edu](mailto:sciencehelp@byu.edu). Then stop by the desk and we will help prepare the print such as dimensions, hollow, no supports, no raft, etc. which we can help you understand.

Third, after the object is finished printing, you will want to give it some finishing touches. You might remove support material, use sandpaper to smooth it out, or add some paint to give it the final appearance you want.

For more information, read about 3D printing on [Wikipedia](#).

3D printing is fun and easy. Go ahead and give it a try!

Subject Guide



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## 3D Printer

### What is 3D printing?

A 3D printer works by depositing a substance layer by layer until an object is formed. The printer in the Taylor Family Digital Library (TFDL) is a consumer-level machine, meaning that it creates small-scale objects using a plastic-based material. The process is much cheaper and less messy compared to that of large, industrial 3D printers.

### Why offer a 3D printing service?

Libraries and Cultural Resources (LCR) is committed to providing the latest technology and tools that enhance research and hands-on, experiential learning. LCR is providing a valuable service to students and researchers by making 3D printing more accessible. Many experts believe this technology will revolutionize the world of manufacturing.

The consumer-level printer in the TFDL is ideal for experimenting with design and prototyping. It allows students and researchers to test their concepts in a real-world scenario.

### Where is the 3D printer located?

The printer is located in the Digital Media Commons on the third floor of the Taylor Family Digital Library.

### How do 3D printers affect air quality?

Unlike larger, industrial printers that use resins, our consumer-level 3D printer does not emit fumes. The material used in the printer in the TFDL is a synthetic substance called polylactic acid (PLA). It is derived from plant material and is biodegradable.

### How much detail can the printer create?

The 3D printer in the TFDL is capable of producing objects with a resolution of one-tenth of a millimetre, approximately the width of a strand of hair.

### How much does it cost to print an object and how long does it take?

It costs \$1.00 plus 15 cents per gram for a printed item, which could amount to a few dollars. It can take anywhere from a few minutes to a several hours. Cost and time depends upon the size and complexity of the object.

### What kind of objects can I print?

You can print anything on a small scale, such as a prototype design, an action figure or a trinket for a necklace.

There are many open-source files available online that can be downloaded for printing, or you can create your own.

Please keep in mind that you can't print everything you find online. Copyright laws and intellectual property rules apply. Ensure that any files you acquire from the internet are open-source or that licensing requirements are met. There are many websites that have Printable 3D models available for free or for sale:

- [Thingiverse](#)
- [3D File Market](#)
- [Open Education Database](#)
- [Dalhousie University Library 3D Model Repository](#)

The Digital Media Commons also has a variety of 3D modeling tools available so that you can create whatever object that you can imagine:

- Rhino 3D
- Autodesk 3DS Max



[Request 3D print job](#)



Autodesk AutoCAD

- SketchUp Pro
- Blender

There are also basic modelling applications available online that can help you get started with CAD and nonCAD 3D modelling:

- [Tinkercad](#)
- [OpenScad](#)
- [SketchUp](#)
- [PhotoToMesh](#)

#### Can I see my object being printed?

You can watch the 3D printer in action anytime during regular business hours. Due to the large number of projects, it is extremely difficult to pinpoint exactly when your project will be printed.

#### How do I request a print job?

Once you submit your request, it will be added to the queue and staff will notify you when your item is ready for pick-up.

#### 3D Printing Directions

The file must be in .STL, or stereolithographic file format to print it. [MeshLab](#) is a freeware program that can be used to view and convert your file to STL format.

Once a request is submitted you can keep in touch with the 3D Printing department through the confirmation email that will be sent to you. The maximum build size is 284 x 154 x 152 millimeters, or 11.2 x 6.1 x 6 inches.

When notified by email that your model is ready you will be sent an invoice listing the print cost. Take this receipt to the TFDL Service Desk to make your payment and collect your model.

#### How can I learn more about the 3D printing service?

Sign up for an orientation session by visiting the [workshop calendar](#).

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
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3D Printing Pilot Service

Explore, Make, Fabricate

3D printing has changed the landscape of fabrication. From engineers to artists, entrepreneurs to hobbyists, 3D printing makes it easy to turn an idea into reality. The UCI Libraries have purchased a 3D printer to support such creativity. Located in the Multimedia Resources Center in the Ayala Science Library the 3D printer is available to UCI faculty, students, and staff. During this pilot period while we assess the demand and resources required to provide such a service, printing will be free.

Who can print?  
What can I print?  
What 3D printer does UCI Libraries own?  
Where is the 3D printer?  
How much does it cost?  
How do I design my object?  
How do I print my object?  
What colors can I print in?  
What if I have more than one object?  
How long will my object take to be printed?  
How will I know when my printed object is done?  
Can I watch my object print?  
Why does my printed object look unfinished?  
Is there somewhere else I can print my object?  
How can I find out more about the 3D Printing Service Pilot?

Who can print?

The 3D printer is available for use by all UCI students, faculty, and staff on a first-come first-served basis.

What can I print?

The 3D printer must be used exclusively for lawful, non-commercial purposes and in compliance with all University of California policies. Users may not collect, upload, transmit, display, create or distribute content that violates or may violate any law or third-party right, including, without limitation, any copyright, trademark, patent, trade secret, moral right, privacy right, right of publicity, or any other intellectual property or proprietary right. The UCI Libraries reserve the right to decline any print request for any reason.

What 3D printer does UCI Libraries own?

UC Irvine Libraries has a Makerbot Replicator Desktop 3D printer. This 3D printer uses 1.75 mm polylactic acid (PLA) filament.

- Build Volume: 25.2 L x 19.9 W x 15.0 H cm [9.9 x 7.8 x 5.9 in] or 7,522 cubic centimeters [456 cubic inches]
- Include photos of objects with dimensions here

Additional specifications and information about the Makerbot Replicator can be found at <http://store.makerbot.com/replicator>.

Where is the 3D printer?

The 3D printer is in the Multimedia Resources Center in the Ayala Science Library.

How much does it cost?

During this assessment period 3D printing is free.

How do I design my object?

Designing a 3D object to print is done using 3D modeling software. There are many 3D modeling programs available, including professional programs like SolidWorks and Autodesk Inventor (which are available in the MRC), and free software programs like Blender, Wings3D, FreeCAD, and Sketchup. You will need export your 3D model into .STL (STereoLithography) format in order to print it.

How do I print my object?

