ARCH 319: Architectural Product Design Workshop

4 Units

Course Description

Students will delve into developing their own novel Product Design and working prototype in this workshop. Having been exposed to the myriad of Environmental Products, ideas, and principles through this program, the students in the course will be choosing and developing a novel architectural environmental product into a functioning prototype. Product Design might expand on existing concepts and continue to focus on projects that solve wicked problems with design and cladding, while others are more about techniques and methodologies rather than the specific material per se.

Students will learn about and explore some of the latest advancements in material research of our time, addressing issues of locality, globalization, and sustainability. Students will be exposed to a multitude of outside resources, depending on the material or idea involved. Students involved with metal will work with contacts at Zahner Metals of Kansas City, one of the premier architectural metal fabricators in the world. Composite plastics will be working with contacts at Kreysler & Associates, one of the main fiber reinforced plastic companies. Wood products will be working with contacts at the Wood Institute and The American Wood Council (AWC) is the industry's signature program for-development of design tools, and guidelines for wood construction that allow for the appropriate and responsible manufacture and use of wood products.

Students will also learn about the digital side of product design — including design of digital products, like apps, programs, or modeling software and digital means by which to develop
products, like using 3D printing for creation of simple prototypes or mockups used in the iteration process. Solidworks will be introduced as an option for 3D modeling as it is more tailored to the design, development, and prototyping of certain types of products.

Some of the principles of this workshop will be to choose carefully something that is small and manageable, make sure the product is somewhat novel, does not duplicate existing products, search the web for possible competitors, sell us on your idea, tell us why existing products do not do the job, convince us that nothing exists that will fill the need you have identified.

Product Design in the architecture community seems to be becoming a rarity. Where historical practices such as Charles and Ray Eames developed a multitude of products ranging from tableware to prefab architecture, current practices tend to seem to subjugate themselves into the non-descript tableware, or one-off prototyping for specific facades. Conversely, many architecture products have not evolved from their initial concept and fabrication, often to the chagrin of addressing any sustainable concept. While the business community has been waking up to the need and opportunity presented by the current interest in sustainability, most executives, and students – lack a basic understanding of the issues surrounding sustainability and the tools and methods that enable “sustainable design thinking”. This course is an intentional, focused effort to help prepare you to lead positive and productive change in global industries and companies; to open up your thinking to ‘design for sustainability’. Tolerance for design thinking and rapid prototyping; ambiguity, creativity and holistic thinking – will be needed in class, and inherent in the process of Product Design.

Learning Objectives

The course aims to encourage students to:

— Be able to demonstrate knowledge of the design process to create, iterate, and test a prototype for a new product.

— Use skills in graphic design developed in ARCH 105L: Fundamentals of Design Communication and ARCH 109: Design Foundation and knowledge of process of launching a product developed in both ARCH 1XX: Idea to Reality and this course to demonstrate understanding of how to market a new product by creating a brand image, marketing plan, marketing materials, and package design for your product.

— Be able to demonstrate understanding of the process of initiating and developing a prototype by the final review.

— Be able to demonstrate understanding of testing for efficacy, durability, and ease of use in their final review.
— Students will continue to work on their presentation skills by presenting at mid and final reviews for all assigned projects and by actively participating in all discussions.

— Demonstrate understanding of strengths and weaknesses of various fabrication methods available for developing prototypes through prototyping and testing process that will be presented as part of the final review.

— Utilize design learning and knowledge of the problems inherent in conventional materials and some of these advanced materials; longevity, embodied energy, cost, life safety, life-cycle-analysis. This will be demonstrated by performing a critical analysis of their own product as part of their final presentation.

Prerequisite(s):
ARCH 229: Shelter Design Workshop

Co-Requisite(s):
None

Concurrent Enrollment:
None

Recommended Preparation:
None

Course Notes

Communication
Students should contact their respective assigned CA with any questions regarding assignments, Blackboard, TurnItin via Blackboard, etc.

Blackboard: Blackboard will be the main platform for turning in assignments and accessing resources.

