APPL110
Introduction to Design and Making
Developing Your Personal Design Potential
Spring, 2020

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.
Methods	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. We will frequently work in groups 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 many 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!

Results	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 your 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
Discussion	Our goal in this course is to empower you to bring ideas to reality. Learning and practicing technical skills are an important component of this process. However, it is even more important for us to develop patience, persistence, and general grit if we are to successfully work through a meaningful design process from needs assessment through final product.
Engineering Student Outcomes	On completion of this course of study, you should be able to: ABET Demonstrate the ability to communicate effectively with a range of audiences. ABET Demonstrate the ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. ABET Demonstrate the ability to acquire and apply new knowledge as needed, using appropriate learning strategies. KEEN Demonstrate constant curiosity about our changing world. KEEN Explore a contrarian view of accepted solutions. KEEN Integrate information from many sources to gain insight. KEEN Identify unexpected opportunities to create extraordinary value. KEEN Persist through and learn from failure. KEEN Identify personal passions and a plan for professional development. KEEN Fulfill commitments in a timely manner.

Class Essentials

CONTACT INFORMATION

Dr. Glenn W. Walters	Teaching assistants
🏢 **Office Location** 158 Caudill ✉ **Email** walters@unc.edu 📞 **Phone/Text** (919) 451-1750	Ana Carvallo ana3177@live.unc.edu (404) 452-0531

LOGISTICS

🕐 **Class meeting times**
TTH 12:30 – 1:45

📍 **Class meeting location**
208 Phillips Hall

📅 **Office Hours**
Thursdays 2:30 – 4:00 BeAM@Murray Hall
 or by appointment

📖 **Required Texts**

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 January at Student Stores*

IDEO. *The Field Guide to Human-Centered Design*. IDEO.org, 2015. *Available on the class Sakai site under Resources or at* https://www.designkit.org/resources/1

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.

❑ **Software**

Adobe Illustrator/Adobe Creative Cloud – available at no cost to UNC students at https://software.sites.unc.edu/software/adobe-creative-cloud/

Tinkercad – create your free account at https://www.tinkercad.com/

Autodesk Fusion 360 – Create a free educational account available at the Fusion 360 students and educators page.

Course Content

➢ COURSE TOPICS

- Human-Centered Design Concepts and Methods
- Design Critique and Iteration
- Entrepreneurial Mindset in the Design Environment
- 2D Design Process and Considerations
- Measurement and Dimensioning
- 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

➢ COURSE SCHEDULE

The current course calendar is available in Sakai under Resources

To help you succeed

➤ COURSE EXPECTATIONS AND POLICIES

- This course is highly interactive and attendance at all sessions is required unless previously arranged with the instructor. Attendance is regularly recorded and is a factor in your final grade.
- In the event of an unavoidable absence (e.g. medical), a written explanation is required. I expect all students to abide by the UNC Class Attendance Policy.
- During class time, do not use your phone or computer for something unrelated to class; research shows that this is distracting to other students in the class. If there is an urgent situation, then you can leave the classroom to use your phone or computer. Unless specifically instructed otherwise, **all electronic devices should be packed away during class.**
- 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.
- Due dates are given with each assignment. It is expected that assignments be submitted at the beginning of class, on the due date.
- 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.

➤ STUDENT RESOURCES

SEE, SAY, DO SOMETHING	ACCESSIBILITY RESOURCES
We're happy you are here and eager to learn. Despite our best intentions to follow a plan, life may throw us a curve ball. If you or someone you know is experiencing some distress or you are concerned about the well-being of a student, please report it here: https://deanofstudents.unc.edu/carereport. It is important to support one another. If you see something, say, and do something.	UNC-CH provides accommodations for any students with documented disabilities. If you have a disability and believe you require accommodations, please contact the Department of Accessibility Resources at http://accessibility.unc.edu. Please contact me early in the semester so we can make any necessary arrangements and discuss the learning checks.

Assignments & Evaluation

➢ YOUR COURSE GRADE

10%: Homework and quizzes	Short written assignments and quizzes on the readings
34% Individual Projects	Structured individual fabrication assignments – technical skills development
23% Group Projects	Group design and fabrication assignments – process skills development
23% Individual Final Project	Integrated individual design and fabrication project
10% Final	Reflective assessment and self-evaluations
100%: total	

➢ GRADE INTERPRETATION & HONOR CODE

Your final course grade will be determined from a standard scale:	**ACADEMIC HONESTY**
A 94+ **A-** 90.0 - 93.9 **B+** 87.0 - 89.9 **B** 84.0 - 86.9 **B-** 80.0 - 83.9 **C+** 77 - 79.9 **C** 74 - 76.9 **C-** 70 - 73.9 **D+** 67 - 69.9 **D** 60 - 66.9 **F** <60	There will be clear communication if assignments are individual or group. For individual assignments, while I encourage collaboration, it is a violation of the honor code if a student duplicates work or obtains solutions from another student and submits it on their own. Please reference the honor code: http://honor.unc.edu.

➢ MAJOR COURSE DUE DATES

Final Project	Thursday April 16, 2020
Final Exam Period	Friday May 1, 2020 12:00-3:00PM 208 Phillips Hall

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.