Services

- Course Reserves
- Borrow
- Interlibrary Loan
- Computing
- Printing & Copying
- For Users with Disabilities
- Scholarly Communication and Management Program
- Digital Scholarship Service

Quick Links

- Hours
- Event Calendar
- Connect from off-campus
- Course Reserves
- Borrowing
- Interlibrary Loan
- My ANTPAC
- Study Space Locator
- Langson Library
- Ayala Science Library
- Grunigen Medical Library
- Libraries Gateway Study Center
- Law Library
- Supporters & Friends

Users must bring their design to the MRC during [business hours](#). The print object must be an .STL file on a USB flash drive formatted in any format (preferably ntfs, or fat32). All submissions are subject to approval based on scheduling and availability of the 3D printer.

**What colors can I print in?**

Your printed object will be printed in one solid color. Available colors vary. You will be given your choices when you submit your request.

**What if I have more than one object?**

Each file must be submitted separately by filling out a separate 3D Printing Request Form available at the MRC.

**How long will my object take to be printed?**

The time it takes to print an object can vary widely. See our [time guidelines](#) for estimates. Using the UCI Libraries' 3D printer may take up to a week depending on the queue. For more time efficient options, check out these [alternate providers](#). If you have more than one object and there is high demand for the 3D printer, the Libraries may choose to schedule only one printed object per person/entity per day.

**How will I know when my printed object is done?**

You will receive an email from the UCI Libraries and can pick up your printed object from the MRC during normal [business hours](#). Printed objects will be held for 3 business days.

**Can I watch my object print?**

coming soon

**Why does my printed object look unfinished?**

Users may see imperfections in their printed objects. Small bumps or holes and rough edges at the base of an object may occur with 3D printing. Imperfections can be cleaned up with fine sand paper, file and/or tools. The Makerbot Replicator is very accurate but there may be some instances where objects do not fit precisely together. Objects are built from the ground up and in certain instances prints will require support material and / or rafts to ensure proper printing. Support materials is often needed if the design has large overhangs or parts suspended in mid-air. Rafts are often used as support at the base of the model. Users may receive their print job with the tape still on. These types of are easily removable by the user. Staff will not be responsible for removing materials and / or rafts. All finishing must be done by the user outside of the Libraries' buildings. See our [tips for finishing a printed object](#).

**Is there somewhere else I can print my object?**

Check out these [alternate providers](#).

**How can I find out more about the 3D Printing Service Pilot?**

If you have more questions about 3D printing email [libmrc@uci.edu](mailto:libmrc@uci.edu) or visit the MRC during [business hours](#).

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## 3D Printing @ Columbia

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### Introduction

#### Tips for Designers

3D models can be designed in any number of software programs, including:

- [123D Design](#) – free
- [3DS Max](#) @ [DSC](#)
- [AutoCAD](#) @ [DSC](#)
- [blender](#) – free
- [FreeCAD](#) – free
- [Maya](#) @ [DSC](#)
- [MeshLab](#) – free
- [OpenSCAD](#) – free
- [Rhino3D](#)
- [SketchUp](#) – free
- [SolidWorks](#)
- [Thingiverse Customizer](#) – free
- [Tinkercad](#) – free version
- [ZBrush](#)

Models submitted below must be submitted in [.stl format](#). Most software programs can export 3D models in [.stl format](#), but get in touch if you need help.

#### Tips on 3D printing

The Libraries recently purchased a [MakerBot Replicator 2](#) as an experiment to engage users in a number of software programs already provided by the Libraries (AutoCAD, 3DS Max, Maya, etc.). If use of the Replicator 2 is high, we hope to expand our offerings in this 3D ecosystem in the future. Before an [.stl file](#) can be printed on the MakerBot Replicator 2, it must be converted from .stl into [G-code](#) using the free [Makerware](#) software.

To properly print, 3D models must be closed forms, meaning that there are no improper openings in the data file. You can check to see if your model is closed at [willit3dprint.com](http://willit3dprint.com).

Looking for other places to print?

GSAPP students can have models fabricated in the [Digital Output Shop \(3D printing info\)](#).

A number of laboratories in [SEAS](#) have 3D printing facilities.

Vendors such as [Shapeways](#) will print models for a fee.

#### Submit your design to be printed

Ready to have your model printed? Now you can [upload an .stl file](#), pick a view that best represents the model, and fill out some brief information. Then we'll print the most up-voted models from time to time!

We will evaluate designs that are submitted to ensure they are printable, appropriate, and will not consume an unreasonable amount of our limited resources.

#### Frequently Asked Questions

##### 1. How much does it cost to print on the Libraries' 3D printer?

Right now there is no cost to print something in 3D, but we also do not guarantee that everything that is submitted will be printed.

##### 2. I need to have something printed by tomorrow – can you do it?

The Libraries' 3D printer is not intended to be like one found in a fabrication shop. We encourage you to get in touch early in the design process if you would like to have

something printed. Items submitted via the submission interface will likely not be printed immediately following approval for the site.

### 3. How will you choose what items to print?

Periodically the staff of the Science & Engineering Library will print some of the most up-voted models, so be sure to share your models with your friends so they can vote for them!

Printing will ultimately be at the discretion of the staff in the Science & Engineering Library; items that will be used for research, teaching, classwork, or other stated missions of the University and the Libraries will, however, be favored over items that are for personal use.

### 4. What are the specs of the MakerBot Replicator 2? How big can it print? What's the resolution?

All of the specifications for the MakerBot Replicator 2 are listed on the [product feature list](#).

Questions? Comments?

Get in touch via [email](#) or [online](#)!

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WHAT IS 3D PRINTING?

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

(From <http://3dprinting.com/what-is-3d-printing/>)

SPEC Kit 348: Rapid Fabrication/Makerspace Services • 97

#### HOW DOES IT WORK?

It all starts with making a virtual design of the object you want to create. This virtual design is made in a CAD (Computer Aided Design) file using a 3D modeling program (for the creation of a totally new object) or with the use of a 3D scanner (to copy an existing object). This scanner makes a 3D digital copy of an object and puts it into a 3D modeling program.

To prepare the digital file created in a 3D modeling program for printing, the software slices the final model into hundreds or thousands of horizontal layers. When this prepared file is uploaded in the 3D printer, the printer creates the object layer by layer. The 3D printer reads every slice (or 2D image) and proceeds to create the object blending each layer together with no sign of the layering visible, resulting in one three dimensional object.

(From <http://3dprinting.com/what-is-3d-printing/#howitworks>)

#### WHAT MATERIALS ARE AVAILABLE?

MakerBot PLA Filament is a nontoxic resin made of sugar derived from field corn and has a semisweet smell (like waffles) when heated. It is the best and most consistent PLA filament for your MakerBot Replicator 3D Printer and guaranteed to have no heavy metals, phthalates, or BPA.

