Physics Laboratory for Engineers
PS253-XX, Fall 2018
ERAU Daytona Beach

*See section page on Canvas for class time.
Room: COAS 219

Instructor: *See section page on Canvas for name, email, and office info.
Lab Director: Don Schumacher
Contact: schumad3@erau.edu 386-226-6617
Office Hours: MF 1-2:30, TuWTh 10:30-12 (or by Appt.) COAS 221

Following University Policy and the Student Handbook, formal communication for the course is through your University @my.erau.edu email account.

Textbook:

Required – Obtain the lab modules from Canvas. *You must bring a copy to class.*
Recommended – *An Introduction to Error Analysis* 2nd Edition, John R. Taylor 1996.
All course related information and documents will be distributed and available via Canvas. Student is responsible for printing paper copies ahead of time if required for in-class work.

Learning Outcomes:

- Make quality measurements of physical quantities and identify experimental sources of error
- Record and organize data in presentable tables, plots, and figures
- Analyze data, determine uncertainties, perform error analysis, and perform error propagation
- Examine, identify, and explain the causes of incorrect data or unexpected results
- Communicate technical information effectively and efficiently in multiple formats
- Write a clear, concise scientific and technical laboratory report
- Use various electrical and mechanical measuring devices and estimate their accuracy. Use proper significant figures. Properly compute and interpret the mean and standard deviation.
- Use a computer spreadsheet program for data reduction, statistical analysis and the construction of tables and graphs for presentation of experimental test findings.
- Use systems that are interfaced to a computer and their control software to conduct automated experiments and obtain data files for use in spreadsheet software.

Grading:

To protect your privacy, grades are *only* discussed in person, not through email or over the phone.

Read each lab module at least once before coming to class. Your final grade in this course is very heavily weighted on the reports you will turn in some weeks detailing the topics and experiments covered in class. You will need to use quality time outside of lab to write up your reports and proofread them in order to submit a well written, *high grade*, report. It is to your benefit to work on these ahead of due dates so that you may get help from your instructors if needed!

Attendance	10%
Quizzes	15%
Worksheets	30%
Reports	40%
Group Poster	5%

A	100-90
B	89-80
C	79-70
D	69-60
F	<60

Note that other portions may account for a letter grade or more, so they should not be ignored.

The Lab Director determines all final grade decisions. He reserves the right to apply curves, adjust grade brackets, or change the weight of graded material in order to maintain a fair and appropriate grade distribution. Standard grading practices are applied and followed across all PS253 sections.

Attendance:

Attendance is required and will be taken each lab by your instructor. You must attend the lab section for which you are registered. If you do not attend lab you cannot submit reports or in-lab worksheets for the missed lab; if you attempt to hand in work for a lab you did not attend, it will not be accepted and given a 0%. **Please note:** 3 or more absences results in failure of the course, regardless of your grade standing (see Policies section).

If you are *15 minutes or more late* or leave before your group has finished the experiment, you will be marked tardy and have points deducted from your attendance score for that lab. Attendance is required to get credit for in-class activities (in-lab worksheets and quizzes). You may still submit work if you complete a *majority* of the lab.

The lab director must approve all excused absences PRIOR to the absence. To excuse an absence, it MUST be either a death in the family, documented medical emergency, or university business. If no documented reason exists for an absence, we cannot excuse it. To get an absence excused, you MUST make arrangements with the lab director. *This is not the instructor's responsibility.*

If you unexpectedly miss class due to one of the mentioned categories, you have ONE WEEK to provide documentation. If you provide documentation to the *Dean of Students Office* (dbdos@erau.edu, 386-226-6326), they will email all of your instructors that the absence is excused. This is the preferred method of documentation. After one week without notice the absence is unexcused regardless of the reason.

If you are 'feeling sick' for whatever reason and decide not to attend class, you must at least be seen by the *Health Services Wellness Center* (dbhealth@erau.edu, 386-226-7917) in order to qualify for an excused absence. When you are seen, you need to fill out a form telling Health Services to allow your lab director to contact them so we are able to confirm your visit through documentation; they will not automatically call us, and you must inform us so we know to call them.

Participation:

Participation is not the same as attendance. Simply showing up to lab is not enough to learn useful new knowledge and do well in this course. Since this is a lab class you must work with equipment, converse with your partners, and analyze and interpret data. You are also expected to keep your lab area clean and to reset your station before leaving so it is ready for the next class. Your instructor will be watching and guiding you to make sure you are actively participating in your group.

