USC Iovine and Young Academy

Arts, Technology and the Business of Innovation

ACAD 444: Designing Products for Industry

Units: 4
Day/Time: TBD
Location: TBD
Instructor: Steve Child/ Grant DelGatty

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Office Hours: TBD
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IT Help: http://iovine-young.usc.edu/ait/index.html
Hours of Service: M–F, 8:30am–5:30pm **Contact Info:** iyhelp@usc.edu, 213.821.6140

Catalog Description :

A thorough look into developing a feasible consumer product through implementing all aspects of the R&D process, including consumer insights, competitive analysis, ideation, and manufacturability.

Course Description

Product Design II is the second of three product design courses offered at the IYA, and is designed to build on the learnings of Product Design I. The goal of this course is to continue the learning foundation of the product design process and what it takes to bring a product to market, while focusing more on the final function, form development, aesthetic, and manufacturability of the product. Students will be developing a product that, as in Product Design I, addresses a specific market opportunity/problem, and will take their solutions to a level that considers CMF (colors, materials, and finish), technical drawings/CAD, 3D modeling, rapid prototyping, visual modeling, and production methodologies.

At the end of this course, students will be presenting a final product proposal for a specific market/problem they identified towards the beginning of the semester. As in Product Design I, students will develop solutions for the problem they have identified through a process of research, ideation, and refinement. The refinement phase of this project, however, will be more in-depth and thorough than Product Design I, with students diving deeper into creating an actual manufacturable product.

In addition to delivering a process book at the end of the semester, the final deliverable will be a physical visual model of the student's final design (full scale, unless otherwise specified by the instructor) that best represents the final product, along with a final presentation of the complete project.

Learning Objectives

Students will be able to demonstrate:

- An understanding of the fundamentals of the product design process
- An ability to research and determine the needs and desires of specific target consumer groups
- An ability to determine typical consumer pain points / problems with the competition, and create compelling and feasible solutions to address these areas of opportunity
- A knowledge of drawing conclusions from research, and determining solutions through an iterative process of rapid visualization
- A knowledge of the rapid prototyping process and an ability to produce and fabricate a physical representation of the final product
- An understanding of CMF and manufacturing processes, and how to communicate their designs through the use of technical drawings and BOM (Build Of Materials) documents
- An ability to evaluate their work and that of their peers in a critical manner

Prerequisite(s): ACAD 245 Product Design I
Co-Requisite(s): ACAD-188 and ACAD-189
Concurrent Enrollment: None

Course Notes

Product Design II is a studio based course which very closely mimics the actual work environment of a design studio. The format of the course is primarily critique-based, and is expected to be highly collaborative. Learning objectives will come from weekly homework assignments and the feedback of both the instructor 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.

Required Readings and Supplementary Materials

The following is a list of suggested material, however, it is not required reading for Product 1

Brown, Tim. *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.* Harper Collins, 2009

Denison, Edward. *The Big Book of Packaging Prototypes: Templates for Innovative Cartons, Packages, and Boxes*

Green, Stephen. *Information Design Systems*. London and Boston: International Thomson Computer Press, 1996

Hara, Kenya. *Designing Design.* ˆHeller, Steven. *Design Literacy (Continued): Understanding Graphic Design.* New York: Allworth Press, 1999

IDEO. *Human-Centered Design Toolkit: An Open-Source Toolkit.* IDEO, 2011

Jacobson, Robert, ed. *Information Design*. Lars Muller Verlag, 2007

Maeda, John. *The Laws of Simplicity.* MIT Press, 2006

Miller, J. Abbott and Lupton, Ellen. *Design Writing Research.* Princeton Architectural Press, 1999

Moggridge, Bill. *Designing Media.* MIT Press. 2010

Moggridge, Bill. *Designing Interactions.* MIT Press, 2006

Lawson, Bryan. *How Designers Think: The Design Process Demystified*, Oxford: Architectural Press, 1997

Lupton, Ellen. *Graphic Design Thinking*. Princeton Architectural Press, 2011

McLuhan, Mashall. *Understanding Media: The Extensions of Man.* MIT Press, 1994

McLuhan, Marshall. *The Medium is the Massage.* Gingko Press, 2005

Meggs, Phillip. *Meggs' History of Graphic Design.* Wiley, 2006

Sparkle, Penny. *Design in Context.* Chartwell Books, 1987

Thorburn, David and Jenkins, Henry. *Rethinking Media Change: The Aesthetics of Transition (Media in Transition).* MIT Press, 2004

