Fall 2021

# PHYS 111-001: Physics I

Gareth Perry

**COURSE OUTLINE** **PHYSICS 111 SECTION 001** **FALL 2021**

**INSTRUCTOR**
Dr. Gareth Perry
Office: 104C Tiernan Hall
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**OFFICE HOURS**
Tuesdays 10:00 – 11:00 am, Thursdays 02:00 pm – 03:00 pm, or by appointment, in TIER 101 (CSTR conference room) or via Webex: https://njit.webex.com/meet/gperry.

**CLASS SCHEDULE**
Mondays and Thursdays, 10:00 – 11:20 am, in TIER 114.

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

**COREQUISITE**
Math 111 or Math 132, Phys 111A.

***FAILURE TO MEET EITHER CO-Requisites or PRE-Requisites will result in student being dropped from class.***

**COURSE MATERIAL**
Access to digital version of the textbook and online homework can be obtained by purchasing: **Mastering Physics with Pearson eText -- Standalone Access Card - for University Physics with Modern Physics (by Young & Freedman), 15th edition, ISBN: 9780135206348.**

You may also pay for the digital textbook directly through the Mastering Physics website: https://mlm.pearson.com/northamerica/masteringphysics/, or through the *MyLab and Mastering* link on the course Canvas page. Instructions on how to do this can be found here: https://support.pearson.com/getsupport/s/article/MyLab-Mastering-for-Canvas-Student-Registration-and-Sign-In.

You will need the access code provided when you purchase the 15th edition of the textbook to access the eText and homework assignments for this 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 all online and can be accessed through the course's Canvas page. You must log-in to Canvas and access the electronic assignment via the *MyLab and Mastering* link. Once you solve the assigned problems, you submit them to the automated grading system. Specific Information for the Pearson Mastering Physics (https://mlm.pearson.com/masteringphysics/) homework system are as follows.

For your reference, **the Pearson Mastering Physics course ID is: perry82227.** Note: Instructors cannot access recover login information or passwords.

In this course we will heavily rely on the NJIT Canvas Learning Management System (LMS). The course *PHYS111001-Physics I* should automatically appear in your Canvas *Courses* tab. My lecture notes and quiz solutions, your assignments and grades, etc.., and other important information will be posted there, so please check often.

**NOTE: THE LABORATORY COURSE, PHYS 111A, MUST BE TAKEN CONCURRENTLY WITH PHYS 111. THE STUDENT MUST REGISTER FOR BOTH THE LEC/REC AND THE LAB COURSE. WITHDRAWAL FROM EITHER COURSE WILL CAUSE A SIMULTANEOUS WITHDRAWAL FROM BOTH COURSES.** Otherwise, the Lab course is run separately from the lec/rec course – **see** https://centers.njit.edu/introphysics/welcome/.

## ATTENDANCE

It is expected that students will attend all lectures. 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 e-mail your instructor 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 4th floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

Also, please check NJIT Physics Tutoring: https://physics.njit.edu/physics-tutoring-sign-sheet.

## GRADING

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

Common Exams

Three common exams will be given during the semester.

- Common Exam 1: Monday, September 27, 2021, 4:15 - 5:45 PM
- Common Exam 2: Monday, October 18, 2021, 4:15 - 5:45 PM
- Common Exam 3: Monday November 22, 2021, 4:15 - 5:45 PM

*Missed Exams*

The general policy is that students who miss a common exam will receive a score of zero for that Exam. That score will be included in the calculation of your final grade. Students that miss two common exams automatically fail the course.

Students who anticipate an absence from a common exam should discuss their situation with their instructor PRIOR TO their absence. To qualify for a "make-up 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, the student should present this document to the **Dean of Students - (973) 596-3466, Room 255 Campus Center** for evaluation. BOTH the Physics 111 instructor and Dean of Students must concur in permitting a "make-up common exam". Students who miss common exams that do not present documentation within 7 days of the common exam will receive a score of zero for the common exam.

If the above qualification is met, a separate "make-up exam" will not be offered. Instead, the final exam grade 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.

Conflict common exams are usually held from 6:00 to 7:30 PM on exam days; contact Ms. Oertel (christine.a.oertel@njit.edu) for arrangements.

