



Syllabus – Fall 2020

Webpage and Course Manual: <http://blackboard.jhu.edu/>
Required Textbook: John R. Taylor, *An Introduction to Error Analysis*, 2nd ed.
(University Science Books) ISBN:0-935702-75-X
Co-requisites: AS.171.105

1 LABORATORY CONTACTS

Instructor	Reid Mumford	reid.mumford@jhu.edu	103 Bloomberg	410-516-5183
Head TA	Bastián Pradenas	bpraden1@jhu.edu		
Teaching Assistant	Peter Weck	pweck1@jhu.edu		

2 LEARNING OBJECTIVES

The primary goal of the course is to teach experimental laboratory techniques and data analysis. Students will learn how to:

- Ask questions and define problems.
- Design experiments.
- Collect, analyze, and interpret scientific data.
- Use models to describe the data.
- Construct evidence-based conclusions and make predictions.

3 COURSE DESCRIPTION

The Classical Mechanics and Electricity & Magnetism Laboratories are one-credit classes designed to give physics majors an opportunity to develop experimental techniques, gain experience with a variety of laboratory tools, and cultivate scientific intuition. The experiments in the course have been chosen to reinforce the physical concepts taught in the companion lecture courses.

Because of the university's decision to offer only online courses this semester, most of the experimental content will be presented in video format. While students will not get the opportunity to manipulate the apparatus in our lab, special effort has been made to enable exploration and experimentation. In this way we hope to approximate the in-lab experience online. Pre-recorded videos and computer simulations will be used as needed to replicate the experiments that would have been done in-person. Students will have the opportunity to design at-home experiments using common supplies and the sensors that are pre-packaged in most smartphones.

Even in the online modality, students will be instructed in the use of several basic laboratory tools and software. For example: Python and Jupyter Notebooks, digital calipers, Vernier LabQuest data acquisition units, photogates, the Logger Pro analysis package, and various other sensors and measurement devices.

4 LABORATORY LOGISTICS

- Students are encouraged to collaborate with their peers to discuss the physics and experimental techniques for each activity. When the course meets in-person, this collaboration is natural. With the online version of the course, it is assumed that the collaboration between students will happen informally (self-organized) using Zoom meetings or similar technology.
- Students are required to use their own laptop computer in the lab.

5 GRADING AND ASSESSMENT

5.1 ASSESSMENT PHILOSOPHY

This course emphasizes the process of scientific reasoning. Therefore, scores earned on a laboratory activity do not simply depend on a “correct” experimental result.

We are of the opinion that experiments can always be improved. Our goal is to provide meaningful feedback on student work to teach good scientific habits and analysis skills. When lab submissions are assessed, we put ourselves in the role of hypothetical collaborators, and offer suggestions to improve work before it is (hypothetically) published to the larger scientific community. Students are strongly encouraged to take the feedback you receive on your submissions to improve their future work.

It is the responsibility of each student to access and review this feedback in a timely manner. We cannot be responsible for mistakes that are the result of not reviewing our feedback. If you are unsatisfied with the feedback that you receive on your submitted work, please contact your TA, the Head TA, and/or Lab Manager with your concerns.

5.2 LABORATORY ACTIVITIES

Each laboratory activity is scored out of 43 points:

- 3-points – Perusall participation.
- 10-points – pre-lab quiz.
- 30-points – lab notebook.

5.2.1 PERUSALL PARTICIPATION

Students are expected to read and participate in the assigned reading for each lab activity. Lab assignments will be posted on Perusall.com (a link will be provided on Blackboard). Students may earn up to 3 points based on their participation in the discussion of the assigned reading on Perusall.

The purpose of the Perusall discussion is to prepare students for each lab activity. Therefore, no credit will be awarded after the deadline for each reading.

5.2.2 PRE-LAB QUIZZES

Pre-lab quizzes are due in advance of each laboratory activity (see the course calendar). Quiz questions are based on readings and material taken directly from laboratory assignments and are designed to prepare students to do each laboratory activity.

Pre-lab quizzes are submitted online using Blackboard/Turnitin. Quizzes will be made available at least one-week ahead of time and will be due before the online lab material is posted.

Late pre-lab submissions will be accepted but will be assessed a 50% late penalty.

5.2.3 LAB NOTEBOOKS

For each activity, students will submit a “lab notebook” that records, describes, and summarizes their experimental work. Unless otherwise noted, students will submit one .zip file that contains all of their work.

Lab notebooks will be written using Python and Jupyter notebooks. Notebooks should be a record of the work, equations, models, data, plots, and results that relate to the lab activity.

All lab notebooks are due roughly 72 hours after each lab meeting (i.e. Thursday at 11:59pm).

Files that are submitted after the deadline will still be graded but will receive a late penalty. 10% deductions will be made each day beyond the deadline up to a maximum of a 50% point penalty.

Your work will be evaluated based on your data analysis and presentation, result, uncertainty estimate, and the interpretation of your result. A complete description of the grading rubric is given in a separate document (see “Lab Grading and Self-Assessment Rubrics” – available on Blackboard).

Grading questions must be brought to the attention of the TA, Head TA, and/or Lab Instructor within two weeks of being graded. Requests for re-grades that are made outside of this time period will not be considered.

5.2.4 FINAL PROJECT AND POSTER SESSION

The final activity of the course is an open-ended project lab. The project will be a laboratory activity that is chosen and developed by the students in each lab partnership. In addition to regular office hours and one-on-one consultations, one class period will be dedicated to the projects to provide students with time to refine, collect data, and analyze the topic that has been chosen. Successful projects will incorporate all of the elements of a typical lab activity to the chosen physics application.