(From <https://store.makerbot.com/pla-filament>)

#### INFO

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- [www.3ders.org](http://www.3ders.org)  
3D printer and 3D printing news
- **3D Printing**  
Features the latest news on 3D printers, jobs and additive manufacturing companies.

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## NEW! FILE SUBMISSIONS

### Now through Google Drive

We are now accepting 3D model files for print requests through Google Drive (replacing our former KSU Dropbox method). Visit our [How to Print](#) page for details.

## ABOUT THIS GUIDE



Thanks to a generous sponsorship from the Undergraduate Student Government in May of 2013, University Libraries acquired the Makerbot Replicator 2x, a dual-extrusion 3D printer. The printer is currently being managed by and housed in the Student Multimedia Studio, located on the first floor of the Kent State University Library.

*Printing capabilities are open to all currently enrolled KSU students free of charge.*


After realizing the increased demand and popularity of the service, University Libraries purchased a second 3D printer and has continued this free service.

This guide contains information on 3D printing at the SMS. In it you will find our printing policies and procedures, along with information such as FAQs, a glossary of terms and links to free 3D modeling software. Follow the left-hand navigation to access the various pages.

## QUESTIONS?


If you have any questions about the process or 3D printing in general, check our [3D Printing FAQs](#) page or contact us at 330.672.0221. You are also welcome to visit us in person at the Student Multimedia Studio, located on the first floor of the University Library.

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FAQS

What is 3D printing?

3D printing refers to rapid prototyping - creating a physical 3-dimensional object from a digital model. There are several types of 3D printers. The printer that we use is the MakerBot Replicator 2x which performs a Fused Filament Fabrication technique (also known as Fused Deposition Modeling - FDM) to create the final 3d printed object. In this method, a lightweight plastic filament that when fed through the nozzle is heated up to its melting point and then extruded onto a build plate surface, hardening upon impact. This process continues, depositing the melted filament layer by layer until a 3-dimensional object is formed.

What are some examples of practical uses for 3D printing?

3D prints can be found useful in numerous applications, such as prototypes for entrepreneurs, architectural models for class projects and for any other low-volume, custom-prototype needs. Here are some examples of practice use in an educational environment:

- *Architecture* - printing their 3D models to further enhance their understanding of structures
- *Fine arts* - creating 3D objects from their digital designs; incorporating 3D prints into their other mediums; designing and 3D printing jewelry, sculptures, etc.
- *Visual communication design* - creating prototypes of product designs and packaging
- *3D animation* - creating 3D printed objects from their designs
- *Engineering* - creating 3D prototypes of their designs in order to fully understand their engineering design principles and to experience the challenges that are encountered along the way
- *Advertising / marketing / business / entrepreneurs* - having a 3D prototype of the item that they are selling, to show their clients
- *Nursing / medicine* - creating 3D replicas of anatomy
- *Archaeology / paleontology* - creating 3D replicas of fragile relics for study (ex. creating replicas of fossils in order to study their movement, etc.)
- *Forensics* - incorporating 3D printing into crime scene investigation (ex. creating 3D replicas of evidence, such as footprints, or skeletal remains and facial reconstruction)
- *Chemistry / physics / biology* - creating accurate 3D visual aids such as DNA or chemical reactions

### Who can use the 3D printing service?

The 3D printing service is open to all currently enrolled Kent State students in all disciplines. The actual printing process is performed by our SMS consultants. Have a class of students who wish to 3D print? Contact us first to discuss the assignment so that we can review our policies with you and discuss any limitations that you may have in printing.

### How large of an object can you print?

The maximum build volume that we prefer for the Makerbot Replicator 2x is 150 (X) x 150 (Y) x 140 (Z) mm. The max build volume for the Ultimaker 2 is 190 (X) x 195 (Y) x 174 (Z) mm. However, since the printers only run while we are open, the total printing time for a particular model must be under 12 hours, which for a cube-shaped model would equate to a 94 x 94 x 94mm design.

Please be aware that we may ask to print your model at a smaller scale than you would like. We do this with the goal of ensuring the best success of your print. With creative design, though, you can print larger simply by separating your model into smaller printable pieces. So keep that in mind as you prepare your file for printing.

### Which 3D modeling software should I use to create a printable design?

We do not have any limitations in the modeling software that you use. We have two file formats that we accept (STL and OBJ) and as long as your software can save or export as one of those formats we should be able to print your model.

### Which file formats do you accept?

We accept STL and OBJ files. Most 3D modeling programs can save/export as at least one of those two. Please note, if creating a model in Tinkercad please download your design as an STL file (not an OBJ). For some reason we have difficulty opening OBJ files that have been produced in Tinkercad.

For the full specifications on our 3D printers, visit their official websites:

- [Makerbot Replicator 2x](#)
- [Ultimaker 2](#)

Last Updated: Aug 19, 2015 1:06 PM URL: <http://libguides.library.kent.edu/3d> [Print Page](#)

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Tags: 3d modeling, 3d printing, student multimedia studio

## University Libraries

**ADDRESS:**  
1125 Risman Dr., Kent, OH 44242

**PHONE:**  
330-672-3456

**EMAIL:**  
[library@kent.edu](mailto:library@kent.edu)



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## 3D PRINTING GUIDE

### HOW CAN I MAKE MODELS SUITABLE FOR PRINTING?

*Models may need cleanup and adjustment before they can be printed. These tools and tutorials can help when you are processing your models:*

#### Netfabb Tutorials

Repair Software, helps to fix and repair 3D Files.

A Step-by-step guide with exercise files can be downloaded. 2 video tutorials show how to repair files, check printability and do automatic packing.

#### Makerbot Customizer on Thingiverse

A Web App, allows to modify existing models. Click [here](#) to download the App.

Makerbot provides a simple and basic tutorial.

#### GrabCAD Workbench Tutorials

A cloud-based PDM (product data management) solution, helps to manage, view and share [CAD](#) files.

8 video tutorials give an overview of GrabCAD Workbench.

### ONLINE RESOURCES

[Rapid Prototyping Applications](#)

[Finding Models and Scanning Objects](#)

[Creating New Models](#)

[Preparing Models for Printing](#)

### PRINTING SERVICES

[Services Inside MIT](#)

[Services Outside MIT](#)

### INFORMATION

[Learning More at MIT](#)

### WHAT IS THIS SITE?

This guide contains top information resources for Makers who are interested in making stuff with 3D printers. It is a starting place for your project.

### NEED MORE HELP?


[More information](#) on how to make stuff from the libraries

[Ask the Libraries](#) if you have questions.

[Research Consultations](#) - appointments with subject experts for in-depth help.

[Tell the Libraries](#) how to serve you better. We want to hear from you.



