INTRODUCTION TO DESIGN AND MAKING: DEVELOPING YOUR PERSONAL DESIGN POTENTIAL

APPL110
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TTH 3:30-4:45 0275 PHILLIPS HALL

INSTRUCTOR

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INTRODUCTION

Design thinking is a popular buzz term in this age of Kickstarter, instant turnaround, and short time-to-market. But what is design thinking really all about? In many ways, it is a process that most of us were quite familiar with in our preschool years. Observe an opportunity. Take an action. Assess the results. Laugh at the failures. Repeat.

But how do we get back to that pure form of design thought? In this class we will dissect the process through an integrated format of discussion and making. Starting with the most basic of materials, we will exercise our latent creativity muscles and exorcise the constrained thinking and other obstacles engrained in us by "traditional" education. In this class, "failure" is an important concept that will be embraced and even celebrated. Science, entrepreneurship, and life itself is a process of try and try again. We must accept and learn from failure in order for "try" to become "do" and for "do" to lead to success.

By the end of the semester, you will have brainstormed, designed, and made dozens of artifacts. In the process, you will learn how to identify and work to the strengths of your fellow students and how to form teams dedicated to accomplishment of specific creative tasks. Rapid iterative processing, both mentally and through realization of physical prototypes will be extensively practiced. The most important skill to learn is how to efficiently ideate in a team setting by identifying and overcoming your personal obstacles to rapid, creative action. As humans, we are all creative. Our goal is for you to discover your personal strategies for moving through creative roadblocks in a challenging, fun, and nurturing environment.

COURSE FORMAT

Instructional time will center around team exercises in ideation, brainstorming, and creation of physical prototypes. Concepts and process in design will be presented and discussed throughout class sessions with concurrent mentored activities that illustrate the discussion

material. In simple terms, we'll talk about the important elements of design and prototype development and, at the same time, you'll be doing and making things that will illustrate what we're talking about.

A typical class session will start with a brief synthesis of the previous sessions and project work. We will then introduce the concept or expansion for the current session. In groups, we will then work through a guided design activity that incorporates creation of physical objects. These exercises will be actively facilitated by the instructor and TA mentors and feedback will be provided throughout the class period. In most cases, the classroom activity will extend into a homework assignment that will be completed by the team prior to the next class meeting.

Students will need to meet in teams outside of class time in order to complete assignments. For certain assignments, the teams will have access to mentors and the instructor during their team meetings.

Our students are expected to make extensive use of the BeAM makerspace network. BeAM is the perfect environment to continue your growth as an ideator and to make connections with fellow makers. BeAM is a safe zone for skills development and productive failure!

I reserve to right to make changes to the syllabus, including project due dates and test dates (excluding the officially scheduled final examination), when unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.

TEXT AND READINGS

Kelley, T. and Kelley, D. (2013). *Creative Confidence.* New York. Crown Publishing Group.

I strongly recommend that you obtain and start reading this book as soon as possible. It's entertaining and an easy read. We will discuss and refer to this text periodically throughout the semester. *Creative Confidence* will help guide you in your development as a design thinker.

Additional readings will also be assigned during the semester.

LEARNING OBJECTIVES AND OUTCOMES

Most of our objectives have already been discussed in the sections above. In brief our objectives are to:

- Develop ideation skills and a personal brainstorming technique in the group environment
- Develop physical prototyping skills using a variety of media
- Develop and reinforce positive and productive means of actively using failure to improve your creative process.
- Develop design critiquing skills in the group environment
- Develop an open-mind approach to brainstorming
- Develop skills necessary to rapidly create physical representations of ideas.

