

Individual Investigation Assignment
[revised 2/27/24]

The primary purpose of this exercise is for you to independently research a topic relevant to the course beyond the regular classroom material. You should acquire enough knowledge about the topic to achieve one of the following:

1. Carry a derivation to a more technically sophisticated level,
2. Apply theory to a challenging real-world problem, or
3. Provide some other evidence of your thorough understanding of a very focused topic.

This is an opportunity to demonstrate your knowledge and skills through an assessment method other than a traditional homework assignment or exam. The required meeting with me will also simulate to some extent the types of interactions that you will likely have with managers, graduate school advisors, and other authorities in your career. Engineers are often asked to research a subject and share their findings with their colleagues. Consequently, the only guidance that I will provide will be limited to clarifications of the specifications of the assignment and the grading criteria. I will not provide technical assistance other than the planned lecture material and homework support. If you find that you need additional technical expertise to thoroughly understand your topic, you must either find it yourself or pursue another avenue.

The assessment of your work will be in the form of a 30-minute (maximum) meeting with me at a mutually agreed time within a randomly assigned week during the semester (see below). The meeting must include a significant amount of analytical work on your part demonstrated on a whiteboard or via PowerPoint, and it will involve some discussion of the topic.

Assignment:

1. Select a topic or task within the scope of the course but not covered in detail in the lectures. Research the topic well enough so that you can discuss it knowledgeably with me for 30 minutes. You may choose a topic in a portion of the textbook not covered by the course or one that is not included in the textbook at all. A list of representative topics will be posted at the course web site, but you do not have to choose one of the listed topics.
2. Your topic should be very focused, and your presentation should be built around significant analytical work. It should not be an overview of some type of technology. For example, a general discussion of what the Internet of Things (IoT) is and the impact it will have on society, while certainly interesting, would not fit the scope of the assignment. However, you could show how the radiation pattern or input impedance of an antenna used on IoT devices is calculated or estimated.
3. Describe your proposed topic to me in a roughly 100 to 200-word e-mail message. The message is due on the Tuesday of the week before the week in which you will meet with me. For example, if your presentation is scheduled for the week of April 1–5, you must send your e-mail to me by Tuesday, March 26. However, I encourage you to contact me much earlier than then to improve the chances that you will get your first-choice topic. Include details on what you intend to do and how your proposed work will meet the requirements of the assignment. If the topic is from the posted list, do not simply write “I want to do Topic #N.” Explain what you intend to present in your meeting with me. Your e-mail should show that you have done some preliminary research on your topic.

4. In your e-mail message, propose a date and time for our meeting within the one-week window assigned to you. We might have to negotiate a mutually free time. Scores for late proposals will be reduced 5 points/day (not including weekends), but if you contact me by the Tuesday deadline and our negotiations extend beyond it, there will be no score reduction.
5. Prepare for the meeting by reading background material, completing any required derivations of equations, and studying the topic thoroughly. Also, look for applications or implications of your topic that go well beyond any expositions in the textbook. These can be your own insights, or they can be gained through a separate reference. If an external reference is used, you must cite it.
6. Your presentation should take 20 minutes or less to leave approximately 10 minutes for follow-up questions from me. You should therefore practice your presentation to make sure that it is not too long.

Special Guidelines and Other Important Information:

1. Proposed topics and meeting times will be approved in the order in which they are received. If you propose a topic that is similar to one that someone else has already chosen, you must propose a new topic.
2. Be prepared to meet at a time other than your first choice. You can get an idea of available times by consulting my weekly schedule at my personal web site at <http://www.facstaff.bucknell.edu/dkelley/sked.html>
You may also check my Google calendar. Note, however, that I sometimes have meetings, travel, or other obligations that are not listed on the schedule. I am available after 5:30 pm most evenings. Zoom-based presentations will be considered.
3. You may bring any books, journal papers, notes, or other supporting documentation that you wish to the meeting.
4. A running list will be maintained on the course web site of possible topics and those that have already been selected. You **do not** have to choose one of the listed topics.

Scoring:

This assignment will account for 10% of your overall course grade. A numerical score of 0–100 points will be assigned. The overall score will be the sum of the scores achieved in the categories listed in the table on the next page. The scores for the 2nd, 3rd, and 4th categories will be quantized in 10-point increments, with the 2nd and 3rd categories scored as follows:

20 pts acceptable or professional performance
10 pts below expectations
0 pts unprepared or significantly underprepared

If you miss the scheduled meeting time without prior notification, then your score will be limited to the points that you earned for your topic proposal (first line in the table below). Exceptions for extenuating circumstances such as serious illness or family emergencies will of course be accommodated but must be verified by the Dean's office, a health professional, or other authority.

The meeting will end at the scheduled time, regardless of when it begins. If you are late for any reason other than an extenuating circumstance as described above, then you will have less time for your presentation. Arrive early to log in to the presentation computer, set up demos, etc.

Available Points	Category
25	Clarity and focus of topic proposal (preliminary e-mail message)
20	Problem identification, formulation, and solution (knowledge and skills)
20	Effectiveness with which the concept is communicated (presentation quality)
30	Level of accuracy and confidence of answers to follow-up technical questions (knowledge and skills)
5	Exceptional creativity/originality/effort applied to topic or its presentation and/or professional performance in any category above

Week Assignments:

The randomly assigned windows for presentations are listed below. You may schedule a time to meet with me by mutual agreement on any day of the week assigned to you. Weekend meetings will not be scheduled. If you wish to switch times with anyone, you must notify me by the Tuesday preceding the earlier of the two weeks.

Mar. 4–8 Jiorle
 Mar. 18–22 Ashnault, Flynn, Tuncel (proposal e-mail due Monday after Spring Recess)
 Mar. 25–29 Jeong, Pudasaini, Youn
 Apr. 1–5 Bailey, Kennedy, Sagoe
 Apr. 8–12 Amsali, Andrews, Strausser
 Apr. 15–19 Baganski, Ren, Zhang
 Apr. 22–26 Piper, Powick, Regec