OIDD 4150/5150, MEAM 4150, IPD 5150
Product Design
Fall 2022 Syllabus

Course Description:

This course provides tools and methods for creating new products. The course is intended for students with a strong career interest in new product development, entrepreneurship, and/or technology development. The course follows an overall product design methodology, including the identification of customer needs, generation of product concepts, prototyping, and design-for-manufacturing. Weekly student assignments are focused on the design of a new product and culminate in the creation of a prototype, which is launched at an end-of-semester public Design Fair. The course project is a **physical good** - but most of the tools and methods apply to services and software products. The course is open to any Penn sophomore, junior, senior or graduate student.

Teaching Team:

Ashley Marcovitz - Studio Instructor
productdesignwharton@gmail.com (preferred email checked regularly by Prof. Marcovitz and TAs)
ashmarco@wharton.upenn.edu (personal email for confidential messages)

Karl Ulrich - self-paced modules

Colette Bernard, TA for sections 401 and 403
Jacqueline Aquino, TA for section 402
Justin Moore, grader for all sections

Course Format:

Product Design meets for three hours a week for in-person class with Professor Marcovitz. Studio class usually consists of a lecture followed by a hands-on activity, or unstructured work time in the Studios@Venture Lab, our brand-new making facility in Tangen Hall.

Students are expected to complete 1.5 hours of asynchronous content from Professor Ulrich on their own time throughout the week. This content is delivered via Canvas in the form of several short videos, readings, and podcasts. **Professor Ulrich attends the final Design Fair and does one in person lecture for each section, but does not participate in the studio sessions.**

Please note that class with Professor Marcovitz will not meet in person until the week of September 12th, which allows for all sections of the course to sync up, so that all sections can participate in the final Design Fair on the same day. There will be a series of “Pre-Work” assignments for you to complete prior to our first in-person meeting, which set the stage for a successful semester. The Pre-Work is substantial, and includes learning the basics of Rhino, a 3D modeling software, which can take time to get comfortable in - please plan accordingly.

Goals & Objectives

- Understanding and implementing concepts of design thinking, human-centered design and ideation
- Development and refinement of product concepts, prototypes and pitches
- Introduction to 3D modeling using Rhino
- Introduction to rapid prototyping tools such as laser cutter and 3D printer
- Communication and visualization techniques (sketching and prototyping)
- Introduction to studio model of teaching and working, introduction to concept of group critique and feedback

Meeting Times and Locations

This is a three-hour in-person course held in Tangen Hall, 115 S. 40th Street (40th and Sansom). Class will begin in room 708 and we will often move to the 1st floor Studios@Venture Lab during class for hands-on work time. Occasionally class will meet directly in the Studios and this will be conveyed before class. The three-hour format allows us to do many hands-on activities using the tools and equipment in Venture Lab. Think of this as the lab component of the course. Some weeks a portion of the time will be unstructured, allowing you to work on your projects.

Professor Ulrich's weekly content is available for asynchronous viewing/listening on Canvas. You must view or listen to the lecture material prior to your studio session each week. The weekly lecture content is organized as a Canvas "quiz," with a series of chunks and true/false or multiple-choice questions for each chunk. This format is intended to keep your attention and allow efficient granting of credit for viewing the lectures.

Class times - Tangen Hall room 708

Section 401 - Mondays 3:30 - 6:30 PM

Section 402 - Tuesdays 12 - 3 PM

Section 403 - Wednesdays 3:30 - 6:30 PM

You must attend the section to which you are registered.

Supplies/Software

Students will be provided with a license of Rhino 7 for use during the course. Instructions for accessing the class license of Rhino will be provided on Canvas. The class license can be used for both the Mac and Windows versions of Rhino, but please be aware that the course will be taught using the Windows version. Windows computers with Rhino are available for student use in the Studios@Venture Lab. Students who are less confident with computers may have trouble translating the lessons to the Mac

version, which has a slightly different layout. Such students are advised to use the Windows computers in the Studios for their coursework.

Required textbook (Kindle/Amazon) - It is recommended that you rent the ebook version. We are only using limited chapters so the book will not be available at the bookstore.

Ulrich, Eppinger, and Wang. 2019. Product Design and Development. 7th Ed. McGraw-Hill

https://www.amazon.com/Product-Design-Development-Karl-Ulrich-ebook-dp-B07TC9LZCD/dp/B07TC9LZCD/ (Links to an external site.)

Students should also acquire the following:

- A dedicated unlined sketchbook (any size that feels comfortable to you is great)
- Pencil with eraser
- An external mouse for use with Rhino - it is very difficult to use Rhino on a trackpad and a mouse is essential. If a mouse is not within budget, USB mice will be available during class time but if possible please purchase a mouse for homework use. **A mouse with a scroll wheel is ideal.**
- *Optional:* a 6" digital caliper - a caliper is a highly accurate measuring device we will be using during class. We will have shared calipers for class use but if you enjoy design, owning your own is a great tool. This is a highly recommended model. https://www.amazon.com/Digital-Caliper-Adoric-Calipers-Measuring/dp/B07DFFYCXS/

Assignment Deadlines & Late Policy

Most assignments will be due at the start of your studio section each week, including Professor Ulrich's asynchronous content. All assignments have an attached rubric for your reference on how the assignment will be graded.

