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Spring 2021

## PHYS 111-008: Physics I

Vitaly Shneidman

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Office Hours: By appointment via Webex and TBA

Webpage: <https://web.njit.edu/~vitaly/111/> (Lecture Notes etc)

### Class Schedule:

#### Lecture (006 & 008)

Fridays: 12:30 PM – 1:50 PM

<https://njit.webex.com/njit/j.php?MTID=m6bed337dcb9207c0346cffe16678bb7>

#### Phys 111 Recitations

Section 006 Mondays: 9:00 AM – 10:20 AM

<https://njit.webex.com/njit/j.php?MTID=m08f59a3f4386b229227571a4c504cda9>

Section 008 Mondays 12:30 PM – 1:50 PM

<https://njit.webex.com/njit/j.php?MTID=m6568a5267294d65086f12c1b6c53645d>

**PREREQUISITE:** Math 131 (if not originally placed in Math 111)

**COREQUISITE:** Math 111 or Math 132, Phys 111A (see Note below).

### COURSE MATERIAL:

Access to electronic version of the textbook and online homework can be obtained through purchasing of:

**Mastering Physics with Pearson eText -- Standalone Access Card -- for University Physics with Modern Physics (by Young & Freedman), 15<sup>th</sup> edition, ISBN 13: 978-0-1351-5955-2** . Note: only the card for the 15<sup>th</sup> edition will allow you the access eText and homework; similarly you must login through **Pearsonmastering.com** (other addresses, even from the same publisher, can bring you to the wrong course). However, if you would also like a hardcopy version of the textbook, you can use any recent edition of the Young & Freedman's text. We use Chapters 1 to 13 which sometimes you can get separately from the rest.

Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system. Specific Information for the **Pearson Mastering (PM)** homework system are as follows:

You first create an account on the PM platform and then need a valid Pearson Mastering access code to sign up for the course.

**The pearsonmastering.com homework course ID is:**

shneidman52260 (Sections 111-006 and 008 only !)

For your own reference, record the unique course identifier announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

### **NOTE:**

**A) If you have an approved medical accommodation from the Dean of Students, you are allowed to take the Phys 111A lab course online.**

**B) If you do not have an approved medical accommodation, then the Phys 111A lab course cannot be taken online and has to be face-to-face.**

**C) Because of the COVID19 issues, the Physics Department is allowing students to take the Phys 111 course without the lab, thus allowing one do the lab in a later semester and face-to-face.**

**ATTENDANCE:** It is expected that students will attend all lectures and recitations. Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) are excessive. If you have excusable absences contact the Dean of First Year Students. If you must withdraw from the course, do it officially through the Registrar. Do not simply stop attending and taking exams: that forces the instructor to assign a course grade of "F".

**HELP:** Visit or email your instructors if you are having trouble with the course; do not simply hope for a miracle and fall further behind. The Physics Dept. office on the 4<sup>th</sup> floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

**GRADING:** Your final letter grade in Phys 111 will be based on a composite score for term's work that includes the common midterm exam score, the final exam, lecture/recitation quizzes, and the homework score.

**1) Common Midterm Exam** There will be one common midterm exam given during the semester. The exam schedule is as follows:

- **Common Midterm Exam:** Monday, April 05, 2021 4:15 – 5:45 PM

In-class quizzes covering the preceding or current work may be given during lectures and/or recitations. Those scores count toward your final course grade. **There are no make-ups for in class activities.** Students missing a quiz will receive a grade of zero for that item. The general policy is that students who miss the common midterm exam will receive a score of zero for that Exam. That score will be included in the calculation of your final grade. Students who anticipate an absence from the common midterm exam should discuss their situation with their instructor and Dean of Students PRIOR TO their absence. In order to be qualified to receive a "make-up" common midterm exam score (a very rare occurrence), the student should present documentation for not being able to take the test as scheduled. As is the standard policy of NJIT, this documentation should be presented to the **Dean of Students - (973) 596-3466, Room 255 Campus Center.** BOTH the Physics 111 instructor and Dean of Students must concur in permitting a "make-up" common midterm exam. Students who miss the common midterm exam that do not present documentation within 7 days of the common midterm exam will receive a score of zero for the common midterm exam.

In the event that the above qualification is met, a separate make-up test for the missed common quiz will not be offered. Instead, the portion of the final exam relevant to the contents of the missed test will be considered for giving a grade for the missed test. The instructor will evaluate the final exam questions from those chapters and normalize this portion of the student's grade for the missed common exam.

**2) Lecture Quizzes** A short quiz will be given during each lecture/recitation period.

**3) Homework** Homework assignments will be posted on-line using the Pearson Mastering Homework System, as described on the previous page.

**4) Final Exam** **Comprehensive Final Exam will be given** during Final Exam Period (May 7-13, 2021).

**Final Letter Grades:** Here are the approximate weights to be used for calculating the composite score:

- 25% for the Common Midterm Exam
- 35% for the final exam
- 20% for the total of homework work
- 20% for the in-class quizzes

The cutoff percentages for various letter grades will be:

| Percentage | Letter Grade |
|------------|--------------|
| > 85%      | A            |
| 85 - 80    | B+           |
| 80 - 70    | B            |
| 70 - 65    | C+           |
| 65 - 55    | C            |
| 55 - 50    | D            |
| < 50       | F            |

Final grades are not negotiable: A score of 84.99% is a B+, not an A.

**HONOR CODE STATEMENT:** NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others. Violations will be reported to the Dean of Students. The penalties range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable. **Students are required to agree to the NJIT Honor Code on each exam, assignment, quiz, etc. for the course.**

Turn off all cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors. Creating noise or otherwise interfering with the work of the class will not be tolerated.

