Physics 391: “Experimental Data Analysis Lab”

Statement on Remote Teaching and Learning - Spring 2020:
Welcome to Physics 391. Our standard syllabus follows, but please find here a brief summary of how our remote format will impact this course.

In this extraordinary time, I am committed to our course—to supporting your learning, to getting to know each of you, to establishing a community with each other, and to encourage you to acquire the transferable skills that will serve you well as a physics major and in your future careers.

Our class will communicate through our Canvas site, by email, and Zoom (see Getting Started with Zoom).

You will find the University of Oregon’s policy on academic misconduct in our syllabus. In our remote class, I will ask you to certify that your homework assignments and lab write-ups are your own work. You are allowed to collaborate and discuss with others in the class, but the work you turn in must demonstrate your own thought processes and critical thinking skills.

The University will continue to issue more details about our situation and our syllabus and course activities may need to be adjusted after the start of the term. I will be mindful of the many impacts the unfolding events related to COVID-19 may be having on you. During this unusual time, if you are not able to do an assignment or lab, please communicate with me and we will strive to create an alternative plan to complete the required coursework.

Barring a specific need for adjustment, work is always due in this course Tuesdays via Canvas at 11:59am (just before lecture)—I hope this regular deadline simplifies what you need to keep in mind about the routine of the course.

In case of issues, don’t hesitate to reach out! Here are some additional resources: https://remote.uoregon.edu/student https://service.uoregon.edu/

Instructors and Office Hours:
Prof. Stephanie Majewski (she/her/hers), smajewsk@uoregon.edu, Mon 2-3pm (Zoom) https://uoregon.zoom.us/j/554609523?pwd=ODdDS1ZsVVR5SlFqUzAvcDUxTTZ6QT09 Meeting ID: 554 609 523, Password: 391391
I am here to help guide your learning and to help you succeed. Outside of the above timeslot please email me to make an appointment.

GTF Contact Information and Office Hours:
Brittany Carter (she/her/hers), bcarrier4@uoregon.edu, Mon 12-1pm (Zoom) Adrian Helmling-Cornell (he/him/his), ahelmlin@uoregon.edu, Mon 1-2pm (Zoom)
Course (CRN 35162):
Lectures: TTh 12:00-12:50pm over Zoom
Lab Sections: Fridays 11-12:50pm (CRN 35163 - Brittany), 2-3:50pm (CRN 35164 - Adrian) over Zoom

Required Materials
- Zoom access for lectures, office hours, labs (audio/microphone required), computing that supports data analysis in python
- Prerequisite: Phys 253 or equivalent

Course Website:
At [https://canvas.uoregon.edu](https://canvas.uoregon.edu) you may login and access course documents such as this syllabus. In addition, you may view announcements, course materials including homework and laboratory assignments, and your grades at any time.

Overview: This course will introduce the basic concepts of data analysis and practical techniques for implementing them. Half of the course will emphasize the theoretical foundation of data analysis with lectures and homework assignments, while the other half will emphasize the practical application of data analysis in lab assignments. Development of programming techniques for performing data analysis and data visualization will also be covered using python. The following topics will be covered:
- Measurement Uncertainty and Error Propagation
- Statistical Inference
- Gaussian Distribution and Confidence Levels
- Least Squares and Linear Regression
- Binomial/Poisson Distributions
- Photon Counting Statistics
- Fourier Series and Fourier Transforms

How will you be graded?
- Participation in lab sessions & lectures: 10%
- Homework: 45%
- Lab Assignments: 45%

Final Grade:
- A  90% to 100%
- B  80% to 90%
- C  70% to 80%
- D  60% to 70%
- F  lower than 60%

Participation:
Participation will be based on (remote) attendance and engagement in lectures and lab sessions. Participation will *not* be counted the first week of class to allow for technical ramp-up while we exercise Zoom. Beyond the first week, full participation points will be awarded based on attendance / engagement in 75% of the lecture and lab sessions; accommodations can be made for illness or extenuating circumstances upon agreement with the instructor.
**Homework Assignments:**
There will be 5 homework assignments due on alternating Tuesdays throughout the term; the lowest homework assignment will be automatically dropped. Homework will typically be assigned every other week on Tuesday and due on the following Tuesday at the start of class. The homework will mostly be problems from Taylor forcing you to work through a particular concept 'by hand' at least once. Supplemental problems to exercise your python skills may also be assigned. Homework will be turned in via Canvas.