On completion of this course of study, the student should be able to:

- Efficiently demonstrate a design concept through physical manifestation (e.g. drawing, paper modeling, cardboard fabrication, 3D printing, etc.)
- Clearly explain and provide examples of the basic tenets of human-centered design
- Develop and clearly explain their personal design process
- Demonstrate the ability to efficiently explain a design concept to team members in a manner that allows the team to effectively bring the idea to life
- Objectively critique personal failures and make recommendations for improvement in those areas
- Identify team member strengths and demonstrate ways to employ and empower those skills

EXPECTATIONS, DECORUM, AND ATTENDANCE

This course is highly interactive and attendance at all sessions is required unless previously arranged with the instructor. In the event of an unavoidable absence (e.g. medical), a written explanation is required.

You will be working closely with your classmates and accord them all of the respect and honor that you yourself expect in return. Our goal is to overcome inhibitions to creativity so it is very important to give and receive critique in an objective and professional manner. There are no bad ideas in this class, just a whole lot of ideas that are part of the pathway to a solution. Remember that the crazy, stupid, and impossible ideas have often been the early steppingstones to world-changing innovation.

GRADING

The following factors will be used in determining the student's final grade:

INDIVIDUAL GRADES	PERCENTAGE OF FINAL GRADE	GROUP GRADES	PERCENTAGE OF FINAL GRADE
Individual Projects	35%	Group Projects	25%
Individual Presentation and Writing	15%	Group Presentations and Reports	10%
Peer and Faculty Evaluations	15%		
Totals	65%		35%

It is important to note that homework and projects will primarily be graded based on the quality of the solutions and the evidence and documentation of the process. Demonstrated artistic and engineering skills are not primary factors in project evaluation. This does not, however, relieve the student from the obligation to produce neat, well thought-out work.

Due dates are given with each assignment. It is expected that assignments be submitted no later than 5PM on the date due. If you anticipate that you will be unable to meet a deadline,

please let me know as soon as you know that there will be a delay. While there are any number of factors outside of your control that may cause you to turn in your assignment late, I reserve the right to deduct points for chronically or excessively late submissions.

The final weeks of the semester have been set aside to focus more closely on specific projects and to present your work to the class. This is not intended to be a capstone type event where you focus untold hours into trying to finish a major final project in time for your presentation. Rather, we will take time to revisit the successes and failures through the semester and present our best experiences as a means of illustrating our growth as creative designers.

Final letter grades will be calculated with the following grade scale:

A:	>93.0
A-:	90-92.9
B+:	87.0-89.9
B:	83.0-86.9
B-:	80.0-82.9
C+:	77.0-79.9
C:	73.0-76.9
C-:	70.0-72.9
D+:	67.0-69.9
D:	60.0-66.9

HONOR CODE

I will let you know if each assignment should be done individually or as part of a group. While I encourage you to help each other for individual work, it is a violation of the honor code if you copy or obtain solutions from another student.

ACCOMMODATION FOR STUDENTS WITH DISABILITIES.

The University of North Carolina – Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in difficulties with accessing learning opportunities. All accommodations are coordinated through the Accessibility Resources and Service Office. Please visit http://accessibility.unc.edu for more information.

SCHEDULE

WEEK ONE – YOUR PERSONAL HISTORY OF DESIGN

Tues. Aug. 21 -- Introductions and syllabus review. Review of different design processes and discussion of personal process.

Thurs. Aug. 23 -- The role of empathy in the design process. In class exercise: Understanding someone else's time management challenges. In class exercise: Designing an organizer artifact

WEEK TWO – WARMING UP YOUR DESIGN MIND

Tues. Aug. 28 -- Practicing the iterative design process. Cast a wide net, funnel, expand, repeat. Refining our organizer designs.

Thurs. Aug. 30 -- Learning design critique – personal item presentations. Groups: Presenting our organizers for analysis and critique. Rethinking features and refining design. Assignment due: Personal item critique

WEEK THREE – CRITIQUE AND ITERATION

Tues. Sept. 4 -- Documentation of organizer revisions. Design survey and discussion of design software. Group presentations of organizer designs.

