# Syllabus: 3D Printing


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| **Instructor:** | Hunter King | **Email:** | h.king@rutgers.edu |
| **Time:** | Th 2:00 – 4:50pm | **Place:** | CNS-215 |


## Course Information

**Course Description:**
This course will provide students with a working knowledge and understanding of 3D printing. **Learning goals** cover three categories:

- *User-level skills* from measuring physical objects and creating 3D representations to manipulating the hardware to physically realize them, will be developed.
- *Device-level technical knowledge* relevant material science and design features of the different 3D printing strategies will be covered along with the basics of the computation upon which the process depends.
- *Understanding societal context* – how 3D printing fits conceptually within the history of manufacturing, and within recent social movements of making, repairing, and democratization of technology – will be absorbed through discussions and student-driven projects.

Weekly meetings will include lectures/discussions of above subject matter, but will focus on hands-on training with the available tools and will draw from the personal interests of the class. By the end, students will have learned how to design items suitable for printing and see them through to their successful fabrication, and will have gained exposure to adjacent tools, including laser-cutting and open-source hardware/software.

**Prerequisites:** None, and all majors are welcome

**Software:** The following are available on shared computers in the classroom, but you are strongly encouraged to install on your own computer.
Autodesk Inventor Pro (free for one year with a student license)
Dremel Digilab 3D Slicer (available for Windows or Mac)

**Hardware:** Students are strongly encouraged to purchase calipers of decent quality. Can be analog vernier or dial, or digital. For example, this product or its rough equivalent.

**Office/lab extra hours:** By arrangement

**Class policies:**
– Please make every effort to attend class in-person and on-time. Let me know in advance about extenuating circumstances.
– Please put completely away mobile phones for the extent of class time.

**Topic outline:** a tentative guide

| Week | Topic |
|---|---|
| 1/19 | Introductions |
| 1/26 | CAD software basics |
| 2/2 | Measurements and 2D representations |
| 2/9 | Slicing and printing |
| 2/16 | Design process and project |
| 2/23 | Advanced examples |
| 3/2 | CGI and Blender |
| 3/9 | Midterm project presentations |
| | Spring Recess |
| 3/23 | CNC router |
| 3/30 | Laser cutter |
| 4/6 | Open source hardware/software |
| 4/13 | Arduino tutorial |
| 4/20 | Project time |
| 4/27 | Final project presentations |

**Breakdown of final grade:**

1. **Participation** (20%):
   Presence and contribution to discussions and group projects will contribute to the overall grade. While this 20% will not be evaluate weekly, it will be considered case-by-case at the end of the semester, based partly on feedback from group members.

2. **In-class assignments** (20%):
   In-class assignments will given most weeks when time is not allotted for longer-term projects. Students will work in pairs to complete the assigned exercise designed to develop skills in class. Results will be coarsely evaluated for a grade.

3. **Midterm project** (20%):
   An individual or group project involving 3D design and printing of a moderately complex part will be assigned early in the semester. A presentation of its motivation, process, and results will be done in class on the last day before Spring recess. Some time for project work will be allotted during our weekly sessions, but most of the work is expected to be done out of class.

4. **Final project** (40%):
   A more complex, more open-ended project drawing from personal interests will be developed in the second half of the semester. Its presentation on the last day of class will conclude the course.