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Laser Cutter

Vinyl Cutter

Borrowable Circuit Tech

## 3D Printing

### Location and Hours

**Location:** Main Library Copy Center, located on the 2nd floor of the West Wing.  
[Hours of operation](#) for 3D Printing are in accordance with the Copy Center.

### Access






In order to have something printed on our 3D printer, please fill out the [3D Print Submission Form](#). Prints will be performed in the order they are received and may take a few days depending on order volume.

If you have questions, you can [email Make@State Staff](#) or call 517-884-0844.

### Cost

Cost will be determined by the filament weight of the item printed. The current rate is \$0.20 per gram (All prints under 5 grams will be rounded up to \$1.00.) of the total weight of the final print.

### General Size to \*Price Comparisons:



65grams: \$13.00

40grams: \$8.00

22grams: \$4.40

13grams: \$2.60

1gram: \$1.00

\*Price of object shown subject to change with each individual print.

### Why 3D Printing?

3D Printing is a new technology that promotes creativity and innovation. This revolutionary machine provides an opportunity for our patrons to further their learning experience.

### How does 3D Printing fit in an Academic Library? It advances the Libraries' Mission...

#### Mission...

- By supporting the University's mission of preservation, creation, transmission and application of knowledge
- By providing access to resources to serve educational needs
- Through appropriate facilities and quality service by helpful and expert staff using current technologies, collaborative strategies, and expanding information networks
- By providing an essential facility where emerging and established scholars access information and gather in an atmosphere conducive to learning and other creative endeavors

#### Some of the departments on campus that are using 3D Printing:

- Apparel/Textile Design
- Arts and Letters
- Business
- Communication Arts and Sciences
- Education
- Engineering
- Interior Design
- Packaging
- Veterinary Medicine

#### Equipment



#### MakerBot Replicator 5th Generation

- Affordable, Consumer 3D Printing
- Filament: PLA Plant-based Plastic
- 9.9L x 7.8W x 5.9H inches Build Volume
- 100 Microns (.0039 in) Layer Resolution
- Fused Deposition Modeling (FDM) Technology
- [Manufacturer's Details](#)

#### Filament

- MakerBot PLA Filament is a bioplastic derived from corn. It is guaranteed not to contain any heavy metals, phthalates or BPA.
- PLA filament comes in a variety of colors. 18 filament colors are available for use on the Copy Center 3D Printer.
- Multi-Colored printing will not be an available service.

#### Filament Colors Available in the Copy Center:

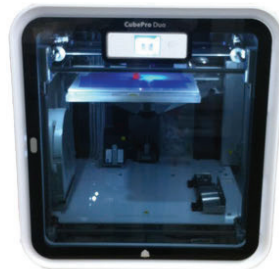


#### MakerBot Digitizer 3D Scanner

- \$2.00 per scanned object
- 8" x 8" Scan Volume
- Consumer-level 3D scanner optimized for 3D printing
- Fast scan time
- Medium to low resolution scans
- Does not scan color data
- [Manufacturer's details](#)



#### Cube Pro Duo 3D Printer



- Affordable, Consumer 3D Printing
- Filament: ABS
- Build volume: 11.2x9.06x10.6 inches
- Print Resolution: 70 microns in HD, 200 microns in SD, 300 microns in fast mode
- Can print two colors on one print
- [Manufacturer's detail](#)

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## 3D Printing



### Getting started

Interested in getting started with 3D printing?

- [Read our 3D Printing FAQs](#)
- Read some [library resources about 3D printing](#).
- Jump right in and start using some of the design tools below!

Then,

- [Submit a 3D printing request using this form](#).
- [Set up a consultation](#) to bring in your file and go over search options.

### Tools for 3D printing

#### Software

The following applications are available on computers in Kenan Science Library. They are also freely available to download to use on your own computer.

##### 3D Design Software

**Tinkercad**  
An easy-to-use web-based tool for creating objects that are ready to be 3D printed. If you haven't done 3D design before, this is a great place to start.

**SketchUp**  
A 3D modeling program for applications such as architectural design, interior design, civil and mechanical engineering, film, and video game design. SketchUp models can be exported to an .OBJ file, which can then be converted to an .STL file using MeshLab (see under "3D Editing and Repair Software").

**Blender**  
A free professional 3D computer graphics software product used for creating animated films, visual effects, art, 3D printed models, interactive 3D applications and video games.

**Maya**  
Maya is a 3D animation, modeling, simulation, rendering, and compositing program. This is licensed software that is available in the Kenan Science Library.

**OpenSCAD**  
A free software application for creating solid 3D CAD objects. It is not an interactive modeler, but rather a 3D-compiler. OpenSCAD reads from a script and renders a 3D model from it.

### Browse 3D Models

- [Thingiverse](#) is a repository of 3D files from hundreds of users.
- [The NIH 3D Print Exchange](#) allows for searching, browsing, downloading, and sharing biomedical 3D print files, modeling tutorials, and educational material.
- [NASA 3D Resources](#) has a growing collection of 3D models, textures, and images from inside NASA.
- [Smithsonian x 3D](#) is a project to share 3D models developed from scans of their diverse collections.

### 3D Editing and Repair Software

**MeshLab**  
An open-source general-purpose system aimed at the processing of the typical not-so-small unstructured 3D models that arise in the 3D scanning pipeline. MeshLab is oriented to the management and processing of unstructured large meshes and provides a set of tools for editing, cleaning, healing, inspecting, rendering and converting these kinds of meshes.

**MeshMixer**  
An experimental 3D modeling tool whose goal it is to make it easy to compose new 3D models from existing meshes.

**NetFabb**  
An .STL viewer and repair tool.

### Molecular Software Applications

[Print your favorite protein using these easy steps](#)

**PyMOL**  
An open-source, user-sponsored, molecular visualization system that can produce high-quality 3D images of small molecules and biological macromolecules, such as proteins.

[Kokopelli](#) (Mac and Linux only)

Kokopelli is an open-source tool for computer-aided design and manufacturing (CAD/CAM). It uses Python as a hardware description language for solid models. A set of core libraries define common shapes and transforms, but users are free to extend their designs with their own definitions.

[UCSF Chimera](#)

An extensible program for interactive visualization and analysis of molecular structures and related data, including density maps, supramolecular assemblies, sequence alignments, docking results, trajectories, and conformational ensembles. High-quality images and movies can be created.

### 3D Printing Service Terms of Use

Those utilizing the library's 3D printer must do so for lawful purposes. Users must abide by all applicable laws (including copyright law (Title 17, U.S. Code) and patent law (Title 35, U.S. Code)), UNC policies, and library policies, while respecting the health and safety of the University community. Kenan Library staff reserve the right to decline any print request for any reason. The Library cannot guarantee model quality or stability, confidentiality of designs, or specific delivery times.