Wong, Wucious. *Principles of Form and Design.* Van Nostrand Rienhold, 1993

Description and Assessment of Assignments

Homework will be given as weekly assignments, and will be presented digitally each week in class by the students with feedback provided in the form of critique. For the duration of the class, students will work in teams to create a final proposal for their product solution. Class time may consist of the entire class collectively participating in a large group crit, or the teams may be broken out to have in-class studio time while the instructor conducts individual team critique.

While the weekly homework assignments will make up the majority of the student's grade, it is also expected that the collective body of work from the entire semester shall be presented at the end of the

semester in the form of a process book. This process book will be printed onto 11”x17” (tabloid) pages in landscape format (horizontal), and should be bound in some way. The overall look, design, and presentation of this process book will be considered in the grade given.

Students are responsible for all assignments, including homework, in-class work, critiques, presentations, demos, readings, process, and archiving work on removable media. It is the student’s responsibility to obtain missed work and information missed if absent. ACAD TBD is a studio-based class, it is crucial for students to attend class since often information is exchanged in a group discussion, critique or similar setting may not be imparted through handouts or notes. Students are responsible to schedule time, outside class time, to access 3D equipment. Lab hours will be posted. Students must attend class to succeed in the course, and be on time.

Grading Breakdown

Projects will be evaluated based on their adherence to given guidelines, attention to craft and overall appropriateness. Initiative, progress and follow-through will also be considered. Both giving and receiving feedback will be crucial 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.

Grades will be assigned according to a point system based on the following:

- Competency in key concepts
- Range of experimentation
- Process and methodology
- Presentation/craftsmanship
- Participation in critiques

Breakdown of grade as follows:

70% - Studio projects and homework assignments

- 20% - Research
- 20% - Ideation
- 15% - Refinement / Final design
- 15% - Final model

10% - Final presentation

10% - Class participation, professionalism, effort, improvement

10% - Process book

Grading 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

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 researching information pertinent to the project at hand.

Attendance is mandatory, and it is expected that students arrive to class on-time. If, for some reason, a student is going to be late, or is absent, he or she should have consent from the instructor prior to the class meeting time, or in the case of an emergency, follow-up with the instructor at his or her earliest possible convenience. Three tardies equals an absence, and three absences will result in an F.

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 formatting of homework assignments. Not adhering to these professionalism standards will be reflected the student's final grade.

Weekly Course Schedule

SECTION I

Research Phase:

- Target consumer / market trends
- Consumer insights
- Competitive analysis
- Point of difference / area of opportunity
- General problem statement

WEEK 1 **Topic / Activity: Target Consumer / Market Trends**
Course introduction, Student introductions,
Discussion on what determines the success of a product.

Homework (Due Week 2):
- Determine a product category for your project and identify who your 'target consumer' is - i.e. - age, gender (if applicable), family status, social status, economic status/income level, profession, education, hobbies, interests, etc.
- Create a page layout design for your team that will stay consistent throughout the semester. This layout should have your team name, as well as the names of individual team members, name of the course/instructor, current date, and a title area describing the subject/content for each page.
- Create a 'user profile' board showing a **minimum** of four examples (actual people or 'persona' individuals) with the above information listed for each in **point form.**
- Produce a 'trend board' showing as many examples of imagery that this consumer identifies themselves with.

WEEK 2 **Topic / Activity: Consumer Insights**
Homework presentations/group crit, Discussion on the importance of consumer insights.

Homework (Due Week 3):
- Create a questionnaire that will help give you constructive information with regard to problems needing to be solved in the product category you are designing into, and what exactly your target customer is looking for. Questions

should include, but not be limited to, gaining insight on if this consumer currently owns a product in this category, reasons on why or why not, do they have an opinion on what they feel is the best product in this category and why, what product in this category does a poor job solving the problem and why, what features and benefits are important for the product to have, what amount of money would they be willing to spend to have these features, and what would the perfect product be in their eyes. The survey should be no more than 10-15 questions long, and should not take someone more than 10 to 15 minutes to answer.
- Conduct a survey with as many **actual** people you can that fit within the target consumer profile you have determined applies to your project. A minimum of six (6) consumers should be interviewed by the collective team, and more is preferred.
- Create one page for every two consumers interviewed. Each page should have as much information about the consumer as possible, ideally having (but not required) their photo, age, etc. If the consumer referred to an existing product on the market, show an image of this product with a quick **point form** reference to it explaining its significance. Lastly, list out in **point form** what 'key takeaways' came from their interview. Not every answer needs to listed here, but only the answers you feel have pertinent information for the direction of your project.

