



**ENGR 1620 Sections 12 and 13**  
Introduction to Engineering  
Fall 2015

Welcome, Bicentennial Class of 2019, to Charlottesville, UVa, the E-School, and ENGR 1620! You're beginning an exciting journey to determine your academic and professional directions. **The main goal of this course** is to help prepare you for this journey by aiding in your discovery of the information and tools you'll use to build a plan for success not just for the next four years but hopefully for years to come.

ENGR 1620 is a design-centered, project-based course. Design is the principal activity of the engineer and it is best learned through hands-on experiences. To mirror professional practice, we'll work in teams on three problems that are increasingly complex and open-ended, and which can be addressed, to some degree, by multiple solutions.

Section 012's theme for the **main project** is "Engineering: It's Natural!" Your team will design and develop an object or a process inspired by nature (biomimicry) in response to a problem you identify. Think airfoils based on manta ray wings, propulsion systems based on squid, camouflage based on octopi, and sensors based on cat whiskers.

Section 013's theme for the **main project** is "Accessibility for All." Your team will identify and research a problem that limits the ability of a person with mental and/or physical challenges to contribute fully to work/home activities. This project is based on the Institute for Economic Empowerment's SourceAmerica Design Challenge (see <http://www.instituteforempowerment.org/design-challenge>).

During the semester, you'll

- **add** to your technological literacy
- **improve** important 21st century skills, such as critical thinking, systems thinking, and problem solving
- **experience** the technical and non-technical knowledge, skills, and abilities you will use in your professional practice of engineering
- **have fun!**

You'll also explore different engineering careers and investigate majors that will support the career you currently envision. We'll study and practice knowledge areas that support the design process, such as reverse engineering and human factors. Finally, we'll explore the connections among other first-year cornerstone courses, such as ENGR 1621, CS Introduction to Programming, APMA, and STS 1500.

At the end of the semester, you will be able to:

- **explain** the benefits of structuring engineering design as a problem-solving, goal-achieving process instead of a solution-driven activity
- **describe** the design-build-test cycle that will help you to go from problem to goal
- **assess** engineering project case studies from the viewpoint of the engineering design process
- **demonstrate** knowledge of key technical and non-technical topics through your performance on assignments and activities
- **identify** career direction(s) and outline (a) plan(s) for achieving your professional aspirations through exploration of various majors and professional practice
- **identify** and **describe** the relationships among your cornerstone courses in order to start to **develop** an integrative, holistic view of your undergraduate career

The **course schedule** is maintained in a separate document to support changes throughout the semester. It lists dates, class topics, deliverables, and quizzes. Additional details on the assignments will be provided in discussion notes and deliverable memos. The schedule does **not** include participation and inclass activities.

### **The Instructional Team**

Susan K. Donohue, Ph.D.  
 (v) 434.982.2205  
 (e) skd9f@virginia.edu

Office hours are noon – 12:50 pm in MEC 213 and by appointment in Rice 211. I will read and respond to email, for the most part, between 9:30 am and 8 pm during the week, and noon – 5 pm on weekends. If you need an immediate answer, please text me before 8 pm (434.953.5190).

Your undergraduate TAs are Kevin Froimson (ksf5fk) and Kevin Wu (kkw5cv). Email them for an appointment. Kevin Wu is available Tuesdays and Thursdays.

### **Readings**

There is **NO TEXTBOOK TO BUY**. Instead, readings will be posted to the course Collab site a week before they will be covered in class. Refer to the *Additional Readings* tab on the Collab site for citations for the texts we'll use and for additional resources on creativity, design, and engineering.

### **How You'll Earn Your Grade**

Your grade will be calculated based on the following percentages:

- 5% Engineering Notebook (which must be in a different book from your STS 1500 notebook)
- 10% Participation/Attendance/In-Class Activities
- 10% Final Exam

- 20% Product Development Documentation and Reports
- 25% Online Quizzes and Follow-Up Activities
- 30% Projects (Product Prototypes and Presentations)

Please note that individual and group assignments contribute equally (50%) to your grade. This grading scale will be used to determine your final grade from the points you earn:

|          |         |         |
|----------|---------|---------|
| A+       | A       | A-      |
| 99 - 100 | 95 - 98 | 90 - 94 |
| B+       | B       | B-      |
| 87 - 89  | 83 - 86 | 80 - 82 |
| C+       | C       | C-      |
| 77 - 79  | 73 - 76 | 70 - 72 |
| D+       | D       | D-      |
| 67 - 69  | 63 - 66 | 60 - 62 |
|          | F       |         |
|          | 0 - 59  |         |

**Your success is important to us!** So that you can complete the above to the best of your ability, please note:

*Participation and in-class activities* – You’re expected to participate actively in class discussions by asking questions, making comments, and answering pop-up surveys. You’ll complete both individual and group tasks during class time to reinforce the concepts covered in our discussions. You will do better academically the more actively involved you are.

*Online quizzes and follow-up activities* – The results of before-class quizzes help me focus our discussions on concepts that require further investigation. The follow-up activities, also administered online via Collab, will give me feedback on how well we’ve been able to resolve questions and uncertainty. Expect both on a day where there is a **Collab Quiz** deliverable noted on the class schedule. Look for the links to these on Collab and in the notification email.

*Projects and project development documentation/reports* – We’ll start the semester with a small “icebreaker” project and progress to a project on alternative energy and then the main project. In all cases, you will work in teams to build your prototype. You’ll also document your journey through the engineering design process for each project, starting with the problem(s) you identify and ending with pictures of your design. You’ll be provided a detailed template for each report/document, and with grading rubrics for all deliverables.

*Final exam* – the final exam is a take-home, open notes, open readings individual assignment. Where you work on it is up to you as long as you have an internet connection and a computing device. You may also work on it for as long as you like. I will be happy to answer questions in person and/or email between our last class meeting and the exam. I will also be in MEC 213 during the scheduled exam time.