

PHYS 481 & 482: Physics Capstone Fall 2024

Faculty Contact Information:

Nicholas Bingham, ESRB 245. Office hours can be arranged with me via email: nicholas.bingham@maine.edu, but please make sure your subject includes “PHY 481: purpose of email” For the PHY 482 students, please also add “PHY 481” to the subject so it is easier for me to sort the emails. I will do my best to work around your schedules and am also happy to meet in person or on Zoom if you have a preference.

Course Information:

PHY 481 and 482 is part of the Capstone Experience in the Department of Physics and Astronomy for the degrees Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) in Physics and Bachelor of Science in Engineering Physics (B.S.E.P. or EPS).

B.A. and B.S. students are required to take one semester of Physics Project Laboratory (PHY 481) B.S.E.P. majors are required to take **both** semesters (PHY 481 & 482). ***B.S.E.P. majors must incorporate significant engineering design in their project making use of their engineering discipline.*** B.A. and B.S. physics students may include engineering design into their projects as required or desired. Students required to take both 481 & 482 will normally devote both sequential semesters to the same project. Students desiring to substantially change their project must explain their request in writing.

For BSEP majors: “Engineering design is a process of *devising a system, component, or process to meet desired needs and specifications within constraints*. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and engineering sciences are applied to convert resources into solutions. Engineering design involves *identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade-offs*, for the purpose of obtaining a high-quality solution under the given circumstances. For illustrative purposes only, examples of possible constraints include accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability.”

There is no specific meeting time, however you should have received an availability poll for occasional meetings throughout the semester. Please fill this in as soon as possible.

Required :

- **Project Description:** A 3-5 page doubled spaced document (preferably in LaTeX, but Word and Google Docs will be accepted) explaining the project, goals, timeline, and expected outcomes. This document must include references using proper citation formatting. Your mentor should be able to assist you by recommending appropriate material.
- **A Project Description Form** which must include your mentor’s signature indicating that they have read and substantially agree to the form of the project. Include the mentor’s phone number and E-mail address on the form.
- **ALL** majors, in addition to the above requirements, must include a section discussing constraints applied to your project: Potential constraints include: accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability as well as others. Discuss these considerations with your mentors. ALL engineering projects MUST meet the requirements of Engineering Design (stated above).
- **Mid-Term Project Report:** Approximately 3-5 page double spaced report on your progress to this point. Focus on your accomplishments and how these accomplishments affect the goals given in your Project Description. This report should cite the literature and have a more robust

discussion of constraints and how you are dealing with them. **EPS** students shall, in addition, include additional pages explaining how the project meets the definition of Engineering Design and examples of how they are identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade-offs, for the purpose of obtaining a high-quality solution under the given circumstances and how the project utilized knowledge/skills of their engineering concentration.

- **Web Page:** Each student will develop a web page about his or her senior project. See Project Description for deadline details will be sent to you. Send the URL to me by E-mail. Your website will be shared with the class.
- **Final Project Report:** Final report turned into your mentor and to the instructor (I require a hardcopy as well as an electronic version). The format of the report will be provided in a separate handout. ***This report must be turned in by the deadline!*** Include a discussion of each of the constraints applied to your project and how these considerations affected the design of your project. This discussion should be in more depth than that provided in your project description.
 - **Engineering Physics Students**, after the citations, include an enhanced description of how the project meets the requirements of Engineering Design (similar to what is required in the mid-term report) and include a section on how the project utilized knowledge/skills of their engineering concentration.
- **Lab notebook:** All students ***must*** keep a personal project notebook that documents their efforts and results...***no detail is too small to leave out of the notebook, especially failures.*** The notebook may be electronic (e.g. Jupyter notebook, Word, etc.) or a bound physical notebook and ***must*** be started when the project is initiated. The notebook must be turned in with your Final Report and must be available for review by the instructor as requested. If you opt for the physical notebook, it must be written in pen, and do not scribble out mistakes just make a slight strike-through or note. Follow guidelines provided in a separate document. The notebook may be examined during the semester. Check with your mentor if they have special requirements for a lab notebook.
- **Presentation:** Each student will present their work to the class, mentor(s), and even the public. You are encouraged to make use of electronic presentation methods (i.e. PowerPoint). Presentations will occur in the Friday afternoon Colloquium slot during the last week of classes. 481 students will give 10-minute presentations and 482 students will give 15-minute presentations. Additional time will be provided for questions. In general, do not discuss your constraints or why your project is Engineering Design in the presentation.
 - Your project mentor will read your report and provide the instructor with both written comments and a recommended grade on your final report and your overall progress.
 - * *Only in unusual circumstances will your final grade exceed this recommended grade.* Failure to turn in materials on time or inadequate materials will lower your final grade.

Grading:

- Project Description: 10%
- Mid Term project report: 10%
- Notebook: 10%
- Final Report: 40%
- Presentation: 30%

In addition to high quality materials, all materials must be turned in by the deadlines in order to earn an A. Late materials (up to one-week total) will reduce your maximum grade to a B. Failure to turn in material or material later than a week (combined) reduces your maximum grade to a C. ***Incomplete grades will not normally be given.***

Academic Honesty Statement:

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students with disabilities statement:

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 139 Rangeley Rd, um.sas@maine.edu, 581.2319, as early as possible in the term. Students may begin the accommodation process by submitting an accommodation request form online (http://umaine-accommodate.symlicity.com/public_accommodation/) and uploading documentation. Once students meet with SAS and eligibility has been determined, students submit an online request with SAS each semester to activate their approved accommodations. SAS creates an accessibility letter each semester which informs faculty of potential course access and approved reasonable accommodations; the letter is sent directly to the course instructor. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with the instructor privately as soon as possible.

Tentative Course Topics:**Course Schedule Disclaimer (Disruption Clause):**

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Observance of Religious Holidays/Events:

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

Sexual Discrimination Reporting:

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a faculty or staff member who is deemed a "responsible employee" about sexual discrimination, they are required to report this information to Title IX Student Services or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

Why do teachers have to report sexual discrimination?

The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

What will happen to a student if a teacher reports?

An employee from Title IX Student Services or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response.

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: **Counseling Center: 207-581-1392 or Northern Light Primary Care, University of Maine: at 207-581-4000.**

For confidential resources off campus: **Rape Response Services: 1-800-871-7741 or Partners for Peace: 1-800-863-9909.**

Other resources:

The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: **Title IX Student Services: 207-581-1406, Office of Community Standards: 207-581-1406, University of Maine Police: 207-581-4040 or 911.** Or see the Title IX website for a complete list of services at <https://umaine.edu/titleix/>