

PRIN 525 Physical Maker Lab

Units: 2

Meeting Times: 3 hours lecture/lab a week

Instructor: Adam Hughes

Office: TBA

Office Hours: TBA

Contact Info: Adamhugh@usc.edu

Teaching Assistant: TBA

Section Title: Making and Fabrication of Physical Products

Course Description

Navigate the entire product creation process from making and material selection to fabrication and manufacturing.

Learning Objectives

Before you can bring a product to market, you must build a deep understanding of the fabrication process as well as the range of materials available. The objective of this course is to teach the wide library of materials available to makers as well as the process of integrating a human-centered process into the making and fabrication of physical materials.

Learning Outcomes

In this section of the Physical Maker Lab, students will gain a deep understanding of a wide range of materials, including fabric, plastic, wood, metal, and cutting edge materials. In addition, students will learn skills in rapid prototyping and user testing to better understand the desirability of their materials and form.

Technological Proficiency and Hardware/Software Required

Microsoft Excel as well as Powerpoint and/or Keynote and/or Google Slides will be necessary for key deliverables. In addition, Solidworks, Fusion 360, or Similar CAD, Adobe CC is suggested, though not required for visual rendering of ideas.

Required Readings

Unless otherwise specified, the following readings are available online, or in major bookstores.

- *Materials and Design: The Art and Science of Material Selection in Product Design*, Mike Ashby and Kara Johnson, third edition, ISBN 978-0-08-098205-2.
- *The Design of Everyday Things*, Donald Norman
- *Research Methods for Product Design*, Alex Milton; Paul Rodgers

Grading Breakdown and Scale

Assignments will be docked one full letter grade each week they are late. Absence is not an excuse for late work.

Assignment	% of Grade
Labs	20
Assignments	30
Major Project	40
Participation	10
TOTAL	100

Description of Assignments

01 - Fabric: Students produce an artifact using fabric.

02 - Plastic: Students produce an artifact using plastic.

03 - Wood: Students produce an artifact using wood.

04 - Metal: Students produce an artifact using metal.

05 - Midterm: Students develop a proposal, including sketches and rough prototypes, for a major project centered around the making and fabrication of a physical product.

06 - Final Project, Milestone 01: Students present progress made on their prototypes since Week 08.

07 - Final Project, Milestone 02: Students present progress made on their prototypes since Week 10, and also provide an analysis and series of concepts for how the product could be fabricated in 2-3 alternative materials.

08 - Final Project, Milestone 03: Students present progress made on their prototypes since Week 12, and also provide an overview of the results of at least 3 user studies that would have been conducted using their product prototype.

09 - Final Project: Students present a final prototype of a physical product they have made and fabricated throughout the class, including a deep analysis and documentation of their process throughout.

Weekly Calendar

	Topics/Daily Activities	Readings	Assignments
Week 01	Course Introduction; What Influences Product Design; The Product Design Process	<i>Materials and Design</i> , Ch. 1-2	1- Fabric
Week 02	Materiality, Design and Creativity	<i>Materials and Design</i> , Ch. 3	
Week 03	Materials: The Stuff that Surrounds Us	<i>Materials and Design</i> , Ch. 4	2- Plastic
Week 04	Manufacturing: Shaping, Joining, and Surfaces	<i>Materials and Design</i> , Ch. 5	
Week 05	Form Follows Material	<i>Materials and Design</i> , Ch. 6	3 - Wood
Week 06	Material Selection	<i>Materials and Design</i> , Ch. 7	
Week 07	Materials and Sustainability	<i>Materials and Design</i> , Ch. 8	4 - Metal
Week 08	Midterm Review; Midterm		5 - Midterm
Week 09	Prototyping Techniques 01: Demo and Lecture	<i>The Design of Everyday Things</i> , Reading Selection 01	
Week 10	Prototyping Techniques 01: Demo and Lecture	<i>The Design of Everyday Things</i> , Reading Selection 02	6- Final Project, Milestone 01
Week 11	Work in class/Shop	<i>The Design of Everyday Things</i> , Reading Selection 03	
Week 12	New Materials; Summary of Materials and Design	<i>Materials and Design</i> , Ch. 9-10	7 - Final Project, Milestone 02
Week 13	User Testing Techniques 01: Stress testing materials	<i>Research Methods for Product Design</i> , Reading Selection 01	
Week 14	User Testing Techniques 01: Testing material desirability	<i>Research Methods for Product Design</i> , Reading Selection 02	8 - Final Project, Milestone 03
Week 15	Manufacturing for Scale	<i>Research Methods for Product Design</i> , Reading Selection 03	

	Topics/Daily Activities	Readings	Assignments
Week 16	Final Project Presentations		9 - Final Project Presentations

Policies

No make-up exams (except for documented medical or family emergencies).

Due dates and requirements for all Labs and Assignments will be posted on the course site. Students will “post” their work to their USC web space as defined on the course site.

It is the student’s responsibility to post work by the due date following the defined class procedures, even if you miss class. Work turned in late will lose 10% credit per day and late work is not accepted after two weeks past the due date. To receive credit for late work you MUST email the grader that you posted a lab or assignment after the due date or you will not receive credit.

An attendance sheet will be circulated each lecture. You must sign in for lecture to receive lecture attendance credit.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.