USC Iovine and
Young Academy

*Arts, Technology and the Business
of Innovation*

IDSN 599: Physical Product Design
Units: 4
Fall 2024
Day and Time: Tuesdays, 5:00-7:50pm

Location:
Iovine and Young Hall
3780 Watt Way
Los Angeles, 90089
Room: 213

Instructor:
Grant Delgatty
Office Hours: Email for appointment
Contact Info:
Grant – delgatty@usc.edu

IT Help: https://iovine-young.usc.edu/ait/index.html
Hours of Service: 8:30am - 5:00pm
Contact Info: iyhelp@usc.edu, 213-821-6917

Course Description

Physical Product Design is an introductory course that teaches students the fundamentals of designing and developing challenge-based consumer product solutions. The course will utilize an expedited process of learning how to research market opportunity, identify specific consumer needs and pain points through human centered design methodologies, brainstorm and discern a range of ideas, quickly and clearly visualize concepts, create iterative low and medium fidelity prototypes to validate with consumer feedback, and utilize 3D modeling, 3D printing and automated computer numerical control (CNC) methodologies to develop final product solutions.

Prerequisite(s): None
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: Students should have a basic-to-proficient understanding of Adobe Creative Suite, Keynote and/or PowerPoint, and although not necessary, some basic experience with 3D CAD modeling is beneficial (i.e. - Shapr3D, Solidworks and/or Fusion 360).

Learning Objectives and Outcomes
Students will be able to demonstrate:

• An understanding of the fundamentals to developing desirable, feasible, and viable consumer product solutions.

• An ability to discern consumer pain points / problems with the competition and create compelling and feasible solutions to address these areas of opportunity.

• Development in skills relating to creative problem solving, rapid visualization and ideation, and techniques in how to create both low and medium fidelity prototypes.

• An understanding of 3D modeling techniques as well as 3D printing and/or CNC fabrication

• A familiarity with human centered design principles and the iterative process of creating multiple prototypes based on user insights and feedback.

• An ability to evaluate their work and that of their peers in a critical manner.

Course Notes

Physical Product Design is a studio-based course which very closely mimics the actual work environment of a design studio. The format of the course is highly collaborative and primarily critique based. Learning objectives will come from weekly homework assignments and the feedback of both the professor(s) and fellow classmates. It is expected that students will engage in dialogue during class critiques, and a portion of their grade will be based on their ability and willingness to do so.

Technological Proficiency and Hardware/Software Requirements
Students should have a basic to proficient understanding of Adobe Creative Suite, Keynote and/or PowerPoint, and although not necessary, some basic experience with 3D CAD modeling is beneficial (i.e. - Shapr3D, Solidworks and/or Fusion 360).

Communication
Unless otherwise specified, all instruction will be given in-person during class. It is expected that if a student is late or absent from a class, that the student shall follow up with the professor to determine what information was covered.

USC Technology Rental Program
The university realizes that attending classes online and completing coursework remotely requires access to technology that not all students possess. 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 [USC Technology Rental Program Application .](#)

HOW TO PURCHASE SOFTWARE AT THE DISCOUNTED ACADEMY RATE

For classes that require them, the following software are available for purchase **online** through the USC Iovine and Young software catalog at the Academy discounted rate:

Software	IYA Short-Term License at USC Bookstore
Adobe Creative Cloud	$70 2023–2024 annual license
Apple Logic Pro	$35 semester licenses
Solidworks	$35 semester license
Apple Final Cut Pro	$35 semester license

To purchase:
- Visit: https://commerce.cashnet.com/IOVINE
- Select the software license(s) you would like to purchase by clicking "View Details" or the software title, and make your purchase
- You will receive an order confirmation receipt at the email address you provided
- You will be notified by email when the software license has been activated

If you have any questions about this process, please do not hesitate to contact Academy IT Support at iyahelp@usc.edu.

Suggested Readings and Supplementary Materials
- **The Design of Everyday Things** / Donald Norman
- **Change by Design** / Tim Brown
- **Emotional design: why we love (or hate) everyday things** / Donald A. Norman
- **Research Methods for Product Design** / Alex Milton; Paul Rodgers

Description and Assessment of Assignments
Homework will be weekly assignments presented and/or uploaded digitally each week to a shared Miro virtual workspace, with feedback provided in the form of critique from the professor and fellow classmates. Students will work in teams to create product solutions for a chosen domain topic by going through a process of analyzing the competitive landscape to determine blue ocean opportunities, determining design criteria to address these opportunities, developing initial ideas through brainstorming techniques and ideation sketches, developing initial low-fidelity prototypes, utilizing user feedback to iterate on initial concepts, and creating 3D generated medium fidelity prototypes based on this feedback.