Quizzes:

Normally given at the beginning of class; there will be 10 quizzes in total. A quiz may cover any information relating to the experiments to be performed that day, lab safety, topics from previous experiments, and background mathematics relevant to the course. You have up to 12 minutes to complete the quiz once it is handed out, no time extensions are allowed if you arrive late. If you arrive to class after the quiz has begun, you must finish it in whatever time is left. No quizzes will be given after the allotted time has expired. At least two quizzes will include hands-on activities using

equipment in lab; you will have up to 15 minutes to complete a hands-on quiz. Occasionally a quiz may be given online through Canvas before, during, or after a class.

Worksheets:

Several experiments during the semester will involve completing worksheets and answering short questions rather than writing up a full lab report. These will come in pairs: one an in-lab worksheet to be completed and turned in to your instructor before you leave, the second a post-lab worksheet done as homework to be turned in electronically on Canvas before the start of your next class.

Individual Lab Reports:

For many experiments you will electronically submit individually written lab reports on Canvas. Although while in lab you will work in groups, every person will turn in their own personally written report. *You must do all of your own, original work.*

The lab report format will resemble that of peer reviewed journal publications: Journal of Aerospace Engineering, Nature, PNAS, IEEE publications. The report will have several sections: Title Area, Abstract, Background, Theory & Methods, Results, and References. Other required material could be in the form of Appendices: Calculations (by hand or electronically), data for any plots (typed in neat tables with units), and your raw data from the work in lab. Writing reports in this format will help you prepare for writing papers and other formal documents in your career.

Reports must be typed except for the Calculations Appendix which may be hand written and any raw data which was written by hand in lab. You may use any software to prepare your report such as MS Word or LaTeX (available for download at www.latex-project.org).

Reports without all original, raw data from class will not be accepted and given a 0%. This will happen whether you performed the experiment or not! Raw data is considered all the measurements and information you recorded in class while performing your experiments. If you submit at least your raw data, or any material for a report, the minimum score is a 25% as long as you attended lab and it is not late.

If you use something from a source other than your own mind and experience, including but not limited to constants, reference values, quoted text, paraphrased text, diagrams, photographs, derivations, and equations ***it MUST be cited in the text and referenced to the source in your report***. This includes material found in the lab modules and on websites.

More information and help on writing lab reports including sample reports, guidelines, and common mistakes may be found in the course website on Canvas.

Individual Lab Report Rewrite:

The process of rewriting edited drafts is a large part of creating publication quality professional works. This professional practice will be simulated in the course by giving you the opportunity to respond to instructor feedback on your first report. You are required to submit with revisions a rewrite of your first report. In order to rewrite a previous report, a report must have been submitted for graded credit. *Missing reports (never originally submitted) or reports receiving a zero due to issues of academic integrity will not be eligible for rewrites.*

The rewrite allows you the chance to improve your report score by correcting mistakes and gaining those points back. For the rewrite grade, you will receive back for full credit any deducted points that you satisfactorily correct on the rewrite. The rewrite score *will not replace* your original score on

the report; it is an entirely separate, independent assignment grade. Failure to submit the required rewrite will result in a 0% for this assignment.

Group Poster Project:

The assignment on one of the experiments during the semester will be done in collaboration with the other members of your lab group, replacing the normal individual assignment. Your group will produce a *group poster* in the style of those presented at scientific conferences (see around the room and in the hallway for examples). Each group must complete one and only one group poster. They will be graded based on the accuracy, depth, and clarity of their content as well as the visual flow and display of the information.

Collaboration means that you are not solely responsible for the work produced. However, it also means that you are partially responsible for the work produced by others. It is important to communicate effectively with all members of your group. It is important to set, and to meet, internal deadlines within the group- before the project deadline. Proofreading is especially important in collaborative work, as someone must make sure that styles and formats are consistent throughout the work. Each member will be asked to report on the contributions made to the project by each of the team members, and is required to submit a peer review of each team member.

You may seek creative advice and tips on how to make a decent technical poster from tutors at the Digital Studio on campus. This is a helpful free resource available to you, but is not required.

Academic Integrity and the Honor Code:

It is the pursuit of science to find the truth and to explain the universe. Following that, the work you do in this course must be done with integrity and honesty. The data you use in your reports must be all the data you obtained in class- no more, no less. You own your data, and it is a form of intellectual property. You cannot use data from other students, unless the instructor has given approval, and it is unethical to eliminate troublesome data or to create fake data. It is unacceptable to provide work for others or to take someone else's work, student written or published, and use it as your own. All of these are examples of plagiarism, fabrication, or deceit.

