

PHYS-6751

Graduate Laboratory: Nuclear and Particle Fall 2022,

Call number: #11406-101

Instructor: Dr. Julie Roche (rochej@ohio.edu, 740-593-1982)

Office hours: Mo, Tu, and Wd 9:00 to 5:00 pm. To book an appointment in person in my office or over video-conferencing, use Bookings ([this link](#))

Class time and location: Mo & Wd, 2:00 to 3:50 pm, Edwards Accelerator Lab #208 .

Class web site: Blackboard ([this link](#))

All information in this syllabus are subject to change. I will announce changes to the syllabus in class and by email. You are responsible for keeping up to date with the changes.

I care about you being successful in this class. Let me know if something in this syllabus makes it difficult for you to learn. We will find a solution to maximize your training.

Contents

1	Goals and learning outcomes of the class	2
2	Schedule	2
3	Assignments	3
4	Other policies	6
5	Feedback	7
6	Changes to the syllabus	8

1 Goals and learning outcomes of the class

The two goals of this laboratory class are to develop your practical skills and reinforce Nuclear and Particle Physics concepts. At the end of this class, you will be able to:

- Apply data analysis and error analysis techniques.
- Describe detector systems and instrumentation common to nuclear and particle physics experiments.
- Discuss how the physics goals of a particular measurement would motivate the choice of apparatus.
- Present orally the results from one of their experiments or a literature review of a related topic, in the style of conference presentations in nuclear and particle physics.
- Present an experiment's data, analysis, and conclusions in a written report following the conventions of peer-reviewed publications in nuclear and particle physics.

2 Schedule

You will work on **six** different activities during this class: one introductory module, three experiments (noted in lab 1, lab 2, and lab 3 ...), a literature review, and a simulation project. Table 1 gives a preliminary plan of the class and the date on which assignments are due.

2.1 COVID-19

In this class, we will follow all the Health protocols and policies of Ohio University. Please refer to the "Be Safe Bobcats" website ([this link](#)) for more information. If OHIO asks you to stay home because of COVID-19, do so. If you are sick: we wish you to feel better soon. If you are asymptomatic: we hope you remain so. In both cases, you automatically receive a valid University excuse for absence from class. Let me know what is going on asap. Then, later on, when you are ready to get back to your studies, email to make up arrangements.

2.2 Attendance and Participation expectations

Attendance at all laboratory meetings is mandatory. Because of the structure of this class (round-robin), making up sessions is quite tricky. However, make-up sessions will be arranged without any penalty if you present a university valid excuse¹ for your absence. Excused absences include illness, death in the immediate family, religious observance, jury duty, involvement in University-sponsored activities, and isolation or quarantine because of COVID-19.

The expectations for participation are the following:

¹OHIO undergraduate catalog ([this link](#)), search for "Excused Absence"

- Took leadership of part of the lab exercises,
- Worked in a team to accomplish tasks,
- Treated group members, staff, and the instructor professionally and respectfully,
- Was punctual, and
- Exhibited proper respect for safety

3 Assignments

Remember that your instructor will gladly help you with any assignment before the official due date: come and talk.

All assignments are due on Blackboard at 9 am on the date indicated in table 1. All assignments must be completed individually, but you are encouraged to discuss them with your lab partner. You need to produce three different products for each lab: Answers to Preliminary Questions (APQ), a Status Update, and a written lab report or an oral presentation.

3.1 Answer To Preliminary Questions

Before beginning a new experiment, students must submit answers to pre-lab questions. The Preliminary questions are listed in the lab manual.

3.2 Status Updates

Status Updates are short lab reports that get you started on your report and presentation. They focus on your lab understanding and data-taking, and analysis status. The goal is to convince me (and you) that you understand what the experiment is about, how the apparatus works, that you have the data you need for the full report, and that you know how to analyze them. If, while writing your Status Update, you realize you are missing data or don't know how to analyze them, or your data are not good, explain what is missing, what's wrong, and how you will proceed to get a good result.