**LEARNING OUTCOMES:** For this course, which is the first of the introductory Physics series, you can expect to be assessed on the following learning outcomes:

1. Manipulate vectors in components form and as magnitude/direction. Perform vector operations such as addition, subtraction, scalar, and cross products.
2. Recall the definitions and relationships involving position, velocity, speed, acceleration.
3. Apply the equations governing 1-D constant acceleration to mechanical systems for various initial conditions.
4. Apply the equations governing 2-D constant acceleration to mechanical systems for various initial conditions.
5. Comprehend the meaning of the equations governing net force and acceleration (Newton's Laws) for linear motion, and be able to manipulate them in conjunction with a free-body diagram to obtain any desired quantitative relationship.
6. Understand the extension of free-body diagrams and Newton's laws to rotational motion.
7. Understand the extension of free-body diagrams and Newton's laws to frictional forces.
8. Comprehend the definitions and application of work, energy, and conservation of energy principles to solving mechanical and non-conservative systems.
9. Comprehend the meaning of equations governing momentum, impulse, and collisions. Apply the equations governing momentum, impulse, and collisions mechanical systems for various initial conditions. Understand under what conditions momentum is conserved and how to use this relation to calculate unknown quantities based on physical relationships, initial conditions, and known quantities.
10. Define and calculate the center of mass of a system as well as the moment of inertia.
11. Extend the concepts and equations of 1-D constant acceleration to rotational motion for various initial conditions.
12. Understand the extension of linear motion equations to rotational motion. Comprehend the meaning of the equations governing rotational motion and acceleration, and be able to manipulate them in conjunction with a free-body diagram to obtain any desired quantitative relationship.
13. Understand the extension of work, energy, and conservation of energy principles to rotational motion.
14. Recall the definitions of angular momentum. Apply this concept to conservation of angular momentum.
15. Apply concepts of Newton's Laws to equilibrium of linear and rotational motion.
16. Understand the extension of conservation of energy and mass equations to fluid dynamics.
17. Understand the extension of Newton's Laws and energy concepts to gravitation.

| TOPIC  | TEXT STUDIES                      | NOTES   |
|--|-----------------------------------|---|
| Week 1<br>Units, Physical Quantities, and Vectors  | 01/18<br>Chapt. 1                 |   |
| Week 2<br>Motion in One Dimension                  | 01/25<br>Chapt. 2                 |   |
| Week 3<br>Motion in Two Dimensions                 | 02/01<br>Chapt. 3                 | Optional: Sect. 3.5   |
| Week 4<br>Newton's Laws of Motion                  | 02/08<br>Chapt. 4                 |   |
| Week 5<br>Applying Newton's Laws I                 | 02/15<br>Chapt. 5                 | Optional: Sect. 5.5   |
| Week 6<br>Applying Newton's Laws II                | 02/22<br>Chapt. 5                 |   |
| Week 7<br>Work, Kinetic Energy                     | 03/01<br>Chapt. 6                 | Refresh: scalar (dot) product   |
| Week 8<br>Potential Energy, Conservation of Energy | 03/08<br>Chapt. 7                 | Optional: Sect. 7.5   |
| <b>Common Midterm Exam</b>                         | <b>04/05</b>                      | <b>Chapters 1 to 7</b>  |
| Week 9<br>Linear Momentum and Collision            | 03/22<br>Chapt. 8                 | Optional: Sect. 8.6   |
| Week 10<br>Rotation, Moment of Inertia             | 03/29<br>Chapt. 9                 |   |
| Week 11<br>Dynamics of Rotational Motion           | 04/05<br>Chapt. 10 – Sections 1-6 | Refresh: vector (cross) product   |
| Week 12<br>Static Equilibrium                      | 04/12<br>Chapt. 11 – Sections 1-3 |   |
| Week 13<br>Fluid Mechanics                         | 04/19<br>Chap.12 – Sections 1-5   |   |
| Week 14<br>Universal Gravitation                   | 04/26<br>Chap. 13                 | Optional: Sect. 13.6, 13.7  |
| Week 15  | 05/03<br>REVIEW                   |   |
| <b>Final Exam</b>                                  | <b>TBA</b>                        | <b>Comprehensive Exam<br/>Chapters 1 to 13 with<br/>emphasis on 8 to 13</b> |

## Spring 2021 Academic Calendar

|             |           |   |
|-------------|-----------|---|
| January 18  | Monday    | Martin Luther King, Jr. Day   |
| January 19  | Tuesday   | First Day of Classes  |
| January 23  | Saturday  | Saturday Classes Begin  |
| January 25  | Monday    | Last Day to Add/Drop a Class  |
| January 25  | Monday    | Last Day for 100% Refund, Full or Partial Withdrawal  |
| January 26  | Tuesday   | W Grades Posted for Course Withdrawals  |
| February 2  | Tuesday   | Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date |
| February 15 | Monday    | Last Day for 50% Refund, Full Withdrawal  |
| March 8     | Monday    | Last Day for 25% Refund, Full Withdrawal  |
| March 14    | Sunday    | Spring Recess Begins - No Classes Scheduled - University Open   |
| March 21    | Sunday    | Spring Recess Ends  |
| April 2     | Friday    | Good Friday - No Classes Scheduled - University Closed  |
| April 5     | Monday    | Last Day to Withdraw  |
| May 4       | Tuesday   | Friday Classes Meet   |
| May 4       | Tuesday   | Last Day of Classes   |
| May 5       | Wednesday | Reading Day 1   |
| May 6       | Thursday  | Reading Day 2   |
| May 7       | Friday    | Final Exams Begin   |
| May 13      | Thursday  | Final Exams End   |
| May 15      | Saturday  | Final Grades Due  |
| TBA         |           | Commencement  |

