Fall 2019

PHYS 111-021: Physics I

Haimin Wang

COURSE OUTLINE
PHYSICS 111
Fall 2019

INSTRUCTOR: Dr. Gareth Perry, Department of Physics, New Jersey Institute of Technology
CONTACT: gperry@njit.edu, 973-596-5802
OFFICE: TIER 104C (office hours held in TIER 101)
OFFICE HOURS: Tuesday: 10 – 11 AM, Thursday: 1 – 2 PM in TIER 101 (in conference room)

COURSE ID (for masteringphysics.com): **MPPERRY3041328**

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 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), 13th edition, ISBN 9780321741257**. This can be purchased when you sign up via www.masteringphysics.com. Use: **MPPERRY3041328** when asked for the Course ID. This code corresponds to this course (and section) specifically. Note: only the card for the 13th edition will allow you the access eText and homework. You must login through masteringphysics.com (other addresses, even from the same publisher, can bring you to the wrong course). The hardcopy version of this book is out of print and is no longer offered by the publisher. This course will cover Chapters 1 to 13 in the text.

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.

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 **Mastering Physics (MP)** homework system: you will have to create an account on the MP platform. You need a valid Mastering Physics access code to sign up for the course your instructor sets up on MP.

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.

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 the instructor if you are having trouble with the course; do not simply hope for a miracle and fall behind. Make use of he Physics Tutoring Center, located in Central King Building (CKB) in Room G12. The Physics Dept. office on the 4th floor of Tiernan has specific information on tutoring as well. 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 exam scores, the final exam, lecture/recitation quizzes and the homework score.

1) <u>Common Exams</u> Three common exams will be given during the semester. The exam schedule is:

- **Common Exam 1**: Monday, Oct. 7, 2019, 4:15 – 5:45 PM
- **Common Exam 2**: Monday, Oct. 28, 2019, 4:15 – 5:45 PM
- **Common Exam 3**: Monday, Nov. 18, 2019, 4:15 – 5:45 PM

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. In order to be qualified to receive a "make-up" common 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 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.

In the event that the above qualification is met, a separate make-up test for the missed common exam 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) <u>Lecture Quizzes</u> In-class quizzes covering the preceding or current work will 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.

3) <u>Homework</u> Homework assignments will be posted on-line using the Mastering Physics Homework System, as described on the previous page.

4) <u>Final Exam</u> A **Comprehensive Final Exam will be given** during Final Exam Period (Dec. 14-20).

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 the homework
- **10%** 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.

Syllabus

TOPIC	TEXT STUDIES	Notes
Week 1 Units, Physical Quantities, and Vectors	Chapt.1	
Week 2 Motion in One Dimension	Chapt. 2	
Week 3 Motion in Two Dimensions	Chapt. 3	Optional: Sect. 3.5
Week 4 Newton's Laws of Motion	Chapt. 4	
Week 5 Applying Newton's Laws	Chapt. 5	Optional: Sect. 5.5
Common Exam 1 – 10/7		**Units, Vectors + kinematics in 1D and 2D**
Week 6 Work, Kinetic Energy	Chapt. 6	Refresh: scalar (dot) product
Week 7 Potential Energy, Conservation of Energy	Chapt. 7	Optional: Sect. 7.5
Week 8 Linear Momentum and Collision	Chapt. 8	Optional: Sect. 8.6
Common Exam 2 – 10/28		**Newton's laws, work, energy**
Week 9 Rotation, Moment of Inertia	Chapt. 9	
Week 10 Dynamics of Rotational Motion	Chapt. 10 – Sections 1-6	Refresh: vector (cross) product

Week 11 Static Equilibrium	Chapt. 11 – Sections 1-3	
Common Exam 3 – 11/18		**Energy, momentum and collisions, impulse, center-of-mass, rotational kinematics, rotational energy**
Week 12 Fluid Mechanics	Chap.12 – Sections 1-5	
Week 13 Universal Gravitation	Chap. 13	Optional: Sect. 13.6, 13.7
Week 14	REVIEW	
Final Exam		**Torque, ang. momentum, statics, fluids, gravitation + all previous topics**

Fall 2019 Academic Calendar

September 2	Monday	Labor Day
September 3	Tuesday	First Day of Classes
September 7	Saturday	Saturday Classes Begin
September 9	Monday	Monday Classes Meet
September 13	Friday	Last Day to Add/Drop a Class
September 13	Friday	Last Day for 100% Refund, Full or Partial Withdrawal
September 14	Saturday	W Grades Posted for Course Withdrawals
September 16	Monday	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
September 30	Monday	Last Day for 50% Refund, Full Withdrawal
October 21	Monday	Last Day for 25% Refund, Full Withdrawal
November 11	Monday	Last Day to Withdraw

November 26	Tuesday	Thursday Classes Meet
November 27	Wednesday	Friday Classes Meet
November 28	Thursday	Thanksgiving Recess Begins
December 1	Sunday	Thanksgiving Recess Ends
December 11	Wednesday	Last Day of Classes
December 12	Thursday	Reading Day 1
December 13	Friday	Reading Day 2
December 14	Saturday	Final Exams Begin
December 20	Friday	Final Exams End
December 22	Sunday	Final Grades Due