We will accept late work for most assignments up to 24 hours after the due date/time. Late work will be graded at 25% credit, provided your submission would have merited full points had it been on time. For example, a 1 pt assignment submitted late within 24 hours of the due date would receive 0.25 pts provided that the work was fully complete. Any submissions after 24 hours will not be accepted.

There are several notable exceptions to the late policy. Assignments that are time-sensitive, such as Darwinator submissions and pitch slides, cannot be submitted late and are ineligible for 25% credit if submitted late. These assignments require work for our TAs, instructors and your fellow classmates immediately upon their due date/time and therefore cannot be submitted (or edited) late. These assignments are very clearly marked on Canvas and often have an unusual due time - please take note.

Extensions will be considered on a case-by-case basis. Please do not hesitate to reach out if you feel you are falling behind or are having difficulty due to extenuating circumstances.

Course Overview

Please see the Modules page on Canvas for a highly detailed breakdown of coursework and assignments.

Pre-Work (to be completed asynchronously before our first in-person class)

- *Self-paced module due week of Sept 12: Introduction to Product Design*
- Learn the basics of Rhino through Prof. Marcovitz's video tutorials and complete Mini Project: Design a Laser Cut Stool (please note unusual deadline for this project, which allows all stools to be laser cut for the first day of in-person studio): **due Sept. 8 at midnight**
- Identify a pain point in your life that you are interested in exploring to use in activity in our first in-person class

Class 1 (week of September 12)

- **In Studio: Introduction to Emotional Design**
- *Self-paced module: Opportunity Identification and the VIDE Model*
- Homework: Watch Rhino tutorials on Scale Tool, Curve Exercise Part 3

Class 2 (week of September 19)

- **In Studio: Basics of Aesthetic Design**
- *Self-paced module: Far Horizon Innovation*
- Homework: submit 5 product ideas to the Darwinator and rate 50 of your classmates' ideas (see unusual deadlines in Canvas)
- Choose one idea and prepare 60-second Opportunity Pitch for next class

Class 3 (week of September 26)

- **In Studio: Opportunity Pitches**
    - After everyone pitches, the class will vote and the top half of ideas will move forward. Students whose ideas are not moving forward will pair up with a winning idea to move forward as a pair.
- *Self-paced module: Cost, Channel and Unit Economics*
- Homework: Get to know your potential customers by conducting more ethnographic interviews and taking photos of a user going through your pain point.

Class 4 (week of October 3)

- **In Studio: Concept Generation**
- *Self-paced module: Industrial Design and Crowdfunding*
- Homework: Generate 10 concepts with your team around your problem statement
- Homework: Rhino tutorials on curve commands and surface building

Class 5 (week of October 10)

- **In Studio: Proof of Concept Prototype**
- *Self-paced module: Careers in Product*
- Homework: create proof of concept prototype, continue Rhino tutorials on surface building
- Homework: prepare 2-minute Team Concept Pitch for next class with your partner

Class 6 (week of October 17)

- **In Studio: Concept Pitches**
    - After all groups pitch, the class will vote and the top half of ideas will move forward. Pairs whose ideas have not been chosen will join a new group and students will be in these new groups of four for the remainder of the semester
- *Self-paced module: Patents and Intellectual Property*
- Homework: sketch for One Part project, practice 3D modeling an object for the Studios, continue Rhino tutorials, proof of concept user testing assignment

Class 7 (week of October 24)

- **In Studio: Intro to 3D Printing & Fabrication**
- *Self-paced module: Global Sourcing*
- Homework: Rhino tutorials on solid modeling
- One Part project due week 9
- Homework: Rhino tutorial: Advanced Tools (20 min)

Class 8 (week of October 31)

- **In Studio: Manufacturing Processes & Alpha Prototype Work Day**
- *Self-paced module: Sustainability and Service Design*
- Homework: One Part Challenge is due for class 9

Class 9 (week of November 7) -

- **In Studio: Professor Ulrich in-person lecture; Alpha Prototype Work Day**
- *Self-Paced Module: Product Management*
- Homework: Team Schematic Design, continue to work on Alpha Prototype
- Homework: Prepare a 4-minute Alpha Prototype Pitch with your group to present next class

Class 10 (week of November 14)

- **In Studio: Alpha Prototype Pitches**
    - No ideas will be eliminated. This is a litmus test for how well you are doing with your prototype and pitch before the Design Fair.
- *Self-Paced Module: Entrepreneurial Product Development*
- Homework: Team Assembly Drawing, Team Cost Model, 10 Product Names, Optional: Graphic Design with Rhino tutorial

NO CLASS WEEK OF NOV 21 FOR THANKSGIVING

Class 11 (week of November 28)

- **In Studio: Design Fair Prep Work Day**
- Homework: Team Design Fair Deliverables Assignment, Team Final Prototype, Team Final Name

Class 12 (week of December 5):

- **No regularly scheduled class this week! Instead, everyone who does not have another class is expected to attend our final Design Fair - Weds Dec 7, 6:30 - 8:30 PM, location TBD**

The Design Fair is a single final event (there is no final exam) for all sections of Product Design, and as such, will occur outside of class time for some sections. If you are unable to attend because you have a conflicting class, we understand and hope that others in your group are able to represent you at the fair. You will not lose points if you are unable to attend.

Policies

Please see Canvas for a detailed description of grading, academic dishonesty, and other policies, as well as information about office hours for Prof. Marcovitz and the TAs.