Course: ENGR 1620: Introduction to Engineering
Class Number 24035.

Lab: You must be signed up for a lab (24061, 24063, or 24065) separately.

Meeting times: Mondays, Wednesdays, and Fridays from 10 AM to 10:50 AM in Thornton D222.

Prerequisite: None

Instructor: Archie Holmes, Jr.
E314 Thornton
Phone: 924-7770
Email: archieholmes@virginia.edu
Google Chat ID: archie.holmesjr

Course Introduction and Learning Goals

This course is designed for you to experience one of the basic, challenging, and fascinating aspects of engineering: the engineering design process. At its core, engineering is the practical application of science and mathematics to solve complex, open-ended problems that benefit society. This requires that engineers balance technical, economic, social, and political aspects of a problem (which often compete with each other).

During your studies at UVa, we will give you the technical and non-technical skills needed to begin the practice of engineering. This course is specifically designed to introduce you to the concept of engineering design through classroom activities, writing and laboratory assignments, and a semester long project where your team designs a robot to complete in ENGR 1620’s Robot Games. At the end of this course, you are expected to be able to do each of the following:

- Define the important aspects of the engineering design process.
- Define the role that non-technical skills (e.g., communication, ethics, etc.) play in the practice of engineering
- Clearly present an engineering design in written or oral form.
- Provide constructive feedback on engineering designs created by others.
- Work effectively on collaborative teams.

In addition, you will begin to acquire skills and knowledge needed to become a successful practicing engineer and solve complex, open-ended problems.

Course Activities and Schedule

The course activities are designed to help you acquire the knowledge needed to meet the course’s learning goals. Research has shown that active learning provides the best learning experience for students. In an active learning classroom, significant class time is spent with students working on various activities either individually or in groups. It is VERY IMPORTANT that you come to class having done the required readings and/or assignments. Otherwise, you will not get the full benefit of this teaching method.

A copy of the course schedule appears on the course web site (see Class Information via the Internet below). You should refer to this schedule since it contains the topics to be covered each week, links to reading and
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assignments, and important due dates. Any changes to this schedule will be announced via email and be changed online.

**Robot Design Project**

This semester long activity is the main way you get to experience the engineering design process in ENGR 1602. In terms of the instructions, activities, and evaluations, I have modeled the project after the way engineers work in industry. To this end, think of me as the Chief Technical Officer (CTO) of a medium size corporation. I'll dump the problem on you. I will provide initial resources (time, space and robotics kits). I will occasionally call "Design Reviews" to see how things are going or to decide if your efforts justify additional resources. But otherwise, consider me as an executive who expects you to work out problems and come up with solutions on your own.

In a similar vein, think of the course TAs as the Engineering Development Manager. The TAs are closer to you in the management chain and will be a bit more accessible. However, your project is not the only one they oversee. The TAs will be available for consultation but will not be rolling up their sleeves to work at your side. Lastly, think of the undergraduate helpers who are in the lab as a sounding board. They are there to provide guidance and help you think through any problems you encounter. However, they are not there to help you determine how to best accomplish that problem I have assigned you.

In the end, the buck stops with you in terms of the success of this project. You have the responsibility - but you also have freedoms you may not immediately appreciate. This includes, but is not limited to:

- If your idea is legal under the Rules - go for it.
- Not sure which programming language to use? Decide for yourselves.

In terms of time, there are several class sessions devoted to working on your robot (see class schedule on Collab). **Your attendance at these sessions is required.** The lab is also available from your use at the following times:

- Mondays, Wednesdays and Fridays from 9 AM to 10 AM
- Tuesdays from 11 AM to 12 noon

While attendance at these sessions is optional, I suggest that you use them to make sure that your robot is ready for the Games. Note that you are not to take your robot outside of the lab. Therefore, the times listed above are your only opportunities to work on the robot.

**Computer Lab for ENGR 1620**

In the computer lab portion of ENGR 1620, you will be learning to use MathCAD and EXCEL to solve engineering problems. The instructors for the lab strongly suggest that you buy:

- The custom ENGR-162 "E-source" book on MathCAD, Prentice Hall
- Your own copy of MathCAD from the UVa Bookstore. Its cost is approximately $15.

**Obtaining Help**

Success in this course is possible for every single student through being diligent, working thoughtfully and seeking help when one needs it. I am available on Tuesdays from 9 AM to 11 AM and Wednesdays from 1:30 PM to 3 PM for meetings with you or your team. Due to other commitments, these times may change from week to week.
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to week. If they do change, I will send out an email with a notification and post an announcement on Collab (See Class Information via the Internet below). I have an open door policy so feel free to stop by with questions any time my door is open. If it is closed I request that you not disturb me.

If you cannot make these times, your best bet is to contact me via email and make an appointment. For a faster response, make sure that your subject line starts with “ENGR 1620”. From time to time, I am also available for quick questions via Google Chat. If I am available you will see a green light next to my chat ID.