Thurs. Sept. 6 -- Fundamentals of laser cutter physics and considerations for optimizing cut quality. Joinery on the laser cutter. Preparation for laser design and fabrication. Preview of first laser assignment.

WEEK FOUR – 2D DESIGN CONSIDERATIONS – PANEL CONSTRUCTION

Tues. Sept. 11 – Standard materials for the laser. Exploring with the digital caliper, the importance of measurement in laser processing. First laser assignment – the standardized fit test cut.

Thurs. Sept. 13 -- Focus on design software – Adobe Illustrator and Fusion 360. In-class work session for fit test laser assignment

WEEK FIVE – DESIGNING FOR LASER PROCESSING

Tues. Sept. 18 -- Advanced laser techniques: templates and two-sided processing Assignment due: Laser fit tester

Thurs. Sept. 20 -- Group laser assignment – preparing designs for production

WEEK SIX – TRANSITIONING FROM DESIGN TO PRODUCTION

Tues. Sept. 25 – Intro to 3D printing theory and concepts. Work on group laser project. First 3D printer assignment

Thurs. Sept. 27 – 3D printing, advanced concepts in design and production. Production testing for group laser project
Assignment due: First 3D printed object

WEEK SEVEN – ASSEMBLY HARDWARE AND VINYL CUTTING

Tues. Oct. 2 – Mechanical fasteners workshop

Thurs. Oct. 4 – The vinyl cutter, not just for vinyl… Masks, stencils, and other production aids. Introduction to vinyl cutter assignment. Introduction to large multi-technology group project.

WEEK EIGHT – COMBINING TECHNOLOGIES

Tues. Oct. 9 – Demonstration of group laser production template performance. Work session for vinyl cutter assignment.

Thurs. Oct. 11 – Group multi-tech project design session. Adobe Illustrator tips and techniques

WEEK NINE – COMBINING TECHNOLOGIES

Tues. Oct. 16 – Working with vinyl and acrylic. Bending acrylic and other post-processing

Thurs. Oct. 18 – Fall Break

WEEK TEN – ADVANCED 3D PRINTING TECHNIQUES

Tues. Oct. 23 – Design for 3D printing. Hardware fit tolerance testing - individual assignment discussion. Design session for group multi-technology assignment.

Thurs. Oct. 25 – 3D printing work session – group and one-on-one mentoring

WEEK ELEVEN – BASIC ELECTRONICS

Tues. Oct. 30 – Introduction to basic circuits and components. Paper circuits and rapid wiring techniques

Thurs. Nov. 1 – Introduction to Arduino. Fundamentals of microcontrollers and electronic prototyping.

WEEK TWELVE – BASIC ELECTRONICS

Tues. Nov. 6 – Arduino circuit prototyping and programming

Thurs. Nov. 8 – Arduino circuit prototyping and programming

WEEK THIRTEEN – REVERSE ENGINEERING

Tues. Nov. 13 – Fundamentals of reverse engineering. Understanding the limits of ethical and legal use and attribution.

Thurs. Nov. 15 – Repurposing, scavenging, and hacking: the prototyper's rapid design toolkit

WEEK FOURTEEN – SPECIAL TOPICS AND GROUP PRESENTATIONS

Tues. Nov. 20 – Fluid fittings workshop. Presentation of group projects

Thurs. Nov. 22 -- Thanksgiving

WEEK FIFTEEN – SPECIAL TOPICS AND GROUP PRESENTATIONS

Tues. Nov. 27 – Pathways to commercialization for physical products. Presentation of group projects

Thurs. Nov. 29 – Materials sourcing and related topics. Presentation of group projects

WEEK SIXTEEN – SPECIAL TOPICS AND GROUP PRESENTATIONS

Tues. Dec. 4 – Course wrap-up. Summary of techniques used and synthesis of methods applied through the semester.

FINAL EXAM -- REFLECTIVE STATEMENT

Thurs. Dec. 13 – 4:00-7:00 Phillips 0275