

Fall 2021

## PHYS 111A-003: Physics I Lab

Ssu-Ying Chen

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| INSTRUCTOR          | Name: Ssu-Ying Chen, E-mail: sc945@njit.edu  |
| OFFICE HOURS        | Hours and Location:  |
| TEXTBOOK            | Physics 111A Laboratory Manual 10 <sup>th</sup> Edition, sold by NJIT bookstore  |
| DESCRIPTION         | This physics I laboratory course involves experiments which demonstrate the principles of Elementary mechanics including rectilinear and circular motion; equilibrium and Newton's laws of motion; work, energy, momentum; the conservation laws.  |
| NOTE                | To take the laboratory course, PHYS 111A, a student must take concurrently the lecture course, PHYS 111 unless the student passed the lecture course previously. Withdrawal from either course will cause a simultaneous withdrawal from both courses.   |
| 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:<br>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 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:<br/>Attendance (25%); Participation (25%); Laboratory Report (50%)</li> <li>2. A grade of zero (0) will be given for any missed experiment with no excuse.</li> </ol>   |

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|               | <p>3. Submission of the lab report is due the following week class begins – penalty for lateness is 10 % per day.</p> <p>4. Laboratory Report Grading (points):</p> <ul style="list-style-type: none"> <li>- Style ; font type, font size, line space, margin, etc. given by your lab instructor (5)</li> <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  | Period                | Experiment  |
|-------|-----------------------|---|
| 1*    | 9/1 (W) ~ 9/8 (W)     | Introduction and Error Analysis   |
| 2     | 9/9 (R) ~ 9/15 (W)    | Lab 103: Translational Static Equilibrium ---Force Table  |
| 3     | 9/16 (R) ~ 9/22 (W)   | Lab 109: One-Dimensional Motion--Velocity as a Function of Time and Distance at Constant Acceleration |
| 4     | 9/23 (R) ~ 9/29 (W)   | Lab 111: Projectile Motion  |
| 5     | 9/30 (R) ~ 10/6 (W)   | Lab 112: Newton's Second Law  |
| 6     | 10/7 (R) ~ 10/13 (W)  | Lab 106: Static and Kinetic Frictions   |
| 7     | 10/14 (R) ~ 10/20 (W) | Lab 6a1: Work and Energy  |
| 8     | 10/21 (R) ~ 10/27 (W) | Lab 125: Conservation of Energy in Spring-Mass System   |
| 9     | 10/28 (R) ~ 11/3 (W)  | Lab 126: Conservation of Momentum and Impulse-Momentum Theorem  |
| 10**  | 11/4 (R) ~ 11/10 (W)  | Lab 114: Uniform Circular Motion  |
| 11    | 11/11 (R) ~ 11/17 (W) | Lab 9a1: Moment of Inertia and Energy in Rotational Motion  |
| 12    | 11/18 (R) ~ 11/24 (R) | Lab 127: Torque and Rotational Inertia  |
| 13*** | 11/25 (R) ~ 12/3 (F)  | Lab 121: Rotational Static Equilibrium---Forces on a Strut  |
| 14    | 12/6 (M) ~ 12/10 (F)  | Lab 7: Archimedes' Principle and Density  |

- \* 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 for Physics Lab Classes during Pandemic

#### 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 inspect 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.