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[Email us](#)

Lauren Di Monte

Jessica Handloff

Dan Hawkins

Colin Nickels

Adam Rogers

Jack Twiddy

David Woodbury

## 3D Printing

We now offer 3D printing at both Hunt Library and D.H. Hill Library. The Hunt Library Makerspace offers a 3D printing service with high-end capabilities, while the D.H. Hill Makerspace offers do-it-yourself access to consumer 3D printers. If you just want something printed, Hunt is your best option; if you want to learn how to use a 3D printer and are willing to put in the time and effort, D.H. Hill is for you.

### 3D Printing at Hunt

The Hunt Library Makerspace's 3D printing service is available to all current NCSU students, faculty, and staff, and Centennial Campus Affiliates.\* The service costs are:

Stratasys uPrint SE Plus	\$10 per cubic inch of material, \$5 minimum	ABSplus plastic	white only	soluble support material
Fusion3 Design F306	\$0.35 per gram of material, \$5 minimum	PLA plastic	multiple colors	breakaway supports (user removes)

To use the service, bring your **STL file** into the Hunt Library Makerspace during our open hours. We'll help you decide which machine to use, tell you how much it will cost, and estimate how long it will take.

You can pay with a **credit/debit card** or charge to a **departmental account**. To charge to a department, please bring the following information: Department, Project ID number, and Bookkeeper's name, phone number, and email. *We cannot charge to grant accounts, which have Project ID numbers starting with a 5.*

\*Centennial Campus Affiliates must first obtain a [Wolfpack One Card](#).

#### EVENTS

AUG 26

D.H. Hill Makerspace Open House

AUG 27

D.H. Hill Makerspace Open House

#### WORKSHOPS

AUG 21

D.H. Hill Makerspace Orientation  
11:30 AM to 12:15 PM

AUG 21

D.H. Hill Makerspace Orientation  
1:30 PM to 2:15 PM

AUG 24

3D Design Workshops with Autodesk Fusion 360  
1:00 PM to 9:00 PM

AUG 24

CAD 101: Intro to Digital Fabrication with Autodesk Fusion 360  
1:00 PM to 3:00 PM

[View all workshops](#)

#### LIBRARY STORIES

3D Scanning Artifacts for Digital History

[All stories](#)



## 3D Printing at Hill

The [D.H. Hill Makerspace](#)'s 3D printers are available for first-come, first-serve use by current students, faculty, and staff who have attended our [D.H. Hill Makerspace Orientation](#). If you have never used a 3D printer before, our staff can help you get started, though you may want to attend a [3D Printing workshop](#) first for a more thorough introduction.

To use a 3D printer at D.H. Hill, you will need to purchase a spool of filament. We currently sell **PLA filament in a variety of colors for \$13.25 per 0.5kg spool** in the Makerspace. You may also bring your own filament in, but be aware that filament varies in quality and print settings across suppliers, even for the same type of plastic.

The 3D printer options at Hill are:

<a href="#">LulzBot Mini</a>	3mm filament	<a href="#">Cura LulzBot Edition software</a>
<a href="#">MakerBot Replicator 2</a>	1.75mm PLA filament	<a href="#">MakerBot Desktop software</a>

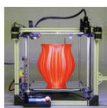
## Software

- [MeshMixer](#)
- [Tinkercad](#)

## Spaces

- [D.H. Hill Makerspace](#)
- [Hunt Library Makerspace](#)

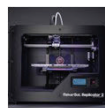
## Use in the library



[Fusion3 F306 Gen I 3D Printer](#)



[Lulzbot Mini](#)



[MakerBot Replicator 2 3D Printer](#)



Stratasys uPrint  
SE Plus 3D  
Printer



Wanhao  
Duplicator 4S

## FAQ

### What is 3D printing? How does it work?

3D printing is the process of making a physical object from a 3D digital model. It is also known as additive manufacturing because the physical model is built up one layer at a time. All of our current 3D printers use a process called Fused Deposition Modeling (FDM), in which a plastic filament is fed through a heated nozzle which melts the plastic. Computer-controlled motors move the nozzle around to create the shape of a layer, which hardens immediately. The object is built this way, one layer at a time, from the bottom up.

### What are some practical uses of 3D printing?

There are a multitude of practical applications for 3D printing, from aerospace and automotive engineering to prosthetics and other medical uses. 3D printing enables rapid prototyping of design concepts and functional, working models, and is also used for low-volume, custom, or on-demand manufacturing.

### What software can you use to make printable 3D models?

For beginners, we recommend starting with Tinkercad. It is web-based, optimized for 3D printing, and easy to get started with. For a free account, you can join the NCSU Libraries Tinkercad team using this link: <http://go.ncsu.edu/tinkercad>

However, almost all 3D modeling software will output the filetype (STL) our machines require. There are many options; a few popular ones are SolidWorks, AutoCAD, Inventor, 3DS Max, Creo, Blender, Rhino 3D, and Sketchup. In general, *solid* modelers will be easier to print from than *surface* modelers. Information on software available to students and staff can be found at [software.ncsu.edu](http://software.ncsu.edu) and [www.eos.ncsu.edu/software](http://www.eos.ncsu.edu/software)

**Is the library the first place at NCSU to have 3D printers?**

No, we are not, but we are the first to offer 3D printing services to all NCSU students, faculty, and staff. The Center for Additive Manufacturing and Logistics on campus has long done research on 3D printing, including with cutting edge processing and advanced materials such as titanium. The College of Design has also long had a 3D printing service for its students.

**What if I need to 3D print with higher resolution, faster turnaround time, or different materials?**

There are many professional 3D printing services available, including [Fineline Prototyping](#) (based in Raleigh) and [Shapeways](#) (online).

**Contact**

**D. H. Hill Library**  
2 Broughton Drive  
Campus Box 7111  
Raleigh, NC 27695-7111  
(919) 515-3364








**James B. Hunt Jr. Library**  
1070 Partners Way  
Campus Box 7132  
Raleigh, NC 27606  
(919) 515-7110

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## 3D Printing: Home

This guide will assist patrons who plan to use the 3D printing available in the Engineering Library.

[Home](#)
[Software](#)
[Tutorials](#)
[FAQ](#)
[3D Scanning](#)

### How Can I Print?

You will bring in your **.cube** file on a USB drive and give it to a library staff member at the **Information Desk**. (Refer to our **Contact** section for library hours.)

- You can convert your 3D file into the **.cube** format using the **Cubify software**. The Cubify software will let you know how many grams the design will take to print and **how long** the print should take.