Lecture Quizzes

A short quiz covering the preceding or current work will be given approximately every week during a lecture period. 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.

Final Exam

A *Comprehensive Final Exam* will be given during Final Exam Period (December 15-21, 2021).

*Note:* All exams will consist of multiple-choice questions. Students will submit exam questions on Scantron cards that will be collected at the end of each exam. There will be no partial credit for multiple-choice questions, however students are required to show work to support their answers.

Homework

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

## FINAL LETTER GRADES

Here are the approximate weights to be used for calculating the composite score:

- 48% for all three common exams (16% each)
- 32% for the final exam
- 10% for in class quizzes
- 10% for homework

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.

## PHYSICS 111 SECTION 001 COURSE SYLLABUS

| **TOPIC** | **TEXT STUDIES** | **NOTES** |
|---|---|---|
| Week 1<br>Units, Physical Quantities, and Vectors | Chapt.1 | |
| Week 2<br>Motion in One Dimension | Chapt. 2 | |
| Week 3<br>Motion in Two Dimensions | Chapt. 3 | Optional: Sect. 3.5 |
| Week 4<br>Newton's Laws of Motion | Chapt. 4 | |
| Week 5<br>Applying Newton's Laws | Chapt. 5 | Optional: Sect. 5.5 |
| **Common exam 1 – 09/27** | | **Units, Vectors + kinematics in 1D and 2D (Chapt. 1, 2 and 3)** |
| Week 6<br>Work, Kinetic Energy | Chapt. 6 | Refresh: scalar (dot) product |
| Week 7<br>Potential Energy, Conservation of Energy | Chapt. 7 | Optional: Sect. 7.5 |
| Week 8<br>Linear Momentum and Collision | Chapt. 8 | Optional: Sect. 8.6 |
| **Common exam 2 – 10/18** | | **Newton's laws, Work, Energy (Chapt. 4, 5 and 6)** |
| Week 9<br>Rotation, Moment of Inertia | Chapt. 9 | |
| Week 10<br>Dynamics of Rotational Motion | Chapt. 10 – Sections 1-6 | Refresh: vector (cross) product |
| **Common exam 3 – 11/22** | | **Energy, Momentum and Collisions, Impulse, Center-of-mass, Rotational Kinematics, Rotational Energy (Chapt. 7, 8 and 9)** |
| Week 11<br>Static Equilibrium | Chapt. 11 – Sections 1-3 | |
| Week 12<br>Fluid Mechanics | Chap.12 – Sections 1-5 | |
| Week 13<br>Universal Gravitation | Chap. 13 | Optional: Sect. 13.6, 13.7 |

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| Week 14 | Review for final exam | |
| **Final Exam** | | **Comprehensive Exam Chapters 1 to 13 with emphasis on 10 to 13** |

**Fall 2021 Academic Calendar**

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|---|---|---|---|
| September | 1 | Wednesday | First Day of Classes |
| September | 4 | Saturday | Saturday Classes Begin |
| September | 6 | Monday | Labor Day |
| September | 8 | Wednesday | Monday Classes Meet |
| September | 8 | Wednesday | Last Day to Add/Drop a Class |
| September | 8 | Wednesday | Last Day for 100% Refund, Full or Partial Withdrawal |
| September | 9 | Thursday | W Grades Posted for Course Withdrawals |
| September | 15 | Wednesday | Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date |
| September | 29 | Wednesday | Last Day for 50% Refund, Full Withdrawal |
| October | 20 | Wednesday | Last Day for 25% Refund, Full Withdrawal |
| November | 10 | Wednesday | Last Day to Withdraw from Classes |
| November | 25 | Thursday | Thanksgiving Recess Begins |
| November | 28 | Sunday | Thanksgiving Recess Ends |
| December | 10 | Friday | Last Day of Classes |
| December | 11 | Saturday | Saturday Classes Meet |
| December | 12 | Sunday | Sunday Classes Meet |
| December | 13 | Monday | Reading Day 1 |
| December | 14 | Tuesday | Reading Day 2 |
| December | 15 | Wednesday | Final Exams Begin |
| December | 21 | Tuesday | Final Exams End |
| December | 23 | Thursday | Final Grades Due |