**Lab Assignments:**
There will be 5 lab assignments due on alternating Tuesdays (when homeworks are not due) throughout the term; the lowest lab assignment will be automatically dropped. It is expected that you will work on your labs during the two weeks before they are due.

The TAs will be available via Zoom during your assigned lab times to provide support and advice. You will be expected to work with a partner, although each member of the lab group is expected to turn in their own material including the data analysis and any associated code.

Formal write-ups will not be required, although I do expect you to annotate your electronic lab notebooks to clearly show the work you have done. I really want to see proof that you did the lab and understood the material. Neatly organized notes taken during the lab itself, answers to the questions posed in the lab writeup, plus a short summary giving the main quantitative results is perfectly adequate. Labs will be turned in via Canvas.

For an upper-division course, the university expects students to spend one hour in class and two hours out of class for each credit. While each student will vary, you should expect on average to put this much time into this course. In particular, you should not expect to complete all of the lab work during the scheduled lab times each week. Make sure you do not try to start your lab assignments at the last minute. Most students who struggle in this course simply don't invest enough time in completing the labs.

**Campus resources to support your learning:**

**Instructional Accommodations:**
The Accessible Education Center ([http://aec.uoregon.edu](http://aec.uoregon.edu)) exists to help students achieve access to educational resources. If there are aspects of the instruction or design of this course that result in barriers to your participation, please contact us as soon as possible so we may discuss your situation.

**Counseling Center:**
Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center (541) 346-3227. See also [https://counseling.uoregon.edu](https://counseling.uoregon.edu).
Inclusivity:
Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

Academic Integrity:
All students are expected to complete assignments in a manner consistent with academic integrity. Academic dishonesty devalues the reputation of our institution, its faculty, its students, and the degrees we offer. Moreover, academic misconduct is particularly unfair for the students who do their work with integrity and honor. Students can find more complete information about the University of Oregon’s Policy on Academic Dishonesty in the University of Oregon Student Handbook. Suspected academic dishonesty will be reported.

Important Dates: (academic calendar)
Apr  4th  Last day to drop without a “W”
Apr  6th  Last day to add a class
May 17th  Last day to withdraw (drop with a “W”)
Jul 16th  Last day to change grading option to P/N

NOTE: these dates/policies may be updated; please see the academic calendar link for the most recent information
# Physics 391 - Tentative Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Lab</th>
<th>Homework</th>
<th>Reading</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Measurement Uncertainties</td>
<td>Jupyter/Python Setup</td>
<td>HW1</td>
<td>Taylor Ch 1-3</td>
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<td>3/30-4/3</td>
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<td>Week 2</td>
<td>Statistical Inference</td>
<td>Python Intro</td>
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<td>Taylor Ch 4 Atrium Files</td>
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<td>4/6-4/10</td>
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<tr>
<td>Week 3</td>
<td>Normal Distribution</td>
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<td>HW2</td>
<td>Taylor Ch 5</td>
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<td>4/13-4/17</td>
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<td>Week 4</td>
<td>Weighted Average</td>
<td>Speed of Light</td>
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<td>Taylor Ch 6-7</td>
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<td>4/20-4/24</td>
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<td>Week 5</td>
<td>Linear Regression</td>
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<td>HW3</td>
<td>Taylor Ch 8</td>
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<td>4/27-5/1</td>
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<td>Week 6</td>
<td>Binomial Distribution and Random Walks</td>
<td>Brownian Motion</td>
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<td>Taylor Ch 10 Random Walk</td>
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<td>5/4-5/8</td>
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<td>Binomial Examples</td>
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<td>Hypothesis Testing</td>
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<td>Week 7</td>
<td>Poisson Distribution and Counting Stats</td>
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<td>HW4</td>
<td>Taylor Ch 11 Poisson</td>
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<td>Examples Poisson</td>
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<td>Derivations</td>
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<td>Week 8</td>
<td>Fourier Series and Transforms</td>
<td>Photon Counting</td>
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<td>FFT Handout</td>
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<td>5/18-5/22</td>
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<td>Aliasing Example</td>
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<td>Week 9</td>
<td>Sampling Theory</td>
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<td>HW5</td>
<td>FFT Example</td>
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<td>5/26-5/29</td>
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<td>Week 10</td>
<td>Discrete Fourier Transforms</td>
<td>Fourier Transforms</td>
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<td>Finals</td>
<td>Final Lab Due Friday 6/12 at 10:00am</td>
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<td>Week 6</td>
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The given schedule is tentative; changes will be discussed in class and posted online.