




## Design and Making: Turning your entrepreneurial ideas into reality






Spring 2024



<p><b>Introduction</b></p>	<p>Have you ever had an idea for a product but didn't know how you could make it yourself? In this class, you will make it! At the start of the semester, you will brainstorm ideas for entrepreneurial needs, and the final product will be a device or process that addresses the need.</p>
<p><b>Methods</b></p>	<p>You will go through the entire design and fabrication process in this semester-long project. You will work in small groups and get feedback throughout the semester from potential stakeholders. These are people who would use or purchase your product, or have other expertise that can help to improve your design.</p> <p>Class will consist of lectures, discussions, brainstorming, and time to work on prototype fabrication. While you will be focusing on your own project, you will also be giving feedback to your peers throughout the semester. You should expect to spend a significant amount of time outside of class working on your project.</p>
<p><b>Results</b></p>	<p>By the end of this course, you should be able to:</p> <ul style="list-style-type: none"> <li>● Perform a needs assessment to determine the most important needs to address</li> <li>● Structure your time management over a semester-long project, with the help of project management software</li> <li>● Operate within a budget</li> <li>● Work as part of a multi-disciplinary team that includes students, faculty, and stakeholders who are potential users or beneficiaries of the device that you are developing</li> <li>● Use the library and online resources for background research</li> <li>● Experience an iterative design process, getting feedback from stakeholders throughout</li> <li>● Use CAD software and 3-D perspective drawing to design prototypes</li> <li>● Use facilities in BeAM to fabricate prototypes</li> <li>● Use principles of universal and human centered design to develop designs</li> <li>● Communicate information about your project, both in oral and written form</li> </ul>
<p><b>Discussion</b></p>	<p>You will develop your engineering and entrepreneurial skills throughout this semester. You will use the resources of the BeAM makerspace to design and fabricate your project. You will receive appropriate background and training in both mechanical and electrical design to enable you to turn your ideas into reality. After the semester is over, you are encouraged to pursue any entrepreneurial opportunities that may develop from this project.</p>
<p><b>Engineering Student Outcomes</b></p>	<ul style="list-style-type: none"> <li>● An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.</li> <li>● An ability to communicate effectively with a range of audiences</li> </ul>

- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An 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.
- Demonstrate constant curiosity about our changing world.
- Integrate information from many sources to gain insight.
- Persist through and learn from failure.
- Discern and pursue ethical practices

## Class Essentials

CONTACT INFORMATION	
Dr. Richard Goldberg	Teaching assistants
 <b>Office Location</b> 156 Caudill Labs  <b>Email</b> r.goldberg@unc.edu  <b>Phone</b> 919-966-5768	N/A

LOGISTICS	
 <b>Class meeting times</b> Tues/Thurs 2:00-3:15pm  <b>Class meeting location</b> Phillips 208  <b>Office Hours</b> Office Hours: Monday 1-2pm and Tuesday 3:30-4:30pm	 <b>Required Texts &amp; Software</b> <ul style="list-style-type: none"> <li>• The Field Guide to Human Centered Design, available online at <a href="https://www.designkit.org">https://www.designkit.org</a></li> </ul>  <b>Pre-requisites</b> <ul style="list-style-type: none"> <li>• APPL 110 or permission of the instructor</li> <li>• Orientation in BeAM makerspace (can be done during first week of semester)</li> </ul>

Resources	
 <b>Lecture slides</b> I will post lecture slides to Canvas immediately before or after class.	 <b>Zoom attendance</b> In person attendance is expected for this class

## Course content

### □ COURSE TOPICS

- Inspiration
  - Needs identification
  - Background research
  - Identify and interview stakeholders
- Ideation
  - Brainstorm initial design ideas and prototyping methods
  - Technical drawing
  - Get feedback and iterate
- Implementation
  - Incorporate standards
  - Technical Communication
  - Evaluate with verification and validation

### □ COURSE SCHEDULE

See Canvas for detailed schedule

## To help you succeed

### Health

Your mental and physical health are very important to me! Let me know how I can support you and your health this semester. If you receive accommodations from ARS, please let me know ASAP.

### Attendance

1. Much of our work this semester takes place during class time. Therefore, class attendance is required and I will take note of attendance. Let me know ahead of time if you are missing class for any reason and it will be an excused absence. Please do not come to class if you are not feeling well.

