

INF 385T: Concepts and Practices in 3d Printing (28276)

Fall 2017
UTA 1.210A
Wednesdays 12:00 pm – 3:00 pm

Instructor: Walker Riley
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Office Hours: 8am-12pm Wednesday in the Makerspace

I. Course Description

3d printing is one of the fastest growing technologies commercially available today. This course will highlight the ways in which 3d printing applies to the field of information science in both theory and practice. In this class we will:

- Explore the many applications of this budding technology, as well as discuss the implications of what the technology is likely to become in the near future.
- Investigate the potential dangers associated with 3d printing, as well as the policy that will mitigate that danger.
- Look at how the open-source movement has helped make 3d printing what it is today, and how that has affected the manner in which 3d printing community treats intellectual property.

This course will be relevant for not only Information Science students, but also for those in the fields of Computer Science, Architecture, Engineering, Digital Arts, Health-care, Infrastructure, Public Policy, and many more.

II. Course Aims and Objectives

After taking this course, students will be able to:

- Identify and appreciate the ever-growing applications for 3d printing
- Make a compelling case for why 3d printing and maker spaces in general are important tools for cultivating creativity and learning in communities
- Understand the complexities of ownership and intellectual property law in America
- Utilize 3d modeling software to design and create digital 3d models capable of being printed
- Operate, optimize, and troubleshoot a 3d printer and any software used to 3d print

III. Tentative Course Schedule

| Week | Discussion Topic | In Class Exercise | Assignment Due |
|----------|----------------------|--|---|
| Aug. 30 | Introduction | Download Blender, Get to know navigation | |
| Sept. 6 | Libraries | Blender 1: extrude, rotate, scale | |
| Sept. 13 | Education | Blender 2: merge, subdivide, import stl | |
| Sept. 20 | Maker Spaces | Blender 3: Boolean modifiers | Assignment 1: 1 st individual design |
| Sept. 27 | Museums and Archives | Blender 4: Sculpting and | |

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| | | Mirroring | |
| Oct. 4 | Preservation | Blender 5: Optimizing for Printing | Assignment 2: 2 nd individual design |
| Oct. 11 | Repositories (Digital Asset Management) | Cura 1: Quick Prints and View Modes | |
| Oct. 18 | Transparency (makerbot) | Cura 2: Supports, Brims, Rafts | Assignment 3: Paper Proposal |
| Oct. 25 | Dangers and Policing | Cura 3: Layer Height, Print Speed | Assignment 4: In groups, remix a preexisting file and print it |
| Nov. 1 | Open-Source Creation | Cura 4: Infill, Warping, Supplements | |
| Nov. 8 | Copyright and Ownership | Cura 5: Editing G-code | Assignment 5: Paper Draft |
| Nov. 15 | Digital Rights Management | Printing 1: Print Quality Troubleshooting, Overhang, and Bridging | Assignment 6: Submit groups and rough proposal for final projects |
| Nov. 22 | Thanksgiving! | | |
| Nov. 29 | Healthcare/Textiles/Infrastructure* | Printing 3: Printer Troubleshooting | Assignment 7: Paper Final Draft |
| Dec. 6 | Final Projects | Presentations | Assignment 8: Final Prints |

*flexible topic classes

IV. Course Requirements

- **Research Paper:**

Throughout the semester, you will develop a research paper related to the topic of 3d printing or maker spaces (can take many forms; lit review, case study, experiment etc...) We will have plenty of time in class to get feedback and brainstorm for topics or ideas for your paper. The paper does not have to be publishing quality, but you are welcome to put as much effort into the paper as you would like. Sources can be taken from class readings if they are relevant.

I will likely offer an alternative to a traditional paper, which will be to build a printer and turn in documentation in place of a your paper. Details will be discussed in class.

- **Paper Proposal:**

Turn in a topic, along with a rough outline of the paper. You can change your topic later if necessary. This proposal is primarily to make sure that you are thinking of a paper. It is advisable to have a few sources in mind at this stage.