The final assignment will be an individual deck demonstrating the process utilized during the semester. This deck should be well designed and should showcase all aspects of the process you took in developing your final product solution (i.e. - include market research, user profiles, opportunity analysis, problem/opportunity statement, ideation, and prototype iterations). This deck should be no more than 10 to 15 pages long and should be formatted as a PDF which is no more than 15MB, so it can easily be emailed and viewed by potential employers / interested parties.

Class time may consist of the entire class collectively participating in a large group critique, or the teams may be broken out to have in-class studio time while the instructor(s) give individual critique and feedback to other teams.

Students are responsible for all assignments, including homework, in-class work, critiques, presentations, demos, readings, process documentation, and archiving work. It is the student's responsibility to obtain missed work and information missed if absent. As IDSN 5xx is a studio-based class, information is exchanged in group discussion and may not be imparted through handouts or notes, therefore it is critical for students to attend class and be on time to succeed.

Grading Breakdown

Projects will be graded based on adherence to given guidelines, attention to craft and overall appropriateness. Taking initiative, progression and follow-through will also be considered. Both giving and receiving feedback are critical to your success in the class; therefore, your participation grade is based on your active involvement in class and critiques. Assignments will be docked one full letter grade each week they are late. Absence is not an excuse for late work. Please be sure to communicate with the professors if you miss or are planning to miss a class to arrange for homework submission.

Grades will be assessed according to a point system based on the following:
- Competency in key concepts
- Adhering to prescribed volume of work
- Effort/range of exploration
- Process and methodology
- Presentation/craftsmanship
- Participation in critiques

A   **Exceptional** - Going above and beyond with exemplary work both quantitatively and qualitatively.
A-   **Excellent** – Meeting all homework requirements with a very high quality of what's
          expected with regard to content, creativity, attention to detail and craftsmanship.
B+   **Very good** - Completing all assignments with a high level of proficiency but lacking in some areas of
          competency.
B   **Good** - Completing assignments with an above adequate to adequate level of proficiency in the
          five areas of competency.
B-   **Satisfactory** - Completing assignments with a satisfactory level of proficiency in most areas of
          competency, and below adequate in some areas.
C+   **Unsatisfactory** - Improvement needed in the five areas of competency listed in the grading criteria.
C   **Below expectation** - Most likely caused by poor levels of execution, lack of participation
          incomplete work, and overall lack of performance/effort.
C-   **Well below expectation.**
D   **Significantly below expectation.**

Assignments	Points	% of Grade
Good Design / Bad Design examples and concept revisions	50	5%
Opportunity Analysis: User personas / insights, competitive analysis, blue ocean strategy, problem	100	10%

statement, design criteria, opportunity statement		
Rapid Visualization: exercises in visualization/ideation techniques	50	5%
Initial Ideation: brainstorming and initial concept sketches	100	10%
User Feedback 1: analysis of initial ideation and concept iteration based on user feedback	50	5%
Initial Prototypes: Low fidelity prototypes Medium fidelity prototypes	100	10%
User Feedback 2: analysis of low and medium fidelity prototypes and concept iteration based on user feedback	50	5%
3D Model: 3D generated model	150	15%
Final Prototype: 3D generated medium fidelity prototype	200	20%
Individual Process Deck	100	10%
Participation	50	5%
TOTAL	1000	100%

Grading Scale

Course final grades will be determined using the following scale

95 – 100	A = 4.0
90 – 94	A- = 3.7
85 – 89	B+ = 3.3
80 – 84	B = 3.0
75 – 79	B- = 2.7
70 – 74	C+ = 2.3
65 – 69	C = 2.0
60 – 64	C- = 1.7
55 – 59	D = 1.0
0 – 55	F

Assignment Submission and Rubric Policy

Unless otherwise noted, all assignments must be submitted either on the Miro virtual whiteboard or as a PDF in the Google drive. For assignments delivered in class (such as presentations), the work must be completed before the commencement of the class session in which the assignment is due.

Assignments submitted late will be accepted but will incur the following grade penalties:
- 24 hours after deadline is a 10% deduction
- 24-48 hours after the deadline is a 20% deduction

- 48 hours to 3 days late is a 50% deduction
- Submissions more than 3 days late will receive NO CREDIT, unless approved in advance by the instructor.

*Please note deliverable criteria as sighted on each assignment rubric (as shared in class and course materials), as deductions will be incurred by inaccurate submission processes.