WEEK 3 **Topic / Activity: Competitive Analysis**

Homework presentations/group crit, Discussion on competitive landscape

Homework (Due Week 4):

Based on your market and consumer insight research, identify a minimum of 10 competitive products (more is better) which are directly competing in the space you are designing for. For each product, conduct an in-depth research analysis to find out consumer perception of the pros and cons, utilizing resources such as Amazon customer reviews and product forums. Based on your findings, show the following information on your page format in **point form** (two products per page):

- brand and model name of the product
- image of the product
- retail price point
- key features and benefits claimed by manufacturer
- positive and negative takeaways from reviews

WEEK 4 **Topic / Activity: Point Of Difference / Opportunity / Problem Statement**

Homework presentations/group crit, Discussion on 'blue ocean' vs. 'red ocean'

Homework (Due Week 5):

Based on your competitive analysis research and consumer insights, create a list of 'key takeaways' that should be considered in your product solution which will effectively give your product an 'unfair' advantage against the competition. List these 'key takeaways' in **point form** on your page layout, and taking these into account, create a 'problem statement'. The problem statement should be a short, one or two sentence statement, that very clearly and concisely describes exactly what problem your product is solving, and how it will do this better than the competition.

In addition to the key takeaways and problem statement, you will need to create a grid matrix to visually represent a 'point of difference' from the competition, that identifies where the 'blue ocean' opportunities are. A minimum of one grid matrix graph is required, and should clearly identify scales

by which offer the most opportunity against the competition. The scales by which you make this comparison should be feature-based as opposed to price point, however, if price competition is determined to be a key differentiator, then this should be identified in a second grid matrix graphic.

SECTION II

Ideation Phase:

- Mind-mapping
- Brainstorming
- Rapid visualization / sketching
- Sketch modelling

WEEK 5 **Topic / Activity: Brainstorming**

Homework presentations/group crit, Discussion on mind-mapping/'what if'

Homework (Due Week 7 - 2 weeks):

- Create a mind-map to determine all the touch points and things to consider in how the consumer will interact with this product. Mind-map should be done on a large piece of butcher paper, and the evidence of completing this assignment can be a photograph of the paper.

- Conduct a 'what if' exercise. A 'what if' exercise is a brainstorming technique by where the group spends a considerable amount of time randomly writing out suggestions and ideas onto post-it notes that finish the statement "what if …?". The post-it notes are stuck to a wall as each person verbally reads out loud the statement. The goal is to be as free thinking as possible, and ideas can be anywhere from realistic to completely blue sky. The pace of ideas should be quick, and should be kept by moving from one team member to another in sequence. Once the board is covered in post-it notes, and the pace by which ideas are being generated has slowed down, the team then organizes the ideas into 'categories'. Out of the different categories, the team determines which ideas have the most potential and create a short list to be used as a launch point for ideation exploration. Evidence of completing this assignment can be a photograph of the wall of post-it notes.

Using the 'what if' exercise outcome, sketch out a minimum of 25 concepts. To clarify, this should NOT be 25 sketches of one concept, nor should it be 5 sketches of 5 concepts. This should be 25 completely different concepts. There should be roughly 5 sketches per page, and the sketches should be organized on the pages in such a way to have both nice composition, as well as a hierarchy of importance/stronger ideas. This hierarchy can be created with the use of a few techniques such as size of the sketch, line weight differentiation, background highlighting, shading/color pop, etc. Use of brief notation/call-outs and arrows to show movement/function is also encouraged, as well as photos of any reference imagery for helping to visually communicate your ideas.