- **Rough Draft:**

Rough drafts should be at least 1000 words, and have at least 10 sources (half of which must be scholarly). Citation styling is up to you. It is up to you how you reach your 1000 words. You can have the first half of your paper thoroughly written, with the second half untouched. You can lightly develop the entire paper. You can have a few paragraphs developed throughout an otherwise skeletal framework of a paper.

- **Final Draft.**

Final drafts should be 2500+ words with at least 20 sources (again, at least half of which should be scholarly). I want to see that you thoroughly explored your topic and through about it on a level deeper than just what your sources present to you.

- **Final Project:**

The final projects will be done in groups because we have limited time and a limited number of printers. If you wish to work alone, I may be willing to allow that, but you must come talk to me before deciding to work alone.

 - **The Model:**

I want to see that you have a firm grasp of the basics of blender. Having that been said, do not, by any means feel like you have to stop there. If you wish to follow online tutorials in addition to class and you use more complicated tools than we did in class, then please do.

Final models should show a reasonable amount of complexity to justify why it took several weeks to make. We will discuss model requirements in more detail in class.
 - **The Print:**

This is a 3d printing class, so I expect all final projects to be printed and ready for presentation by the last class day. If the print does not look good, or does not work as intended, then as long as your documentation explains why, that is fine. The work put into the print is more important than the final project.
 - **The Documentation:**

Documentation will make up the greatest portion of the final grade. I want a step by step walk through your thought process and I want to see what you did that failed. If you design a mechanical piece that doesn't quite fit I want to know about it, and I want to hear about how you fixed the problem. If you and a group mate have differences in design, I want to hear about it, and I want to know how or if a compromise was reached.

When writing about your model, tell me which methods you used: did you use a boolean merge or did you merge by hand, etc... When writing about printing tell me every setting you chose and why, and if you had to print multiple times I want to know that as well.

Documentation can come in whichever form you or your group are most comfortable with. I will accept papers, hand written journals, blog posts, video... whatever is easiest for you to accurately record your process.

- **Group Remix:**

Download file from online repository, edit the file in blender to improve or repurpose. Get a feel for designing as a group. Turn in design and a writeup of the group design process. Like with the final project, the documentation is what I find most important. I will ask that all groups submit the original file alongside your remix.

- **Individual Design 1:**

For your first design, I just want to see that you have taken the time to familiarize yourself with blender. The model does not need to be especially complex, I just want to see extrusions, rotations etc... If the final model is ugly, that is totally fine.

As with all other non-paper projects in this class, documentation is key. A horrible model can get a fine grade if I can tell from your documentation that you worked hard and understand the concepts we learned in class.

Since we have not yet learned how to print, it is not at all required to print your first design. You are welcome to if you wish, but no points will be deducted if you don't.

- **Individual Design 2:**

This is very similar to the first individual design, but I want to see slightly more complex models. You are welcome to improve upon your first design, or you can make an entirely new design. Anything goes as long as I can tell that you are actually learning blender.

Once again, documentation is the most important part.

Since we have not yet learned how to print, it is not at all required to print your first design. You are welcome to if you wish, but no points will be deducted if you don't.

- **Class Readings**

Weekly readings will be posted in canvas. All students are expected to have read all weekly readings before class as the first half of class will be spent discussing them.

- **Participation**

All students are expected to attend every class. Attendance will be taken. What you get out of this course will be significantly impacted by your participation, and as such, I expect everyone to not just show up, but to be engaged and contribute.

Having that been said, I understand that life gets in the way some times. If you know you will be missing class, try to let me know as soon as possible. If you miss class and I never hear from you about why, your participation grade will be lowered accordingly.

V. Lab Hours (Wed 8am – noon, Makerspace)

Every Wednesday before class I will be in the Makerspace. You can find me there if you need to talk about anything, or if you would like to print. This is the block of time in which most of your printing should be done since I will be there to supervise/take the blame if anything catches on fire (nothing should catch fire, but it isn't exactly impossible given how printers operate).

If you elect to build a printer, then this is also the block of time you should take advantage of for that.

VI. Grading Procedures

Grades will be determined as follows:

Attendance and Participation: (10%)

Individual Design 1: (10%)

Individual Design 2: (10%)

Group Remix: (5%)

Final Paper: (25%)

Final Project and Print: (40%)