Class Information via the Internet

All information for this course will be placed on Collab (URL of https://collab.itc.virginia.edu/). In addition to this document, the following is also available online:

- The official copy of the course schedule
- Articles and assignments that you need to read before class
- The Robot Olympic rules
- Instructions and grading rubrics for course assignments and presentations.
- Announcements and copies of all emails sent to the class

Honor Policy Statement

I am committed to detecting and responding to all instances of scholastic dishonesty and will pursue cases of scholastic dishonesty in accordance with university policy. Scholastic dishonesty, in all its forms, is blight on our entire academic community. All parties in our community -- faculty, staff, and students -- are responsible for creating an environment that educates outstanding engineers, and this goal entails excellence in technical skills, self-giving citizenry, and ethical integrity. Industry wants engineers who are competent and fully trustworthy, and both qualities must be developed day by day throughout an entire lifetime. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, or any act designed to give you an unfair academic advantage. The fact that you are in this class as an engineering student is testament to your abilities. Don’t jeopardize your career by an act of scholastic dishonesty.
Evaluation of Student Achievement

Student progress towards meeting the learning goals of ENGR 1620 will be evaluated by classroom participation, individual writing assignments, peer and self-evaluations, performance in the ENGR 1620 Computer Lab, and work on the Robot design project.

Peer and Self Evaluations: 10% of course grade

An important aspect of a practicing engineer is to provide thoughtful opinions on your work and the work of others. To give you experience in this important skill, you will evaluate the engineering design(s) created by other teams in the class, the performance of your teammates on the Robot Design project, and your own performance on different activities in this class. These evaluations will be graded using the zero, one, and two scale described above.

Classroom Participation: 10% of course grade

Many of the activities done in class will require you to prepare before class and/or produce work during class. Most (but not all) of these activities will be evaluated. In some cases, the work will be collected. In other cases, a poll will be used for you to provide your grade via Collab.

Each time an assignment is evaluated, it will receive zero, one, or two points. Zero points will be assigned for incomplete assignments or assignments that demonstrate an obvious lack of effort on the part of the student. Two points is earned for complete assignments that demonstrate that the student has put appropriate effort in doing the activities of the assignment. One point will be assigned to assignments in between these two standards.

Individual Writing Assignments and Career Presentation: 15% of course grade

During the course, you will be given three opportunities to demonstrate your ability to define the important aspects of the engineering design process and show understanding of the role that non-technical factors play in the engineering profession. Each writing assignment will be graded using a rubric that is provided to you as part of the assignment’s instructions. The first writing assignment is weighted 50% less than the other three assignments.

Another role of ENGR 1620 is to help you decide which engineering major to pursue at UVa. To help you explore this, you will be assigned a partner and the two of you will present a career path to the rest of the class where an engineering degree is useful.

Computer Lab for ENGR 1620: 25% of course grade

This part of the course grade is determined by the instructor for the ENGR 1620 computer lab. Please refer to his/her course memo for how this part of your ENGR 1620 grade is determined.

Robot Design Project: 40% of course grade

The robot design project is the major activity in the course where students get to demonstrate their ability to clearly present an engineering design in written or oral form and work effectively on a collaborative team. There are seven major activities associated with project.

- Robot Labs (10% of the design project grade)
- Plan of Work Paper (5% of the design project grade)
- Preliminary Design Review Paper and Presentation (10% of the design project grade)
- Progress Report (5% of the design project grade)
- Final Design Review Paper and Presentation (15% of the design project grade)
- Post Mortem Analysis Paper and Presentation (20% of the design project grade)
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- Participation in the ENGR 1620 Robot Contest (25% of the design project grade)
- Design Project Notebook (10% of the design project grade)

Each paper and presentation will be evaluated using a provided rubric.

Final Grade Determination

The final grade for ENGR 1620 will be determined using the following table:

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<thead>
<tr>
<th>Letter Grade</th>
<th>Numerical Grade</th>
<th>Letter Grade</th>
<th>Numerical Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97 or higher</td>
<td>C</td>
<td>73 to 76</td>
</tr>
<tr>
<td>A</td>
<td>93 to 96</td>
<td>C-</td>
<td>70 to 72</td>
</tr>
<tr>
<td>A-</td>
<td>90 to 92</td>
<td>D+</td>
<td>67 to 69</td>
</tr>
<tr>
<td>B+</td>
<td>87 to 89</td>
<td>D</td>
<td>63 to 66</td>
</tr>
<tr>
<td>B</td>
<td>83 to 86</td>
<td>D-</td>
<td>60 to 62</td>
</tr>
<tr>
<td>B-</td>
<td>80 to 82</td>
<td>F</td>
<td>59 or less</td>
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<tr>
<td>C+</td>
<td>77 to 79</td>
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I reserve the right to reduce the minimum requirements for each grade once the final course grades have been calculated (e.g., lower the grade needed for a B- to a 78). However, I will not raise the minimum requirement for any grade under any circumstances.