WEEK 6 **Topic / Activity: Rapid Visualization**

Design studio field trip

Homework (Cont. from Week 5)**:**

WEEK 7 **Topic / Activity: Rapid Visualization**

Homework presentations from Week 5/group crit

Homework (Due Week 8):
Narrow down your ideas to 5 concepts, and create 5 new sketches per concept to address different opportunities/possibilities for each concept. Each concept should be on a separate page (5 sketches per page on 5 pages). Same page layout principles apply.

WEEK 8 **Topic / Activity: Visual Communication**
Homework presentations/individual team crit, work in class

Homework (Due Week 9):
Narrow down the 5 concepts to one singular direction and create 5 pages of more refined/detailed sketches. Sketches should include more specific functionality along with beginning to consider internal mechanisms, ergonomics and how the human body interacts with the product, any special materials or technologies that will be incorporated into the design, and exploration of the form language. Depending on the product, it may also be beneficial to produce a user scenario storyboard to help communicate how the product is intended to be used.

WEEK 9 **Topic / Activity: Study Models**
Homework presentations/individual team crit, work in class

Homework (Due Week 10):
Produce several study models of the final product direction (minimum of 3) to begin to understand scale, functionality, mechanisms, and ergonomics. Unless under special circumstances, study models should be created at a full size/1:1 scale. The purpose of study models is to begin to understand the 3 dimensional nature of the product and how it functions. The final aesthetic of the product does not necessarily need to be addressed in the study models. Common materials used to create study models can be cardboard, foam core, paper, plastic, wood, MDF, tin foil, clay, foam, hot glue, duct tape, pins, popsicle sticks, straws, stir sticks, string, styrofoam, and misc found objects.

SECTION III

Refinement Phase:

- Product statement
- Proof of concept
- Final design / visual model
- Manufacturing / technical drawings
- Product details and features/benefits
- Final Rendering

WEEK 10 **Topic / Activity: Proof Of Concept**
Homework presentations/individual team crit, work in class

Homework (Due Week 11):
- Decide on the final name for your product, design a logo for it, and create a short, one sentence statement briefly describing what the product is.
- Determine the final design direction and begin to translate your design into a 3D SolidWorks model
- Produce an RP prototype proof of concept that best represents the basic functionality of the product. NOTE - form development and aesthetics should

begin to be considered at this point

WEEK 11 **Topic / Activity: Final Design**
Homework presentations/individual team crit, work in class

Homework (Due Week 12):
- Finalize 3D SolidWorks model
- Begin final model construction
- Research production methodologies and create a page showing examples of all manufacturing applications that apply to your product solution.

WEEK 12 **Topic / Activity: Manufacturing / Technical Drawings**
Homework presentations/individual team crit, work in class

Homework (Due Week 13):
- Create an exploded view of the product, identifying major components and part names of the product.
- Produce orthographic technical drawings for all parts/components of the product, depicting dimensions, production methodologies, any technology implementation, hardware specification, etc.
- Create a page that identifies the CMF (color, material and finish) strategy you have chosen for the final design (printed examples of color scheme inspiration and materials can help contextualize your thought process here).
- Create a BOM (Build Of Materials) list for all components/parts of your product including name of part with corresponding part number, manufacturer/vendor, material, and estimated cost of part. Costs should be added up to create an estimated final cost of goods (COG).

WEEK 13 **Topic / Activity: Features and Benefits**
Homework presentations/individual team crit, work in class

Homework (Due Week 14):
- Produce a final 3D rendering of the product, and identify with call-out notation all the details and features/benefits of the product, as well as what the MSRP (Manufacturers Suggested Retail Price) is.
- Begin to prepare materials needed for the final presentation

WEEK 14 **Topic / Activity: Final Rendering / Image**
Homework presentations/individual team crit, work in class

Homework (Due Week 15):
- Produce a final color rendering depicting what the product will look like in the environment it is intended. If the product is intended to have human interaction, it should be shown in this way.
(NOTE - If the final model is complete, a high resolution photograph of the model being used in its intended environment is another acceptable form of visually communicating the final design)
- Create a page that visually shows examples of the distribution channels you anticipate this product being sold in.

WEEK 15 **Topic / Activity: Process Book**

Homework presentations/individual team crit, work in class

Homework (Due Week 16):
- Finalize work and prepare process book

WEEK 16 **FINAL PRESENTATION**

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, http://policy.usc.edu/scientific-misconduct.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.
Provides overall safety to USC community. dps.usc.edu