However, science and research are not done by solitary souls in a vacuum. You are encouraged to seek assistance from friends and lab partners. Collaboration is a vital way to learn, but everyone is expected to do their own analysis and arrive at their own conclusions. Your report must reflect the ideas of its *single* author; worksheets and quizzes are to be completed individually as well.

There is zero tolerance for cheating, plagiarism, fraud, forgery, obstruction, disorderly conduct, threatening behavior, theft, or vandalism. These actions may result in failing assignments, failing the class, suspension, or dismissal from the University. Violations of the ERAU Honor Code may be handled in accordance with formal policies in the Student Handbook and the Academic Catalog. An Academic Integrity Case will be opened, which will be noted in your student file, and you will need to discuss the case with the Physical Sciences Department Chair.

Important Policies:

- With three (3) or more *excused* absences you will receive an Incomplete "I" and need to resolve the incomplete in accordance with university policy. With three (3) or more *unexcused* absences you will receive an "F" in the class, regardless of the total points from your completed work.
- You must attend the section for which you are registered.

- You must attach all original data recorded by hand or electronically to your electronic report submission. Reports without original, raw data from class will not be accepted and given a 0%. Data recorded by hand must be copied into an electronic format to submit with your report; the method of which is up to the student so long as it is clearly readable in electronic form (instructor's discretion).
- Reports and assignments will be submitted through Canvas as a ***single PDF file***. It is expected you will still be able to submit these assignments electronically in Canvas regardless of whether or not you attend class the day they are due. Email or mailbox submissions are NOT accepted.
- Assignments submitted 0-24 hours late receive a 25% late deduction. After 24 hours, late work is not accepted and is a 0%.
- If you arrive to lab more than 15 minutes late you will be marked tardy. You are allowed to stay and participate in lab, and should still do that week's homework. If you leave lab early, before your group has finished the experiment, you will be marked tardy and your attendance grade will be penalized.
- If you miss a quiz due to an *excused* absence you are expected to make it up; contact your instructor to find out if you missed a quiz. You must schedule a time to make up the quiz with your instructor or the lab director. Your last chance to make up a quiz is at the start of class before your instructor hands back the quizzes; if you fail to make up the quiz by this time you will receive a 0% for that quiz.
- Students will not be allowed to "Audit" the course, you must instead "Withdraw". The Lab Director changes audits to Withdraws at the end of the term.
- No food or drink in lab. REQUIRED if working with lead, radioactive materials, or chemicals.
- It is recommended to wear closed toed footwear.
- Follow all posted and given safety guidelines especially when working with lasers, focusing optics, lead plate, x-ray sources, radioactive materials or sources, and chemicals.
- If you are reckless or irresponsible, endangering yourself, others, or equipment you may be asked to leave the lab; there could be a penalty, possibly failure of the course (instructor's discretion).
- You may take pictures of the equipment and setup for use in your reports, but do not disrupt class and respect the students around you (instructor's discretion). You may use an electronic device to access and view lab related material. Desktops with internet access are also available.

Seeking Help, Your Ideas, and Evaluations:

You are encouraged to take advantage of instructor and director office hours for help in coursework or anything to do with the course and your continued academic progress. We are here to facilitate your education and want nothing more than to help you succeed in your education.

Your questions, comments, suggestions, and ideas are always welcome. We highly encourage you to complete the online Course Evaluation for this course at the end of the semester. Let us know what you thought about the course, what we did right, and what could use improvements. Maintaining a constructive, critical, and skeptical mind is important for scientists and lifelong learners.

Physics Lab Director
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A note from the Disability Support Services Office:

ERAU is committed to the success of all students. It is University policy to provide reasonable accommodations to students with disabilities who qualify for services. If you would like to request accommodations due to a physical, mental, or learning disability, please contact *Disability Support Services* (dbdsinfo@erau.edu, 386-226-7916) located on the West side of the Wellness Center – Building #20. All discussions are confidential.

Legal Disclaimer:

On Monday, June 11, 2018 the Physics Lab Director informed multiple Campus and University administrative offices of a large number of broken chairs in the physics teaching labs. The chairs were described as having broken back rests and example photographs were sent. Due diligence was made to find timely replacements; however no funding was ever provided to purchase replacements. It was noted by administration that the chairs in question are not under warranty due to inaccuracies in the original purchasing order (conducted by administration). **The Lab Director and section instructors are not responsible for any injuries resulting from broken lab chairs.**

Disclaimer: The lab director reserves the right to modify this syllabus, if necessary, to fulfill the course learning outcomes. Any changes will be in effect one week after they are announced to the students.

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