Software Students will be required to have access to, and be proficient in, 2D and 3D drafting, modeling, and graphics software. Adobe Illustrator, Adobe Acrobat, Rhino, Solidworks, and Autocad are commonly used. Students will be expected to be proficient in Rhino, Autocad, and Adobe products. Solidworks help will be provided in the classroom.

Technological Proficiency and Hardware/Software Required

Blackboard: Blackboard will be the main platform for turning in assignments and accessing resources.

Software Students will be required to have access to, and be proficient in, 2D and 3D drafting, modeling, and graphics software. Adobe Illustrator, Adobe Acrobat, Rhino, Solidworks, and Autocad are commonly used. Students will be expected to be proficient in Rhino, Autocad, and Adobe products. Solidworks help will be provided in the classroom.
USC Technology Rental Program
If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university’s equipment rental program. To apply, please submit an application. The Student Basic Needs team will contact all applicants in early August and distribute equipment to eligible applicants prior to the start of the fall semester.

USC Technology Support Links
Blackboard help for students
Software available to USC Campus

Required Materials

Optional Materials

Description and Assessment of Assignments

1. **Attendance and Participation: 10%**
   Students are responsible for attending each lecture. Students will be expected to participate in in-class discussions. Students should come to class prepared to discuss any assigned readings.

2. **Assignments: 60%**
   Assignments will be based around the different steps in the process of developing a product, from initial idea and research to testing and iteration to creation of branding and marketing materials.

3. **Midterm Presentation: 15%**
   Midterm presentation will consist of presentation of idea and all process work up until that point, including market research, fabrication and testing of prototype(s), etc.

4. **Final Presentation: 15%**
   Final presentation will include product presentation; presentation of fabrication, testing, and iteration process; all marketing materials and branding (including some process work); and demonstration of final prototype.

Participation
[Credit for participation (if any) should be explained, including what a student must do to earn full credit for participation. See the CET resource “Use of in-class work to assess class participation.” Credit may not be awarded solely for attendance, per USC policy. Participation may not be weighted more than 15% of the course grade.]
Grading Breakdown

[A grading breakdown includes all contributions to the overall course grade, with their corresponding weights/percentages. The listed assignments will be the same ones found in the Description and Assessment of Assignments section above.]

Table 1 Grading breakdown template

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance/Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments</td>
<td>60%</td>
</tr>
<tr>
<td>Midterm Presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Final Presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Grading Scale

Course final grades will be determined using the following scale.

A  95-100
A- 90-94
B+ 87-89
B  83-86
B- 80-82
C+ 77-79
C  73-76
C- 70-72
D+ 67-69
D  63-66
D- 60-62
F  59 and below

Course-specific Policies (Assignment Submission, Grading Timeline, Late work, and Technology)

Assignment Submission
Assignments will be submitted through Blackboard.

Grading Timeline

Late work
Late submission of assignments will result in a deduction of at least one letter grade. Unexcused absences on exam days can lead to a student receiving a "0" for that assignment.
Technology in the classroom

Academic integrity

Attendance
The class is only as good as the thoughts discussed by the people there to discuss them. We are a small group. We should care about the experience of the other students each week as much as our own interests. Therefore, it is important that students come to every class on time and participate.

This class follows the School of Architecture Attendance Guideline, posted on Blackboard and at: http://arch.usc.edu/sites/default/files/info/faculty/soa_attendance_guideline.pdf.

Summary: One absence will not affect grade, but more than one absence or more than two tardies will begin to inform final grade for course.

Classroom norms

Establishing a safe space and a space of respect:
• This course, and its lectures and meetings, is a space of empathy and safety.

• This course, and its lectures and meetings, is also a space where diverse thoughts and feelings are valid and should be respected.

• This course, and its lectures and meetings, is a space to explore diverse texts, places, events, and ideas that might sometimes feel uncomfortable for us to discuss. We want this to be a supportive environment where we can explore difficult problems together.

• There is a limit to all of our knowledge (students, faculty, and CAs included). We’re all going to make mistakes, especially regarding cultures and ideas that are less familiar to us, and that’s okay; we’re all here to learn from each other.