The Status Updates will be about 450 words long (or about one page of text). You need to show your word count. There can be as many tables, equations, and plots as you want: they don't count toward the word count.

Status Updates will be graded along four criteria. Did you convince the reader that (1) you understand what the experiment is about, (2) you understand how the apparatus works, (3) you have the data you need or know which one you are missing, and (3) you can analyze the data and evaluate or improve their quality?

Week	Date	In class activity	Assignment due on Blackboard
1	Aug 22 Aug 24	Introduction + Rad training Chap 1 + Presentation tips	Summary of Chap 1
2	Aug 29 Aug 31	Chap 2 + Writing tips Chap 3 + Coding tips	Summary of Chap 2 Summary of Chap 3
3	Sept 5	Labor Day Holiday - no class	
	Sept 7	Chap 4 + Tutorial	Summary of Chap 4
4	Sept 12	Tutorial	
	Sept 14	Lab 1	APQ
5	Sept 19 Sept 21		Status Update tutorial Status Update lab 1
6	Sept 26		
	Sept 28	Lab 2	APQ
7	Oct 3 Oct 5		Report 1 Status Update lab 2
8	Oct 10	Report 1 feedback day	
	Oct 12		
9	Oct 17 Oct 19	Lab 3	APQ Report 2
10	Oct 24 Oct 26		Status Update lab 3
11	Oct 31 Nov 2	Lab 4	APQ Report 3
12	Nov 7 Nov 9		Status Update lab 4
13	Nov 14 Nov 16	Lab 5	APQ
14	Nov 21	Presentation 1	Slides presentation 1
	Nov 23	Thanks Giving break - no class	
15	Nov 28 Nov 30		Status Update lab 5
Exam week	Mon Dec 5 12:20 pm	Presentation 2	Slides presentation 2

Table 1: Tentative schedule for the PHYS-6951 Fall 2022 sessions. All assignments are due on Blackboard at 9 am. The topic of your lab and your partner for this lab will be communicated by email a week ahead of time. If not, do email me.

3.3 Written Report

Your reports will follow the PRL style of the APS paper ([this link](#)). Written Reports will be evaluated along the following criteria:

- Structure:
 - Introduction, methods, results, discussion, and conclusions present (Sections not necessarily labeled as such),
 - Abstract with a summary of paper contents present, and
 - Thorough set of references present.
- Style: The journal style was adhered to.
- Content:
 - Abstract concisely describes motivation, methods, and results,
 - Introduction provides sufficient background, motivation, and lead-in to paper,
 - Methods described in sufficient detail,
 - Results described in sufficient detail,
 - Results and implications thoroughly discussed,
 - Prose is publication quality, and
 - Plots and Table are publication quality.

3.4 Presentation

The presentations will be 10 minutes, structured as a contributed presentation at the American Physical Society Fall Meeting of the Division of Nuclear Physics (DNP). The presentation will be followed by 2-5 minutes of questions. The talk should contain three parts of roughly equal length: introduction and motivation, experiment and analysis, and scientific results. The presentation should be meeting-quality. The presentations will be evaluated along the following criteria:

- Structure:
 - Introduction, methods, results, discussion, and conclusions present (Sections not necessarily announced as such)
 - Citations present on the relevant slide(s)
- Style:
 - Presentation aimed at the appropriate audience (Nuclear physicists)
 - Slides are visually appealing (e.g., Not just lists of bullet points)
 - Presentation is engaging (i.e., Not monotone and stiff)

- Content:
 - Accurate and clear motivation provided
 - Presentation-quality plots present
 - Accurate and thorough* description of the experiment provided
 - Accurate and thorough* description of methods provided
 - Accurate and thorough* description of results provided
 - Referenced work properly cited

*‘Thorough’ means that you accurately described the parts of the experiment you chose to discuss. Of course, a ten-minute presentation doesn’t leave room to discuss every detail, or even most of them.