Grading Timeline

Grades and feedback for all assignments will be returned to students within three weeks of submission.

Class Attendance Policy

It is expected that student attend every class. If a student is unable to attend a class, it is then expected that the student contact the professor no less than 30 minutes prior to the start of class. If this is not possible due to circumstances outside the student's control, it is then expected that the student email the professor either during the class or shortly thereafter to inform the professor of the reasons for their absence. As there will be a considerable amount of groupwork done during class time, it is important student's are present in order to contribute to their working groups. It is within the professor's digression to negatively adjust a student's grade accordingly for unexcused absences, so it is in the student's best interest to either be in class or stay in communication with the professor.

Iovine and Young Hall Cleanout

The Academy is unable to store student projects and materials beyond the end of the semester. Students must remove all projects and personal materials from the Creators Studio, lockers/locker room, and other classrooms by the end of each semester. **All projects and materials left in Iovine and Young Hall will be discarded two days after final exams end. No exceptions.**

Additional Policies

It is expected that students will conduct themselves in a professional manner. Use of connected devices such as cell phones, tablets, etc. during class critique is not allowed, and should only be used during class for the purpose of taking notes or researching information pertinent to the project at hand.

Although the focus of this class is to develop consumer products, it is also expected that much thought and care be put into every component of the project. This includes spelling, punctuation, and grammar, as well as attention to detail such as design layout, cleanliness and craftsmanship, and formatting of homework assignments. Not adhering to these professionalism standards will be reflected in the final grade.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. 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. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Homework Assignments	Deliverable/Due Dates
Week 1a	**Course Introduction** - Introductions - Lecture: The lessons I've learned/human centered design	- 3 examples of 'good' design products (1-2 products / slide) - 3 examples of 'bad design products (1-2 products / slide) - Pages should include photos/images of products, MSRP, and pros and cons (bullet points) of each product to support your opinion.	- 3 examples of good design - 3 examples of bad design – **Due Week 1b**
Week 1b	**Good Design / Bad Design** - Class presentations of good and bad design examples - Discussion: What makes a successful / unsuccessful product	- Redesign three products to address opportunities for improvement - Should be presented on three separate slides – each slide should show the original product along with a sketch or image of your proposed improved design.	- Product redesigns (3) – **Due Week 2a**
Week 2a	**Design Improvements** - Class presentations of good/bad redesigns - Project kickoff (framing and parameters) - Team formation - Challenge exercise	- Determine a product category your team wishes to pursue based on the given project prompt	- Product category proposal – **Due Week 2b**
Week 2b	**Opportunity Analysis** - Discussion on competition and problem/opportunity analysis (Disney case study) - Work in class (break-out session)	- Identify a target user profile - Identify a minimum of 10 competitor products (include name of product, MSRP, Amazon star review, and list of pros and cons for each) - Produce a list of design criteria in order of importance - Create a positioning matrix to determine your product's blue ocean opportunity - Develop a concise problem/opportunity statement	- Opportunity Analysis – **Due Week 3a**
Week 3a	**Initial Ideation** - Team presentations of opportunity analysis	- Create a mind-map showcasing different potential	Initial Ideation: - Mind-map - 15-20 framing questions

		problems and touch points for your product category. - Create minimum of 15-20 'How might we' framing questions	– **Due Week 3b**
Week 3b	**Rapid Visualization (pt1)** - Lecture/demo: Visualization Overview Design Elements + Principles - In class work time	- Produce two pages (50 sketches) of lines/shapes - 10 parallel lines - 10 patterns - 10 circles - 10 ellipses - 10 gradients	- Shape sketches – **Due Week 4a**
Week 4a	**Rapid Visualization (pt2)** - Lecture/demo: Orthographic drawing - In class work time	- Produce 20 sketches of orthographic drawings (front, left side, right side, and top for 5 different products)	- Ortho sketches – **Due Week 4b**
Week 4b	**Rapid Visualization (pt3)** - Lecture/demo: Perspective drawing - In class work time	- Produce 30 sketches of basic shapes in 2-point perspective - 5 cubes from above - 5 cubes from below - 5 cylinders standing - 5 cylinders lying down - 5 pyramids - 5 cones	- Perspective sketches – **Due Week 5a**
Week 5a	**Rapid Visualization (pt4)** - Lecture/demo: Form sketching - In class work time	- Produce 25 sketches of basic shapes in 2-point perspective including shading and cast shadows - 5 cubes from above - 5 cylinders - 5 pyramids - 5 cones - 5 spheres	- Shading sketches – **Due Week 5b**
Week 5b	**Rapid Visualization (pt5)** - Lecture/demo: Contour line sketching - In class work time	- Produce 20 sketches - 10 random forms - 5 products with framing shapes surrounding them - 5 products with contour lines defining the form Rapid Viz Deliverable: - archive all rapid viz exercises into a single PDF doc and submit to Google drive	- Contour line sketches – **Due Week 6a** **Rapid Viz deliverable** – **Due Week 6a**
Week 6a	**Initial Ideation (cont)** - Lecture/demo: Concept generation via 'What if' brainstorming exercises - Work in class - perform 'what if' brainstorming exercise	- Produce a minimum of 60 'what if' concepts per team and identify 15 of your favorite concepts	Initial Ideation: - 'What if' concepts – **Due Week 6b**