• We should be willing to acknowledge that there are limits to our knowledge that may express unintended biases. We should endeavor to learn from others in an effort to widen our knowledge and empathy.

• We should be respectful and patient with one another (and with ourselves) through this learning process.

Sharing of course materials outside of the learning environment
SCampus Section 11.12(B)
Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use
also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).

Residential and Hybrid Streaming Model Courses
[You can include a link and statement for students to consult the latest COVID-19 testing and health protocol requirements for on campus courses. Continuously updated requirements can be found on the USC COVID-19 resource center website.]

Course evaluation
Course evaluations occur at the midterm point in the course and at the end of the course. It is important to fill out these course evaluations to give a review of the students’ experience in the class.

Course Schedule: A Weekly Breakdown

Table 2 Course schedule: weekly breakdown

<table>
<thead>
<tr>
<th>Week 1: August 22-26</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong> Introduction to Product Design</td>
</tr>
<tr>
<td><strong>Working Session:</strong> Metal, Composite, Wood, or Other</td>
</tr>
<tr>
<td><strong>DUE:</strong> End of working session products will have concepts with initial sketches of products</td>
</tr>
</tbody>
</table>
| **Readings:** ● Harvard Business School Case 9-600-143: “IDEO Product Development”.  

<table>
<thead>
<tr>
<th>Week 2: August 29 - September 2</th>
</tr>
</thead>
</table>
| **Lecture and Work Session:** Lecture: Prototype – what’s a mock up prototype?  
Product Pitches: Students will workshop and brainstorm on Products |
| **DUE:** Students refine product pitches, begin to develop prototype |
| **Readings:** ● The Art of the Start by Guy Kawasaki, 2004  
● Harvard Business School Case 9-695-026: “Sweetwater”. |
### Week 3: September 5-9

**Lecture:** Understanding Product Strategy: Learn why it’s critical to have a product strategy, and how it may vary in different types of organizations.

**DUE:** Initial model of prototype, rough scalar model

**Readings:**

### Week 4: September 12-16

**Lectures:** Taking Products to Market Learn how to define and understand your key audiences and choose the most appropriate route(s) to market.

**DUE:** Continue to develop initial model of prototype, rough scalar model. Preparing model for 3D printing prototyping.

**Readings:**

### Week 5: September 19-23

**Lecture:** Mock Up – what’s a working Mock Up?

**Work Session:** In Class Workshop developing Prototype breakout sessions with Zahner Metals

**DUE:** Market, and Marketing Strategy 500-1000 word paper Continue to develop initial model of prototype, rough scalar model. Preparing model for 3D printing prototyping.

**Readings:**
- Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007
- Perspectives on Future Prototyping—Results from an Expert Discussion Gengnagel, Christoph ; Nagy, Emilia ; Stark, Rainer; Gengnagel, Christoph ; Nagy, Emilia ; Stark, Rainer. Rehink! Prototyping: Transdisciplinary Concepts of Prototyping. Springer International Publishing 2015-01-01, p.1-240

### Week 6: September 26-30
<table>
<thead>
<tr>
<th>Lecture:</th>
<th>Lecture: Workflows for printing Software and Drivers Formats for Printing (SLA, OBJ, CAD, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Session:</td>
<td>Workshop mock up model Prototype breakout sessions with Kreysler</td>
</tr>
<tr>
<td>DUE:</td>
<td>Continue to develop initial model of prototype, rough scalar model. Preparing model for 3D printing prototyping.</td>
</tr>
<tr>
<td>Readings:</td>
<td>- Thompson, Rob. Manufacturing processes for design professionals New York : Thames &amp; Hudson; c2007</td>
</tr>
</tbody>
</table>

**Week 7: October 3-7**

<table>
<thead>
<tr>
<th>Work Session</th>
<th>Workshop mock up model Prototype breakout sessions with Wood Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUE:</td>
<td>Continue to develop initial model of prototype, rough scalar model. Preparing model for 3D printing prototyping.</td>
</tr>
<tr>
<td>Readings:</td>
<td>- Thompson, Rob. Manufacturing processes for design professionals New York : Thames &amp; Hudson; c2007</td>
</tr>
</tbody>
</table>