The reference staff will look over the file to see if there are any obvious problems that need to be addressed, and give you an **estimated completion time**. Please refer to our **Helpful Hints** section to make sure your design is printer-friendly before you hand over your USB drive.

- Occasionally, print jobs will fail, so there may be delays in completion, but every effort will be made to meet the anticipated deadline.

You will receive an **email** when your job is completed, and you can pick it up at your convenience. You need to present your **Purdue ID** to collect your print job.

### What is 3D printing?

3D printers allow users to create a physical object from a digital model. This is typically done by laying down many thin layers of material.

3D printing is useful to anyone who requires low-volume custom prototypes. Think about making models for class projects, testing design ideas, creating visual aids, creating components to incorporate into larger-scale models. These ideas can be applied to many fields of study, from engineering to nursing to chemistry to geology. The possibilities are endless, limited only to the size of the printer and your imagination.

Leaders Of The 3D Printing Revolution

To get an even better idea of the possibilities with 3D printing you can also explore a series of 3D model collections in our **3D Model Gallery** section on the **Software** page.

### 3D Printing Applications

3D Printing in Engineering

CubePro for Engineering

### Helpful Hints Before You Print

- Make sure you have used the **Cubify app** to convert your file to the **.cube** format.
- If your object has a **small base**, particularly if it is rounded, **select the "raft" option** in the Cubify software to

### Cube 3

The Cube 3 3D Printer.

### Contact Info

Siegesmund Engineering Library  
Room 160 of the Potter Engineering Center.  
Reference Desk (765) 494-2869


<b>August 8th - August 9th</b>
CLOSED
<b>August 10th - August 14th</b>
8:00am - 5:00pm
<b>August 15th - August 16th</b>
CLOSED
<b>August 17th - August 21st</b>
8:00am - 5:00pm
<b>August 22nd - August 23rd</b>
CLOSED

help it adhere to the printing surface

- **Two colored** printing is **discouraged**, as it takes about twice as long as one-colored printing, so two-color print jobs will receive lower priority than one-color jobs. If you want to use two colors, **consult with a library assistant** for suggestions.
- If your object has **large overhangs**, select the **'support'** option in the Cubify software.
- To keep the **cost down** for your option, you can **scale down your object** using the middle icon in the Cubify software, and you can **use the Draft** preset, and/or choose hollow fill.
- If you click on the **'t'** button, you can see an estimate of **how much time** your print job will take and **how much mass** it will take to print.
- For more questions check out the [Frequently Asked Questions](#).

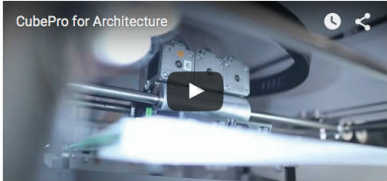
3D Printing in Industrial Design



CubePro for Industrial Design





3D Printing in Architecture

CubePro for Architecture



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## 3D Printing: FAQ

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- Occasionally, print jobs will fail, so there may be delays in completion, but every effort will be made to meet the anticipated deadline.

You will receive an **email** when your job is completed, and you can pick it up at your convenience. You need to present your **Purdue ID** to collect your print job.

### Frequently Asked Questions

- What size objects can be printed?**
  - The Cube 3's maximum print size is 6"x6"x6."
- Who can use the 3D printer?**
  - Anyone who is affiliated with Purdue. This device is not for use by the general public.
- What colors are available?**
  - The library has a limited selection of colors (black, gold, and green), subject to availability of stock on hand. If you wish to use other colors, you can **purchase cartridges from Cubify** and ask the library staff to use those cartridges.
- What type of software should I use?**
  - Please see the **"Software"** tab. You can use any design software you like, but all files must be converted to the **.cube** file format using Cubify's proprietary software.
- Which file formats are accepted?**
  - All files must be converted to the **.cube** file format using Cubify's **proprietary software**. The software can convert **.stl**, **.obj**, **.3ds** and **.ply** files into **.cube** files (limit 50MB input file size).
- How much does it cost?**
  - We are currently piloting the 3d printing service, so there is no charge for prints. We anticipate charging for prints (TBD) starting in Fall 2015. We reserve the right to limit quantities of print jobs during the pilot phase of this project.
- Whom should I contact for additional assistance?**
  - You can stop by the Engineering Library in Potter Center or talk with a staff person by calling (765) 494-2869. Revisit the **contact info** for library hours.

### Helpful Hints Before You Print

- Make sure you have used the **Cubify app** to convert your file to the **.cube** format.
- If your object has a **small base**, particularly if it is rounded, **select the 'raft' option** in the Cubify software to help it adhere to the printing surface
- Two colored** printing is **discouraged**, as it takes about twice as long as one-colored printing, so two-color print jobs will receive lower priority than one-color jobs. If you want to use two colors, **consult with a library assistant** for suggestions.
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- For more questions check out the **Frequently Asked Questions**.



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Library > Research Guides > Multimedia Creation Resources at the Fordham Commons > FabLab/ Makerspace

Multimedia Creation Resources at the Fordham Commons:  
FabLab/ Makerspace

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Available colors

Black

Blue

Orange

Red

Translucent

Translucent Blue

Translucent Purple

Translucent Red


Translucent Yellow

White


Yellow

Printed at the FabLab- Giraffe

Giraffe printed by Chris in  
Transparent Blue



Building



3D Printing

**3D printing is available to members of the Rutgers community**

Welcome to 3D printing at the Fordham FabLab on the ground level of the Douglass Library. Just follow signs to the Fordham Commons to find the 3D printers.

We have two MakerBot Replicator 2 printers.

Visit the MakerBot website for more information about MakerBot, Replicator 2, and Makerware

Please contact Stacey Carton at the Media Center or at 848 932 5042 for an appointment. Or email [sacarton@rutgers.edu](mailto:sacarton@rutgers.edu)

<http://www.makerbot.com/>

Getting started

Create a file for 3D printing using our software or one of your own. (.stl file)

Be sure to visit the Makerbot Replicator 2 page to be aware of size and other limitations

Make an appointment with Stacey at the Media Center (848) 932 5042 or ask for details at the Fordham Commons help desk. We will provide you with the cost for printing your project and set up a printing appointment.

Printing costs are \$.25/gram, rounded up to the nearest dollar. PLEASE BRING EXACT CHANGE- CASH ONLY. (RIAS available- ask for details)

We will also convert your project to a .x3g file which is compatible with our printers.

You will have a chance to preview your project before printing begins.

