

PHY 310 – Intermediate Physics Lab Spring 2020

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Office Hours: M – 10 am to 12:30 pm

W – 10 am to 12:30 pm

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Required Materials:

- An Introduction to Error Analysis, 2nd edition, Taylor.
- A laboratory notebook.
- A computer with good internet connectivity for ZOOM sessions
- A computer that is able to run Matlab

Installing Matlab:

Please use the University site license to install Matlab on your personal computer. To download and install Matlab, use this website ... <https://www.mathworks.com/academia/tah-portal/west-chester-university-of-pennsylvania-40730091.html>

Course Description:

A lecture and laboratory course designed to familiarize students with performing experiments, analyzing results, and presenting findings in both written and presentation forms.

Course Student Learning Outcomes:

Physics 310 is an approved Writing Emphasis course in the WCU General Education program. The writing sessions, laboratory practices and data analysis sessions, draft review meetings, and presentation sessions that take place during the semester, as well as the feedback that the instructor and other faculty give you on your papers and presentations, are all designed to help you meet the following General Education goals: (1) students will be able to communicate effectively, (2) students will be able to employ quantitative concepts and mathematical methods, and (3) students will be able to think critically and analytically.

In discipline-specific terms, this course is designed to meet the following goals.

1. The student will become proficient at using a wide range of experimental tools and measurement techniques common in the modern physics research laboratory.
2. The student will become proficient at estimating and calculating uncertainties.
3. The student will become proficient at communicating the design of an experiment and the results of that experiment to an audience of physicists in writing through research-style papers and in person through research-style talks.

Experiments:

Measuring the Acceleration due to Gravity from free fall or the motion of a pendulum.

Measuring Planck's Constant using the Photoelectric Effect

Measuring the Molecular Polarizability of Air using a Michelson Interferometer

Measuring the Charge-to-Mass Ratio of the Electron using the Bainbridge Apparatus

Measuring the Energy Levels of Argon using the Franck-Hertz Experiment

Attendance Policy:

Attendance is required and critical to the success of the course.

Tentative Course Outline:

Week	Tasks During the Week (outside of lecture)	Deadlines
1	<ul style="list-style-type: none"> Perform acceleration of gravity experiment (Exp 1) Prepare ten-min-lecture on data analysis topic 	
2	<ul style="list-style-type: none"> Write Exp 1 abstract Provide feedback on fellow students abstracts Revise Exp 1 abstract 	Mon: Present ten-minute lecture Wed: Submit draft to research group Fri: Provide feedback to research group Sun: Submit revised Exp 1 abstract
3	<ul style="list-style-type: none"> Work on experiment proposal presentation with research group Listen to instructor feedback on Abstract #1, ask questions as needed, and revise 	Sun: Submit final Exp 1 abstract
4	<ul style="list-style-type: none"> Conduct Exp 2 	Mon: As a group, present research proposal for Exp 2
5	<ul style="list-style-type: none"> Finish Exp 2 data analysis; Write and submit abstract; Prepare for Exp 3 	Mon: Group leader presents research findings for Exp 2 Fri: Submit Exp 2 Abstract
6	<ul style="list-style-type: none"> Conduct Exp 3 	
7	<ul style="list-style-type: none"> Write technical note on Exp 3 	Mon: Group leader presents research findings for Exp 3 Sun: Submit first draft of Exp 3 technical note
8	<ul style="list-style-type: none"> Revised technical note with peer-feedback Prepare for Exp 4 	Fri: Submit revised version Exp 3 technical note
9	<ul style="list-style-type: none"> Revise Technical Note Paper with instructor feedback Conduct Exp 4 	Sun: Submit final draft of Exp 3 technical note
10	<ul style="list-style-type: none"> Create key figures for Exp 4 	Mon: Group leader presents research findings for Exp 4 Sun: Submit figures for Exp 4 talk/paper
11	<ul style="list-style-type: none"> Create talk on Exp 4 and practice presentation 	
12	<ul style="list-style-type: none"> Revise talk 	Mon: Practice talks on Exp 4
13	<ul style="list-style-type: none"> Write scientific paper on Exp 4 	Mon: Present talk on Exp 4 to Department
14	<ul style="list-style-type: none"> NO CLASS 	
15	<ul style="list-style-type: none"> Write scientific paper on Exp 4 	Sun: Submit technical note on Exp 4
16	<ul style="list-style-type: none"> Couse Reflection 	

Evaluation & Grading:

The weighting for the different graded items are as follows:

10-Minute Review Lecture	10%
Team Leader Presentation on Research Findings	15%
Exp #1 Abstract	15%
Exp #2: Abstract	15%
Exp #3 Technical Note	15%
Exp #4 Presentation	15%
Exp #4 Technical Note	15%

A letter grade will be assigned based on performance in the course according to the following scale:

Grade	Quality Points	Percentage Equivalents	Interpretation
A	4.00	93-100	Excellent
A-	3.67	90-92	
B+	3.33	87-89	Superior
B	3.00	83-86	
B-	2.67	80-82	
C+	2.33	77-79	Average
C	2.00	73-76	
C-	1.67	70-72	
D+	1.33	67-69	Below Average
D	1.00	63-66	
D-	0.67	60-62	
F	0	< 60%	Failure

Refer to the Undergraduate Catalog for description of NG (No Grade), W, Z, and other grades.

COVID-19 STATEMENT

Part of West Chester University's response to the COVID-19 pandemic was to switch the vast majority of instruction to remote. This decision was made out of an abundance of caution to protect the health of all members of the WCU community. Faculty have been asked to make every effort to adapt their courses to this novel situation while still meeting the critical learning outcomes of the course. Students are asked to discuss any problems with the new course format and schedule directly with their instructors. Patience and flexibility on everyone's behalf are critical to our community's navigation of this public health crisis.

For this particular course, the following alternative modalities are being utilized: This will be a hybrid course. A majority of the course will take place online with ZOOM sessions every Monday from 3 pm to 6 pm. The sessions might not last all three hours, but students should be available if they do. Students will also be able to conduct experiments in person in Merion 116. Students MUST follow the safety guidelines for minimizing the transmission of COVID-19. This includes:

- A temperature check prior to coming to campus. If above 100.4, you are not allowed on campus. You must be fever free for 24-hours **without medication** before you can come to campus.
- If you are experiencing COVID-like symptoms, please notify me immediately and do not come onto campus. COVID symptoms include: Fever or chills, Cough, Shortness of breath or difficulty breathing, Fatigue, Muscle or body aches, Headache, New loss of taste or smell, Sore throat, Congestion or runny nose, Nausea or vomiting, and Diarrhea
- If you have been exposed to someone with COVID, you must quarantine yourself for 14 days and not come to campus.
- When on campus, a mask must be worn at all times. Gaiter-style masks are not acceptable.
- When on campus, you must stay physically distant from others by keeping at least six feet away.
- When in MER 116, you should only touch equipment at your designated experiment area for that week.
- When entering and leaving MER 116, you must use the sanitizing station.

ACADEMIC & PERSONAL INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term

papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

STUDENTS WITH DISABILITIES

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at <https://www.wcupa.edu/universityCollege/ossd/>. In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 610-436-2433.

EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy.** Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: <https://www.wcupa.edu/admin/diversityEquityInclusion/sexualMisconduct/default.aspx>

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY

It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.