Understand ⟷ **Design** ⟷ **3D Print** ⟷ **Review** ⟷ **Share**

3D Printing and Design projects allow students to think critically, creatively, and with complexity while addressing a significant problem, challenge, or goal. Students will approach problems in integrative ways from multiple perspectives, and will ethically develop, evaluate, and implement their solution to the problem they are solving. A 3D Printing and 3D Design experience will expose students to basic 3D design and printing tools and methods, with opportunities to engage in reflective learning, analytic inquiry, problem solving, and creative design thinking.

Instructional Technology and the Libraries have developed joint learning outcomes that we want students to understand by the end of their 3D printing or 3D design project. These outcomes can be suited to many interdisciplinary options and styles, making 3D printing or 3D design projects an excellent fit within the Integrations Curriculum. While all can be integrated into a project, we recommend focusing on at least 2 or 3 of the following learning outcomes:

- **Authority is Constructed and Contextual**
- **Information Creation is a Process**
- **Information Has Value**
- **Research As Inquiry**
- **Searching as Strategic Exploration**
- **Scholarship is a Conversation**

3D printing/3D design projects are divided into five interconnected sequential steps. Each step is designed to maximize students' ability to think critically about every aspect of their work.

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Understand
- Students work to understand an identified problem, challenge, or goal through research, analysis, and critical thinking.

Design
- Students synthesize and apply the information they found to design a solution that addresses or meets their problem, challenge, or goal.
- Students create their design using applicable design software and technology.

3D Print
- Students will print a prototype of their design using applicable software and 3D printers.
- Students turn in a digital file of their 3D design and a 3D printed prototype of the design.

Review
- Students review for areas of improvement in their 3D design and 3D printed prototype.
- Students will edit, refine, and test their prototype until it is a working solution for their problem, challenge or goal.

Share

- Students share and present their final 3D printed design on the platform/venue determined by their faculty.

Recommended minimum number of class sessions

- Understand and Design begin with a class session for at least 55 minutes
- 3D Print begins with a class session for at least 55 minutes

Recommended number of staff involved in the process

- 1 Librarian
- 1 Instructional Technologist

Recommended Tips & Best Practices

Based on our experience with multiple 3D Printing/3D Design assignments, below are our recommendations for the most successful outcomes.

- If assignment allows, emphasize the process instead of the final outcome. Sometimes students will need to prototype multiple designs before they arrive at a final solution.
- 3D printed objects can be painted, sanded, and refined further after printing if necessary. Be clear with students about expectations and what is allowed with their final objects.
- Have students schedule individual appointments with the CSB/SJU Maker Space to print their prototypes and final objects, instead of trying to print during class sessions. Students will not be charged printing fees.
- Due to its simple web-based interface (and because it is free), we recommend TinkerCad as a good starting point to for students to learn basic 3D design modeling.
- We recommend that students use this project as an artifact to add to their e-Portfolio. They can be shared on social network platforms or with a general audience.