Please visit the websites below for more specific information:

<http://www.makerbot.com/faq/>


<http://www.makerbot.com/support/guides/design/>

The largest build volume the Replicator can print is

28.5 L x 15.3 W x 15.5 H cm  
[11.2 x 6.0 x 6.1 in]

However, we are also limited by time and staff constraints. Please inquire if you have questions about a specific project

Multimedia Resources



**Stacey Carton**

Email Me

Contact:  
Stacey Carton MLIS

[sacarton@rci.rutgers.edu](mailto:sacarton@rci.rutgers.edu)

Manager- Fordham Commons- A  
Multimedia Collaboration Space

Mabel Smith Douglass Library

8 Chapel Drive

New Brunswick, NJ 08901-8527

phone: 848 932-5042

Printed at the FabLab- Raven and Phoenix



Printed by Michael

Printed at the FabLab- Lowpoly Bunny



Examples- Stretchlet Bracelet \$2



Examples- Chain Links \$1



Examples- House Fly \$1



#### Programs/ Websites

The following software has been installed on the Macs in the Fordham Commons:

Blender 2.70  
 Makerware 2.4.1.35  
 Makerware for Digitizer 2.4.1.35  
 Sculptis Alpha 6  
 SketchUp Pro 2014 v.14.0.4

We also recommend:

**TinkerCad.com.** This site requires users to create a login, but offers free "easy-to-use tool for creating digital designs that are ready to be 3D printed into physical objects."

Also, many designs have been uploaded by users to **Thingiverse.com**. Many offer free downloads and many are customizable. Please be aware that there is NO GUARANTEE that these designs will print properly! We cannot be responsible for projects that print incorrectly due to design flaws

The NIH offers downloadable designs at <http://3dprint.nih.gov/>

From the NIH website: "The NIH 3D Print Exchange provides access to a community-contributed database of bioscientific 3D-printable files." The site also offers tools to create 3D printable models from medical images, molecular data, or image stacks. (Login required)

Prosthetic limbs at **E-nabling the Future**

<http://enablingthefuture.org/upper-limb-prosthetics/>

"A network of passionate volunteers using 3D printing to give the World a "Helping Hand.""

"The e-NABLE community has developed a collection of different 3D-printable assistive devices that are free for download and fabrication by anybody who would like to learn more about the designs or fabricate a device for somebody in need."

#### Tips and advice

10 tips, including rafts and shells <http://talesofa3dprinter.blogspot.com/2013/12/top-10-tips-for-3d-printing-design-from.html>

holes and overhangs <http://www.instructables.com/id/3D-Design-For-3D-Printing/step2/Overhangs-Part-1-Holes/>

extreme overhangs and supports <http://www.protoparadigm.com/blog/2012/01/printing-with-support-extreme-overhangs/>

45 degree rule and droop <http://printa3d.blogspot.com/p/design-tips.html>

Creating solid objects <http://jflowers1.iweb.bsu.edu/rfo/makerbot.htm>

#### 3D Digitizer

Now available!

Featuring Makerbot Digitizer

3D Scanner

<http://store.makerbot.com/digitizer>

Scanning is free, but please call ahead for an appointment

#### Sketchup

Recommended tutorials:

Getting started with Google Sketchup (older version)

[https://www.youtube.com/watch?v=gsfH\\_cyXa1o](https://www.youtube.com/watch?v=gsfH_cyXa1o)

**Getting started with SketchUp - Part 1**

<https://www.youtube.com/watch?v=dL01iW9DAEU>

#### External websites

<http://www.shapeways.com/>

This site can allow you to print in materials other than PLA, including precious metals.

<http://www.3dhubs.com/>

This site can guide you to local printers, some of whom can use different materials

#### More 3D printing at Rutgers

<http://rugradstudentblog.net/2014/06/12/3d-printing-at-rutgers/>

#### Recommended articles

**Own a T. Rex With 3D Imaging as Venus de Milo Gets Her Arms Back**

[http://finance.yahoo.com/news/own-t-rex-3d-imaging-040100084.html;\\_ylt=Awrc1Cju5CdVQh0AQDrQtDMD;\\_ylu=X3oDMTBya2hmZ3R1BGNvbG8DYmYxBHBvcwM2BHZ0aWQDBHNIYwNzYw--](http://finance.yahoo.com/news/own-t-rex-3d-imaging-040100084.html;_ylt=Awrc1Cju5CdVQh0AQDrQtDMD;_ylu=X3oDMTBya2hmZ3R1BGNvbG8DYmYxBHBvcwM2BHZ0aWQDBHNIYwNzYw--)

**Artec 3D Teams Up With Mirror Image 3D to Bring 3D Selfies to the Garden State**

[http://finance.yahoo.com/news/artec-3d-teams-mirror-image-130000975.html;\\_ylt=Awrc0F8E4ydVcAQa6EnQtDMD;\\_ylu=X3oDMTByMjB0aG5zBGNvbG8DYmYxBHBvcwMxYXBHND0aWQDBHNIYwNzYw--](http://finance.yahoo.com/news/artec-3d-teams-mirror-image-130000975.html;_ylt=Awrc0F8E4ydVcAQa6EnQtDMD;_ylu=X3oDMTByMjB0aG5zBGNvbG8DYmYxBHBvcwMxYXBHND0aWQDBHNIYwNzYw--)

**How companies will convince you to buy a 3D printer**

[http://www.computerworld.com.au/article/572207/how-companies-will-convince-buy-3d-printer/?utm\\_medium=rss&utm\\_source=taxonomyfeed](http://www.computerworld.com.au/article/572207/how-companies-will-convince-buy-3d-printer/?utm_medium=rss&utm_source=taxonomyfeed)

**(How to) 3D Print Your Medical Scan**

<http://makezine.com/projects/make-42/3d-print-your-medical-scan/>

#### Copyright Notice

##### Warning Notice for 3D Printers and Related Technologies in Libraries

Prepared by  
Tomas A. Lipinski, Dean and Professor (effective October 1, 2014),  
School of Information Studies, University of Wisconsin—Milwaukee, [tlipinski@uwm.edu](mailto:tlipinski@uwm.edu).

##### The Notice:

Library professionals can help both themselves and their patrons minimize liability for any intellectual property infringement that may result from the 3D printing process by posting the following notice above their 3D printer(s):

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## 3D PRINTING AT MORRIS LIBRARY

TAGS: 3D, 3D PRINT, 3D PRINTER, 3D PRINTING, 3D SCANNER, 3D SCANNING, MAKERBOT

A guide to 3D Printing at Morris Library.