Week 6b	**Ideation Sketches** - Lecture/demo: Concept generation via 'What if' brainstorming exercises	- Produce a minimum of 15 sketches per team member of initial ideation concepts based on design criteria / 'what if' exercise	Initial Ideation Sketches: **– Due Week 7a**
Week 7a	**Initial Prototypes** **-** Group presentations (initial concepts) - Lecture/demo on producing low-fidelity prototypes for given product category	- Run initial concepts by target users to obtain feedback - Produce a minimum of three revised sketches based on feedback, and one low-fidelity prototype per team member	Initial Prototypes: - User feedback - Revised concept sketches (3 per team member) - Initial low-fidelity prototype (1 per team member) **– Due Week 8a**
Week 7b	- Work in class (break-outs) - Individual team feedback		
Week 8a	**Revised Prototypes** - Group presentations (initial prototypes) - Demo on producing medium-fidelity prototypes	- Run initial prototypes by target users to obtain feedback - Produce one medium-fidelity prototype per team member	Revised Prototypes: - Medium-fidelity prototype (1 per team member) **– Due Week 9a**
Week 8b	**Fall Recess**		
Week 9a	**3D Modeling** - Lecture/demo: Introduction to 3D modeling (Shapr3D)	- Run revised prototypes by target users to obtain feedback and produce a PDF document describing key takeaways - 3D modeling exercises	User Feedback: - Obtain user feedback on revised medium fidelity prototypes **– Due Week 10a** 3D modeling exercises: **– Due Week 9b**
Week 9b	**-** Group presentations (revised prototypes) and user feedback - Lecture/demo: Advanced 3D modeling (Shapr3D)	- Advanced 3D modeling exercises	- Advanced 3D modeling exercises: **– Due Week 10a**
Week 10a	- Team breakout feedback - Work in class	- Begin 3D modeling of final design	Final 3D model: **– Due Week 12a**
Week 10b	- Individual feedback - Work in class		
Week 11a	- Individual feedback - Work in class		
Week 11b	- Lecture/demo:	- Begin final prototype fabrication	Final prototype: **– Due Week 15b (final)**

	3D printing/CNC/high fidelity model building techniques. - Work in class		
Week 12a	- Individual feedback - Work in class		
Week 12b	- Individual feedback - Work in class		
Week 13a	- Individual feedback - Work in class		
Week 13b	- Individual feedback - Work in class		
Week 14a		- Produce final deck (individual) synthesizing the work you have created from the semester.	- Individual synthesis deck (submit to Google drive) – **Due Week 15b (Final)**
Week 14b	**Thanksgiving Break**		
Week 15a	- Individual feedback - Work in class		
Week 15b	- Individual feedback - Work in class		
Finals Week (TBD)	**Final Presentations** Individual Process Deck Submission		

Statement on Academic Conduct and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Policy for AI Generators:

Use of AI generators may be acceptable in some cases for this class. Should a student determine having AI generated material be beneficial to the outcome of the project, it is expected that the student seek approval from the professor ahead of time, and never pass the work off as being an original creation produced by the student.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](#). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](#).

Support Systems:

[Counseling and Mental Health](#) - *(213) 740-9355 – 24/7 on call*
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - *988 for both calls and text messages – 24/7 on call*
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services (RSVP)](#) - *(213) 740-9355(WELL) – 24/7 on call*
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX (EEO-TIX)](#) - *(213) 740-5086*
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*
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - *(213) 740-0776*
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - *(213) 740-0411*
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - *(213) 740-2101*
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*
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) 442-1200 – 24/7 on call*
Non-emergency assistance or information.

Office of the Ombuds - *(213) 821-9556 (UPC) / (323-442-0382 (HSC)*
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - *(323) 442-2850 or* otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.