3.5 Grading policy

Assignments will be graded on a Passed/Missing basis. Once the due date is passed, your assignment is Missing until you submit it. If you submit an assignment that meets expectations, the assignment is Passed. If you submit an assignment that does not meet expectations, you will be asked to correct it. Your assignment is Missing, and you will get a 1% penalty on your final grade. Once you resubmit your assignment, if you are asked to correct it further, your assignment remains Missing, and you will get an additional penalty of 1%. If your revised submission meets expectations, that assignment is Passed, and you can move on. If, at any time during the semester, you have more than four (4) Missing assignments, you fail the class. If you have a University Valid excuse for Missing work, this sudden fail criterion will be ignored.

Once all your assignments are Passed, your penalty points are tallied and subtracted from a baseline of 100%. The overall numerical grade will be transformed into a letter grade using the following table:

	A: 100-93%	A-: 92-90%
B+: 89-87 %	B: 86-83 %	B-: 82-80%
C+: 79-77 %	C: 76-73 %	C-: 72-70%
D+: 69-67 %	D: 66-63 %	D-: 62-60%

4 Other policies

4.1 Academic dishonesty and plagiarism

The Ohio University Student Code of Conduct ([this link](#)) prohibits all forms of academic dishonesty. These include cheating, plagiarism, forgery, furnishing false information to the University, and alteration or misuse of University documents, records, or identification. Suppose a student engages in course-related academic dishonesty. In that case, the student’s grade on the work in question or the overall grade course may be lowered by the instructor².

²Read more at The Office of Community Standards and Student Responsibility” web page ([this link](#))

This course means no fudging with the data or copying your presentation from someone else. Data must be taken with partners, but you should write your report individually. If you have any concerns about what does or does not constitute academic dishonesty (e.g. paraphrasing prior publications in a report), please don't hesitate to ask me.

4.2 Disability accommodation

Any student who feels s/he may need accommodation based on the impact of a disability should contact me privately to discuss your specific needs and provide written documentation from Student Accessibility Services. If you are not yet registered as a student with a disability, please get in touch with Student Accessibility Services at 740-593-2620 or visit their website ([this link](#)).

4.3 Mandatory Reporting of Sexual Violence and Misconduct policy

We all share the responsibility to create a safe learning environment for all students and the campus. Except for confidential resources (listed [here](#)), all employees are required to report any instances of sexual harassment, sexual violence, and/or other forms of prohibited discrimination to the Office of University Equity and Civil Rights Compliance (ECRC). Suppose you share that you or another OHIO student has had any of these experiences (including in, but not limited to, class discussion, papers, office hours, or other scenarios). In that case, it is my responsibility to notify ECRC. Your safety and the safety of others are essential to me. Therefore, I take my responsibility seriously to report. Additionally, the University requires that I do so (see Policy 03.004 ([this link](#))). In some instances, I may also report to the Ohio University Police Department (OUPD) and/or the Office of Community Standards and Student Responsibility.

4.4 Inclusivity

The best environment in which to learn physics is one that's inclusive and equitable. The students, staff, and faculty of the Department of Physics and Astronomy are committed to professional interactions, respecting and considering all its members' rich and diverse backgrounds. We expect every member of our Department to encourage and support a culture of equity for and inclusion of all social identities in all activities in which we participate and uphold all Ohio University diversity policies. For more information about our culture of inclusion and how to report issues and concerns, consult the Inclusion and Equity website of the Physics and Astronomy Department ([this link](#)).

5 Feedback

I would appreciate feedback from the students on how the class is going. Talk to me, email me, or drop an anonymous note in my mailbox. Specifically, this is the first time I am

teaching this class, so I need help polishing the documents I develop. You may gain up to 10% bonus points on your participation grade for a specific experiment.

6 Changes to the syllabus

1.1: Change the wording from Outstanding to Missing in the grading description. Changed the length of the written Status Update from 600 words to 1 page (about 450 words according to the web).

1.0: 08-21-22: initial