Last Updated: Aug 17, 2015 | URL: <http://libguides.lib.siu.edu/3d> | [Print Guide](#) | [RSS Updates](#) | [Email Alerts](#)

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### IMPORTANT INFORMATION

Required File Format:

.STL or .OBJ

Maximum Object Size:

225 x 145 x 150 mm

8.85 x 5.7 x 5.9 in

PLA filament colors currently available:

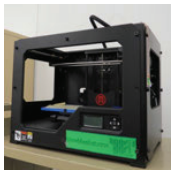
- Silver
- Black
- Red
- White
- Orange
- Green
- Natural
- Glow In the Dark
- Blue
- Yellow
- Purple

Cost per object:

\$0.25 per gram

\$1.00 minimum

### INTRODUCTION

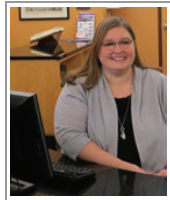


3D Printing can turn your ideas into actual objects.

Through a generous loan by the non-profit organization New Blankets, Morris Library now has a 3D Printer. This printer allows the user to create physical objects from digital models. All members of the university community and the public are encouraged to make use of this exciting technology.

3D printing is sometimes referred to as additive manufacturing or rapid prototyping. It is the process of creating a three dimensional physical object from a digital model. The 3D printer builds the object vertically by putting down layer upon layer of a plastic filament called PLA.

### SUBJECT GUIDE



**Jennifer Horton**

**Contact Info**

Morris Library  
Room 260D  
Southern Illinois University  
Carbondale, IL  
(618) 453-2663  
[Send Email](#)

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### 3D PRINTING STEPS

1. Design a 3D model or find one on a site like Thingiverse.
2. Read the Morris Library Printing Policy. If your print is time sensitive, please allow adequate time. Most prints will be finished in a few days, but there may be times that the printer is malfunctioning, being repaired, experiencing heavy use, or is being used for an event or a course.
3. Make sure your file is in .STL or .OBJ format.
4. Fill out and submit a **3D Printing Request Form**. If you have any special instructions, please include them in the Additional Comments box on the form. After you have submitted the form, the next screen will include the location to submit your .STL or .OBJ file. To upload your .STL or .OBJ file, click Browse under the Attach files option. Find and select your file. Only .STL or .OBJ files will be accepted. Once you have added your .STL or .OBJ file, click the Upload file button. If you want to print more than one object, make sure to submit a file and form for each one.
5. Optional - If you wish, set up a consultation or appointment with a member of the library staff to print your model yourself or watch it print. If you choose this option, someone will contact you about scheduling a time.
6. Library staff will email you with a confirmation of your submission and any follow-up questions.
7. Once your model has been printed, you will receive another email letting you know the cost of the object and how long you have to pick it up.
8. Pick up your model at the Morris Library Circulation Desk on the first floor. You will also pay for your object at the Circulation Desk.
9. Enjoy your object and start designing something new!

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About 3D Printing @ Gerstein + MADLab

In October 2014, the [Gerstein Science Information Centre](#) and the [MADLab](#) launched **3D Printing @ Gerstein + MADLab**, a self-serve 3D printing studio complete with two **MakerBot Replicator 2 3D printers** and a **MakerBot Digitizer 3D scanner**. The service is available for all University of Toronto students, staff, and faculty.

**What do I have to do to use the printer?**

1. Become a **3D Printing @ Gerstein + MADLab Certified User**
2. Reserve time on the printer
3. Pay \$1.50 for each 1/2 hour reserved on the printer
4. Get to printing!

**Where are the 3D printers located?**

The printers are located in the MADLab (Room B112) on the first floor basement of the [Gerstein Science Information Centre](#).

**When can I book time on the printer?**

Printers are available [by reservation only](#). The service will be open Monday to Friday 9:00 am - 5:00 pm.

**I have questions!**

Wonderfull We love questions. Send them to us at [gerstein.3dprinting\[at\]utoronto.ca](mailto:gerstein.3dprinting[at]utoronto.ca).

**I don't know anything about 3D printing. Can I still use the printers?**

**Patrons are *not* required to have any prior experience to 3D print.**

But you do have to understand all the policies & procedures and become certified.

How do you become certified? [Click here.](#)

**What is 3D Printing?**

3D printing turns computer models into real, physical things. It takes a particular material (usually plastic), melts it to a point when it can be extruded out of a small nozzle, and deposits it down in successive layers according to a computer program until an entire 3D object is created... right before your eyes!

Common applications of 3D printing include rapid prototyping and product development, though is increasingly popular in biotechnology, fashion, construction, and other industries. It's also becoming increasingly popular among hobbyists and makerspaces in public and academic libraries.

120 · Representative Documents: 3D Printing Guides

## How does 3D Printing Work??



## What about 3D Modelling? Do I need to be an AutoCAD expert?

### **no AutoCAD required! no 3D modelling *at all* required!**

There are a ton of fun, innovative, and simple designs that you can download for free from online libraries of 3D designs. We recommend that if you are new to 3D printing, try printing something small and quick. We've put together a list of objects you can print to [get experienced](#).

We love [Thingiverse](#). Browse or search the HUGE collection of free pre-designed models that you download free of charge! Still a little unsure? Choose designs that have a picture of the finished object.

### **want to design your own 3D object?**

There are also loads of free, easy-to-use 3D modelling software programs out there. Stay tuned for information about free workshops we'll be offering on how to use these software programs or check out [these handy online resources](#).

### **you're an AutoCAD expert who wants to print your own designs?**

Great! As long as you run your design through the MakerWare software to check for problematic design elements and adhere to the policies and procedures of our service, you **can** print your objects of your own design. We're excited to see what you can do!

## What are the finished products made of?

The 3D printers at Gerstein + MADLab use PLA (polylactic acid), a biodegradable thermoplastic aliphatic polyester derived from corn starch. It's safe to use in our space. You can view the [PLA Material Data Safety Sheet](#).

We currently have filament in 6 colours: white, **black**, **neon pink**, **army green**, **sparkly blue** and **purple**. Unless otherwise requested, you'll print your job in whatever colour is loaded into the printer when you begin your reservation. If you would like to print in a specific colour that we offer, please email us ahead of time and we can help you switch out the filament.

Also note that white PLA can easily be painted.



## Makerbot Replicator 2 Specs

Build volume (cm)	28.5 L x 15.3 W x 15.5 H
Minimum layer height (micron)	100
Filament	PLA – white, black, neon pink, army green, sparkly blue, purple
File type	.x3g
Memory	SD card port

## Acknowledgments

3D Printing @ Gerstein + MADLab acknowledges the following 3D Printing services for sharing their experience and various materials which contributed to the development of our service:

Rodgers 3D Studio at the University of Alabama Libraries

Toronto Public Library Digital Innovation Hub

*Thank you!*



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