

Fall 2021

## PHYS 231A-001: Physics III Lab

Brian O'Donnell

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INSTRUCTOR	Brian O'Donnell E-mail: beo6@njit.edu
OFFICE HOURS	Tier403 or WebEx ( <a href="https://njit.webex.com/meet/beo6">https://njit.webex.com/meet/beo6</a> ) : By Appointment
TEXTBOOK	Physics 231A Laboratory Manual, 7 <sup>th</sup> Edition, sold by NJIT bookstore
DESCRIPTION	This Physics III laboratory course involves experiments which demonstrate the principles of waves, optics, and modern physics.
HELP	<ul style="list-style-type: none"> <li>- Visit or email your instructor if you are having troubles with the lab course.</li> <li>- If you need an accommodation due to a disability, please contact Scott Janz (scott.p.janz@njit.edu 973-596-5417), Associate Director of the Office of Accessibility Resources and Services, Kupfrian Hall 201 to discuss your specific needs.</li> </ul>
GENERAL INFORMATION	<ul style="list-style-type: none"> <li>- There is no exam in the lab course.</li> <li>- No make-ups for missing labs are allowed.</li> <li>- Grading (A through D and F) is based on attendance, participation, and lab report.</li> <li>- Experiments are a group effort.</li> <li>- Laboratory reports should be an individual one submitted by each student.</li> <li>- Lab computer login method: Username: your UCID and Password: your UCID password</li> <li>- NJIT physics lab website: <a href="https://centers.njit.edu/introphysics/welcome/">https://centers.njit.edu/introphysics/welcome/</a></li> </ul>
DELIVERY MODE	Face-to-Face: Delivery of instruction is structured around in-person classroom meeting times. Instruction is delivered in person and students are expected to attend class.
LEARNING OBJECTIVES	<ul style="list-style-type: none"> <li>- Students will master basic physics concepts by performing an experiment relevant to a corresponding course work.</li> <li>- Students will gain hands-on experiences with experimental processes and develop effective written communication skills.</li> <li>- Students should develop collaborative learning skills by working in a group.</li> </ul>
LEARNING OUTCOMES	<ul style="list-style-type: none"> <li>- Students will demonstrate basic experimental skills by the practice of setting up and conducting an experiment.</li> <li>- Students will demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.</li> <li>- Students will demonstrate basic communication skills by working in groups on laboratory experiments and the thoughtful discussion and interpretation of data.</li> </ul>
ATTENDANCE	<ul style="list-style-type: none"> <li>- Attendance policy is very strict. It is a student's responsibility to confirm his/her attendance with the Lab instructor.</li> <li>- It is required for students to attend all lab experiments since grading is based on attendance, participation, and lab report.</li> <li>- It is required for a student to sign the attendance sheet in every lab class. If a student fails to sign it, it is treated to be absent.</li> <li>- Attendance will be checked in the beginning and middle of each class by your instructor.</li> <li>- If a student does not appeal and resolve his/her attendance within 7 days, no further complaint will be accepted.</li> <li>- If a student makes more than 3 unexcused absences, the student is very likely to fail the lab course.</li> <li>- If a student has excusable absences, the student should contact the dean of student office to email an official excuse to his/her lab instructor.</li> </ul>
GRADING POLICY	<ol style="list-style-type: none"> <li>1. The grading guidelines are as follows: Attendance (20%); Participation (20%); Laboratory Report (60%)</li> <li>2. A grade of zero (0) will be given for any missed experiment with no excuse.</li> <li>3. Submission of the lab report is due the following week class begins – penalty for lateness is 10 % per day.</li> <li>4. Laboratory Report Grading (points): <ul style="list-style-type: none"> <li>- Style ; font type, font size, line space, margin, etc. given by your lab instructor (5)</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>- Title (5)</li> <li>- Introduction including Objective and Theoretical Background (5)</li> <li>- Experimental Procedure (5)</li> <li>- Results: Experimental Data (15) and Calculation (15)</li> <li>- Discussion and analysis of results; Answers to questions (35)</li> <li>- Conclusions (10)</li> <li>- Raw Data Sheet (5); unless otherwise instructed, raw data sheets (or photocopies of raw data) should be attached in the lab report. The raw data should be checked and signed by your instructor at the completion of the lab experiment.</li> </ul>
GRADING SCALE	90 - 100 % = A, 85 - 89 % = B+, 80 - 84 % = B, 75 - 79 % = C+, 70 - 74 % = C, 50 - 64 % = D, 0 - 49 % = F

## LAB COURSE SCHEDULE

Week	Date	Experiment
1*	9/3	Introduction, Error Analysis, MATLAB I Introduction
2	9/10	Lab B2: Simple Harmonic Motion
3	9/17	Lab C & O: Physical Pendulum with Small & Large Amplitude
4	9/24	Lab W: Transverse Standing Waves on a String
5	10/1	Lab J: Longitudinal Standing Waves in a Sound Tube
6	10/8	Lab K: Refraction, Reflection and Dispersion of Light
7	10/15	Lab LP: Polarization of Light – Malus' Law
8	10/22	Lab N1: Diffraction Pattern of Light with a Single-Slit
9	10/29	Lab N2: Diffraction Pattern of Light with a Double-Slit
10**	11/5	Lab N: Grating Diffraction
11	11/12	Lab P: Photoelectric Effect
12	11/19	Lab S: Emission Spectrum of Hydrogen Atom
13***	12/3	Lab Q: Electron Diffraction – Wave-Particle Duality
14	12/10	Lab U: Semiconductor Diode Characteristics

\* 9/6 (Mon.) Labor Day. No classes.

\* 9/8 (Wed.) Monday Classes Meet

\* 9/8 (Wed.) Last Day to add/drop a class

\*\* 11/10 (Wed.) Last Day to Withdraw from Classes

\*\*\* 11/25 (Thurs.) and 11/26 (Fri.) Thanksgiving holiday. No classes

## Safety Guidance during Pandemic

1. All students who are attending a physics lab class are required to wear a face covering during a lab class unless otherwise noted.
2. NJIT Physics Teaching Lab provides PPEs (disposable masks and gloves) for all the students who are attending a physics lab class.
3. Hand sanitizers, disinfectant wipes, and disinfecting cleaner sprays are available in lab rooms.

## Physics Laboratory Safety

1. Food and drink are not permitted during class in the lab at any time.
2. Wear safety glasses all the time during lab experiments.
3. Do not come into the lab room early unless the instructor is present.
4. Do not wear loose hair or clothing around moving equipment.
5. Do not set equipment too close to the edge of the table.
6. Do not activate any electric circuit or apparatus until the instructor inspects it.
7. Never touch a possibly live circuit and do not touch electrical equipment with wet hands.
8. Only use laboratory equipment for the instructional purpose for which they were intended.
9. Never look directly at the beam of a laser and light from a lamp used for experiment.
10. All trash and waste materials should be disposed of in the proper container. Do not pour chemicals into the laboratory sink.
11. Do not short the electrical leads on any equipment.

12. Any equipment except computers not in use should be turned off.
13. Do not take apart any apparatus or piece of equipment.
14. All damaged equipment and chemical spills should be immediately reported to a laboratory instructor or a laboratory staff.
15. Accidents and emergencies must be immediately reported to the laboratory instructor. (NJIT Emergency call number: 911)
16. Be aware that fire extinguishers are in Rooms of 406T and 407T.