

INTRODUCTION TO DESIGN AND MAKING: DEVELOPING YOUR PERSONAL DESIGN POTENTIAL

APPL110
FALL 2019
TTH 11:00-12:15 275 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, self-expression, and productive failure!

I reserve the 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

Wodtke, Christina. *Pencil Me In: The Business Drawing Book for People Who Can't Draw*. Christina Wodtke, 2017. Available now(?) at Student Stores

Redwood, Ben, Filemon Schoffer, and Brian Garret. *The 3D Printing Handbook: Technologies, design, and applications*. Amsterdam: 3D Hubs, B.V., 2018. Available late September at Student Stores

Doorley, Scott, Sarah Holcomb, Perry Klebahn, Kathryn Segovia, and Jeremy Utley. *Design Thinking Bootleg*. Berkeley: Hasso Plattner Institute of Design at Stanford, 2018. Available on the class Sakai site under Resources or at <https://dschool.stanford.edu/resources/design-thinking-bootleg>

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, you 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 should 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 Homework Projects	45%	Group Homework Projects	15%
Individual Presentation and Writing	5%		
Participation Evaluations	5%	Participation Evaluations	5%
Quizzes	10%		
Final Project	15%		
Totals	80%		20%

In this class, I primarily use a system known as specifications grading which focuses more on successful completion of assignments rather than quantitative ranking of your work relative to some ideal standard. In this system, I expect you to meet the specifications provided in the rubric to receive points for the assignment. For simpler assignments, this will be all or nothing. For more detailed assignments, individual specifications will be assigned point values and points will be awarded on the basis of whether or not each specification is met.

I also require evidence and documentation of your process which can include sketches, narrative, design files, and photographs. 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 4PM 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. During this period, we will take time to revisit the successes and failures through the semester and present our projects and experiences as a means of illustrating our growth as creative designers.

Final letter grades will be calculated based on the cumulative number of points you have earned out of a semester total of approximately 350 points. Cumulative points earned will be converted to a percentage and letter grades will be assigned according to the following grade scale:

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

The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student Conduct and a respect for this most significant Carolina tradition. Your reward is in the practice of these principles.

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's

life and work. If you have any questions about your responsibility or the responsibility of faculty members under the Honor Code, please consult with someone in either the Office of the Student Attorney General (966-4084) or the Office of the Dean of Students (966-4042). You also may refer to “The Instrument of Student Judicial Governance” (<http://instrument.unc.edu>).

ACCOMMODATION FOR STUDENTS WITH DISABILITIES.

The University of North Carolina at 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. See the ARS Website for contact information: accessibility.unc.edu.

Relevant policy documents as they relate to registration and accommodations determinations and the student registration form are available on the ARS website under the About ARS tab.

TOPICS COVERED

Human-Centered Design Concepts and Methods

Design Critique and Iteration

Entrepreneurial Mindset in the Design Environment

2D Design Process and Considerations

Laser Cutter Physics and Principles

Laser Cutter Workflow and Methods

3D Design Process and Considerations

Solids Modeling Fundamentals with TinkerCad and Fusion 360

Fundamentals of 3D Printing

Design for 3D Printing

Vinyl Cutter Principles and Applications

Adhesives – Fundamentals and Applications

Mechanical Fasteners – Fundamentals and Applications

Fluid Fittings – Fundamentals and Applications

Basic Electronics – Simple Circuits

Basic Electronics – Arduino Microcontroller Environment

Repurposing, Hacking, and Reverse Engineering