APPLIED PHYSICAL SCIENCES

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

APPL 101

Exploring Engineering

Fall 2022

Introduction	Engineers help to design and build solutions to a variety of problems, ranging from major global issues to local needs in the community. This course will explore some of the fundamental skills and tools in engineering. You will learn how to model and simulate systems, how to look to the natural world for engineering ideas and solutions, and how to explore sustainability issues from an engineering perspective. There will be an emphasis on developing strong professional skills, including work in a group setting and effectively communicating your efforts.
Methods	Each class session will incorporate a small group activity. For example, students may be developing or testing a simulation, discussing an ethical issue in engineering, or exploring engineering designs in the natural world. There will be a variety of assignments, including interviews, programming simulations using Matlab, and several group projects. Some class sessions will be project work time and the faculty and TAs will float between breakout rooms to provide extra help. Students will also be expected to work on their projects outside of class time.
Results	By the end of this course, students should be able to do the following: ● Develop models and simulations of different types of systems using the modeling principles and tools that we cover in class ● Analyze a model and simulation to draw conclusions, based on its results as well as its limitations and assumptions ● Examine and model designs found in the natural world to look for engineering solutions to problems ● Analyze and model the performance of a commercial product from the standpoint of sustainability ● Work effectively in teams ● Communicate solutions to engineering problems in written and oral form
Discussion	This class will provide students with a foundation in engineering skills and tools. It will be based on real world examples and will demonstrate the strong connection between engineering and the liberal arts. We encourage you to take the complementary class, APPL 110 Introduction to Design and Making: Developing Your Personal Design Potential. This class is appropriate for you if you are thinking about a minor in Applied Sciences and Engineering, anticipate that you could be working with engineering in your own career, or want to get some engineering experience to expand your own career or graduate school possibilities.

Engineering Student Outcomes

- Demonstrate constant curiosity about our changing world
- Integrate information from many sources to gain insight.
- Identify unexpected opportunities to create extraordinary value
- Discern and pursue ethical practices
- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to communicate effectively with a range of audiences
- 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.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.

Class Essentials

Contact information

Section 001	Section 002	
Dr. Richard Goldberg	**Dr. Ehssan Nazockdast**	**Teaching assistants**
Office Location: 156 Caudill **Email:** r.goldberg@unc.edu Office phone: 919-966-5768 **Office Hours:** **Monday 2:00-3:00 pm** **Tuesday 3:30–4:30 pm**	**Office Location: Murray Hall 1112** **Email: ehssan@email.unc.edu** Office phone: 919-962-5097 Cell phone: (919) 260-9873 **Office Hours:** **Wed 1:30-2:30 pm** **Thursday 1:00-2:00 pm**	TBD

Logistics

Class meeting times

Section 001: TuTh 11:00 am-12:15 pm
Section 002: MonWed 2:30-3:455 pm

Class meeting location

Section 001: Murray G205

Course audience

- Students in any class year and any major who would like an introduction to engineering topics and mindset

This class is a gateway to the minor in Applied Sciences and Engineering

Required Texts & Software

- Matlab, download from here

Pre-requisites

- Prior programming experience is helpful. However you can take this class with no programming experience.

Resources	
Lecture slides I will post lecture slides to Canvas immediately before or after class. **Class recordings** When I am presenting new material, I will record the presentation during class time and these will automatically post to Panopto shortly after class ends.	**Zoom attendance** While in person attendance is expected, I will make Zoom attendance available for students who need this option due to illness, COVID exposure, or other extenuating circumstances.

Course content

Course Topics

- Engineering skills overview
- Introduction to programming in Matlab
- Modeling and simulation
- Ethics in engineering
- Engineering Grand Challenges
- Biomimicry – engineering in the natural world
- Sustainability engineering project
    - Research
    - Experiments
    - Modeling
    - Conclusions

Course Schedule

See link on 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 need accommodations from ARS, please let me know ASAP.

Course Expectations and policies

Attendance:

- Class attendance is required and I will record 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 or under quarantine for COVID exposure.
- While in person attendance is expected, you can attend via Zoom if necessary, especially due to illness or COVID exposure. Let me know ahead of time if you need to attend via Zoom.

Course Expectations and policies

- When assigned, watch all online lectures and do all reading assignments before coming to class (in-class quizzes will help to encourage you to do this).
- Participate in class discussions and activities.
- We will be using laptops frequently during class and you do not have easy access to power in the classroom. Please make sure that it is adequately charged before coming to class.
- During class time, do not use your phone or computer for something unrelated to class
- Come to every scheduled class and let us know ahead of time if you cannot attend.
- Turn in assignments on time; if an assignment is up to 24 hours late, there is a 25% deduction, and if an assignment is beyond 24 hours late, you will get a zero. If you need an extension, you must ask at least 24 hours before the time that the assignment is due (you can avoid a grade deduction this way).

Student Resources

SEE, SAY, DO SOMETHING

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.

CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: https://caps.unc.edu/ or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more. *(source: Student Safety and Wellness Proposal for EPC, Sep 2018)*

ACCESSIBILITY RESOURCES

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 barriers to fully accessing University courses, programs and activities.
Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS

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.	Website for contact information: https://ars.unc.edu or email ars@unc.edu.
Title IX Resources Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison – Adrienne.allison@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.	**Community Standards in Our Course** ***Fall 2022 Course Delivery****: As long as it is possible to do so safely, we will be meeting in person this semester. I understand the ongoing COVID-19 pandemic may require changes to this plan and will be monitoring the situation closely. If I need to change the format of the course temporarily due to outbreaks of illness, I will announce this via email and the course Canvas site.*

Assignments & Evaluation

Your Course Grade

Homework and in class activities, such as worksheets, quizzes, and attendance	**20%**
Simulations	**30%**
Project 1 (biomimicry)	**25%**
Project 2 (sustainable engineering)	**25%**
Total	**100%**

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

Project 1	
Project 2	
Project 3	Exam week

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.

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.