**Week 8: October 10-14**

<table>
<thead>
<tr>
<th>Midterm</th>
<th>Prototype Reviews with outside Jury possibly from IDEO, Art Center, or other Product Design constutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUE</td>
<td>Prototype Brochure Mock-Up 3D printed prototype</td>
</tr>
<tr>
<td>Readings:</td>
<td>- Thompson, Rob. Manufacturing processes for design professionals New York : Thames &amp; Hudson; c2007</td>
</tr>
</tbody>
</table>

**Week 9: October 17-21**
<table>
<thead>
<tr>
<th>Lecture:</th>
<th>From Prototype to Fabrication – the various paths to market</th>
</tr>
</thead>
</table>
| DUE: | Prototype Brochure Mock-Up  
3D printed prototype |
| Readings: | ● Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007  

**Week 10: October 24-28**

<table>
<thead>
<tr>
<th>Work Session</th>
<th>Narrowing the Field: Votes and Group Production for 3 Prototypes for development</th>
</tr>
</thead>
</table>
| DUE: | Prototype Brochure, Product Presentation  
3D printed prototype |
| Readings: | ● Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007  

**Week 11: October 31 - November 4**

<table>
<thead>
<tr>
<th>Work Session</th>
<th>In class Group Production development of 3 Prototypes</th>
</tr>
</thead>
</table>
| DUE: | Full Scale Mock up of Prototype  
Development of Prototype Brochure, Product Presentation  
Video mock up  
Refine 3D printed prototype |
| Readings: | ● Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007  

**Week 12: November 7-11**

<p>| Work Session | In class Group Production development of 3 Prototypes |</p>
<table>
<thead>
<tr>
<th>Week 13: November 14-18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work Session:</strong> In class Group Production development of 3 Prototypes</td>
</tr>
<tr>
<td><strong>DUE:</strong> Full Scale Functioning Mock up of Prototype Development of Prototype Brochure, Product Presentation 30 second Video Refine 3D printed prototype</td>
</tr>
</tbody>
</table>
| **Readings:** *Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007*  

<table>
<thead>
<tr>
<th>Week 14: November 21-25</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong> In class Group Production development of 3 Prototypes</td>
</tr>
<tr>
<td><strong>DUE:</strong> Full Scale Functioning Mock up of Prototype Development of Prototype Brochure, Product Presentation 30 second Video Refine 3D printed prototype due Final Refined 3D printed prototype due</td>
</tr>
</tbody>
</table>
| **Readings:** *Thompson, Rob. Manufacturing processes for design professionals New York : Thames & Hudson; c2007*  

<table>
<thead>
<tr>
<th>Week 15: November 28 - December 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture:</strong> In class Group Production development of 3 Prototypes</td>
</tr>
</tbody>
</table>
| **DUE:**          | Full Scale Functioning Mock up of Prototype  
|                  | Development of Prototype Brochure, Product Presentation |
| **Readings:**    |  |
| **FINAL EXAM:**  | Final Presentation to Zahner, Kreysler, Wood Institute, IDEO, and Art Center  
|                  | Finals Week: December 7-14 |
Sample Bibliography

- Thompson, Rob. *Manufacturing processes for design professionals* New York : Thames & Hudson; c2007
- Harvard Business School Case 9-600-143: “IDEO Product Development”.
- *The Art of the Start* by Guy Kawasaki, 2004
- Belz, Frank-Martin & Peattie, Ken. *Sustainability Marketing.* West Sussex: John Wiley & Sons. (written as a textbook)
- IDEO’s Human-centered Design Toolkit (available free online)
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:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call studenthealth.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) 740-9355(WELL), press “0” after hours – 24/7 on call studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 l Title IX – (213) 821-8298 equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298 usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity lTitle IX for appropriate investigation, supportive measures, 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 Campus Support and Intervention - (213) 821-4710**  
campussupport.usc.edu  
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.