Students must present their proposed idea to the lab instructor or TA for approval on or before the due date that is listed on the course calendar. Students are not to work on their project before it is approved by the TA or lab manager.

The results of the projects will be presented as posters at a virtual poster session held during the last class meeting of the semester.

Participation in the project lab is required for the course.

5.2.5 SATISFACTORY LAB SCORES

In order to be considered “satisfactory” you must score 80% or higher on a lab activity (Perusall + pre-lab quiz + lab reflection).

Students who earn less than satisfactory scores on a lab activity may resubmit their lab reflection to improve the score. Re-submissions will be handled according to the following guidelines:

- Pre-lab quizzes may not be resubmitted.
- Re-submissions are eligible for up to 50% of the previously lost points back.

- Re-submissions must be received within two weeks of the original assignment due date.
- Re-submissions will be handled via email with your section instructor/TA.
- Work that was originally submitted late is NOT eligible for re-submission.

5.3 SUBMITTING WORK

All work for the course will be submitted electronically using Blackboard/Turnitin/Box. **It is the responsibility of the student to ensure that assignments are submitted successfully.**

5.4 FINAL GRADE

The final letter grade in the course will be awarded using the criteria summarized in Table 5.1. The final letter grade is determined by the number of satisfactory laboratory activities that are submitted. See Section 5.2.5 for the criteria a lab activity must meet to be considered satisfactory.

A total of 9 laboratories are offered during the semester plus an additional make-up lab. The make-up lab is designed to help students with unexpected illness or scheduling conflicts that may make it impossible to submit a laboratory activity during the semester. Consult the course calendar for a complete lab activity schedule.

Letter Grade	Number of Satisfactory Labs
A	9
A-	8
B+	7
B	6
B-	5
C+	4
C	3
F	<3

Table 5.1: Conversion between the number of successfully completed labs to final letter grades. Note that the number of satisfactory labs listed above assumes the successful completion of the final project lab.

6 LABORATORY SAFETY

All laboratory courses at Johns Hopkins University require the completion of a basic safety course. The course is available on-line in the "MyLearning" tab on <http://my.jhu.edu>. The required safety course is called: "Laboratory Safety Introductory Course". While this is an online laboratory course – and it is very likely that you will not be conducting experiments in a proper laboratory – the principals taught in the required safety training still apply and are a vital part of laboratory education.

The hazards associated with conducting basic physics experiments are typically low. When instructions are not carefully followed or equipment is abused or handled incorrectly, the probability of injury quickly increases.

7 COURSE POLICIES

7.1 ACADEMIC INTEGRITY

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

Plagiarism is a serious offense in an academic community and it will not be tolerated in this course. Cheating is wrong. The potentially long-lasting consequences of an academic violation for your future education and career are not worth the perceived benefit. If you are feeling overwhelmed in this course, please reach out to your TA or other lab staff. Asking other students for copies of their work is a violation of the ethics policy for this course.

Collaboration between lab partners, other enrolled students, and teaching assistants is recommended and encouraged. However, **students are required to submit their own unique work**.

Students are encouraged to be mindful of the ways that they collaborate with their fellow students. For example, sharing your work electronically with other students is ethically questionable and has the potential to result in an academic integrity violation.

The following general policies are in place to encourage academic integrity among students:

- All academic integrity violations are reported to the Office of the Dean of Student Life.
- Overly-close collaboration between lab partners constitutes plagiarism and will result in a zero grade for the activity.
- The copying of any part of a quiz or experiment from another student, even just spreadsheet formulas, constitutes plagiarism and will result in a non-droppable zero grade for the activity.
- The copying or fabrication of data constitutes fraud and will result in a non-droppable zero grade *and* a full letter reduction of the final grade for each instance.

Report any violations you witness to the instructor. You may consult the associate dean of student conduct (or designee) by calling the Office of the Dean of Students at 410-516-8208 or via email at integrity@jhu.edu.

For more information, see the Homewood Student Affairs site on academic ethics:

<https://studentaffairs.jhu.edu/student-life/student-conduct/academic-ethics-undergraduates>
or the e-catalog entry on the undergraduate academic ethics board:

<http://e-catalog.jhu.edu/undergrad-students/student-life-policies/#UAEB>.

7.2 MAKE-UP LABORATORY ACTIVITY

Time is set aside at the end of the semester for students to make-up **one** lab in place of one that was previously missed.

7.3 DISABILITY ACCOMMODATIONS

If you are a student with a disability or believe you might have a disability that requires accommodations, please contact [Student Disability Services](#) (385 Garland, (410) 516-4720, studentdisabilityservices@jhu.edu)

jhu.edu). Students with an official letter from the Office of Disability Services should contact Reid Mumford (reid.mumford@jhu.edu) as early as possible to make arrangements to support a successful learning experience.

7.4 UNIVERSITY SUPPORT SERVICES

If you are struggling with anxiety, stress, depression or other mental health related concerns, please consider visiting the JHU Counseling Center. If you are concerned about a friend, please encourage that person to seek out their services. The Counseling Center is located at 3003 North Charles Street in Suite S-200 and can be reached at 410-516-8278 and online at <http://studentaffairs.jhu.edu/counselingcenter>.

Johns Hopkins University provides several other avenues of student support through the [Office of Academic Support](#), [Gender Equity Office](#), [LGBTQ Life](#), [Office of International Services](#), [Office of Multicultural Affairs](#), and [Campus Ministries](#). We encourage you to utilize these services to help you succeed as a student. Finally, we invite you to reach out to your TA, Head TA, or the laboratory instructor with any concerns that might come up during the semester. Our job is to help you succeed.