### □ COURSE EXPECTATIONS AND POLICIES

- Come to class
- During class, only use laptops and phones for work related to the class
- You and your partner(s) should contribute an equal effort toward the project
  - If this is a problem, talk to your partner first, and then me
- When visiting and working with others outside of our class, conduct yourself in a professional manner
- Complete a functional prototype at the end of the semester
- Be prepared to work hard and have fun!
- You and your partners should contribute an equal amount of effort toward your project. If you feel that you are working much harder than your partners, you should talk to your partner first, and then let one of us know if the situation does not improve.
- When visiting and working with others outside of our class, conduct yourself in a professional manner
- Follow all BeAM safety guidelines

#### Deadlines:

- There are lots of assignments this semester.
- Deadlines come quickly and are listed clearly on Canvas
- **You** are responsible for keeping track of deadlines – note both the date and time of each deadline.
- Deduction 5% for each day late. After 1 week, assignment submissions are closed
- Exceptions will be made only for severe illness or emergency

#### AI Policy

Generative AI can be useful. But the use of AI could be counter-productive in helping you to develop strong engineering and communication skills.

With that in mind, here are the AI guidelines:

- Writing computer code (if applicable): AI is permitted but you must cite its use

- Writing reports: In principle, you may submit material that contains some AI-generated content, or is based on or derived from it, if this use is properly documented. This may include drafting an outline, preparing individual sections, combining elements, removing redundant parts, and compiling and annotating references. Therefore, AI can be the starting point but not the end point, and you should not be copying significant amounts of text word-for-word and submitting it as your own, without making changes first. In addition, your documentation must make the process transparent – the submission itself must meet the relevant standards of attribution and validation.
- Any violation of this policy may result in a zero on the assignment and/or submission to the honor court

## Assignments & Evaluation

YOUR COURSE GRADE					
Group grades			Individual grades		
Final project	25%	Graded on functionality, durability, collaboration with stakeholders	Individual assignments (writing and other hw)	25%	Individual report writing assignments
Low fidelity prototype	5%	Prototype that illustrates your design idea	Peer and faculty evaluations	15%	You receive an evaluation score based on your efforts within your group
Final group report	10%	Final written report on your project			
Group homework assignments	10%	Various assignments during semester			There will be further grade reductions on any group assignment for students who “disappear” and do not contribute to the assignment
Project management updates	10%	Consistently track progress using Trello (graded each week)			
Total group grades	60%		Total individual grades	40%	

## GRADE INTERPRETATION & HONOR CODE

Your final course grade will be determined from a standard scale:

A	93+
A-	90.0 - 92.9
B+	87.0 - 89.9
B	83.0 - 86.9
B-	80.0 - 82.9
C+	77 - 79.9
C	73 - 76.9
C-	70 - 72.9
D+	67 - 69.9
D	60 - 66.9
F	<60

### ACADEMIC HONESTY

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

Low fidelity prototype	Due right before spring break
Final project	Due at Makerfest

## Class recording policies

The University may record meetings of this class for educational purposes. These recordings will be shared only with students enrolled in the course for purposes of academic instruction only. Your instructor will communicate to you how you may access any available recordings.

Unauthorized student recording of classes on personal devices or on any other format is prohibited.

Students requesting the use of assistive technology as an accommodation should contact [Accessibility Resources & Service](#). Other students must obtain express permission from the department to record the class, and the University will only grant such permission in extraordinary circumstances in which the student otherwise lacks access to a recording made by the University or instructor. Students shall not copy, reproduce, or distribute any recordings of their classes, and students shall delete any recordings at the conclusion of the course.

Any violation of these prohibitions or restriction on the making, use, copying, or distribution of recording of classes shall constitute an honor code violation.

This class will follow all UNC policies, as outlined here:

[https://curricula.unc.edu/wp-content/uploads/sites/1311/2024/01/Spring-2024-Abbreviated-Syllabus-Policy-Insert\\_Final.pdf](https://curricula.unc.edu/wp-content/uploads/sites/1311/2024/01/Spring-2024-Abbreviated-Syllabus-Policy-Insert_Final.pdf)

**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.**