

Fall 2019

PHYS 111-011: Physics I

Junjie Yang

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Yang, Junjie, "PHYS 111-011: Physics I" (2019). *Physics Syllabi*. 107.
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Physics 111 Syllabus Fall 2019

Section Information

Section 011 Class meeting: GITC 1400, Mondays/Wednesdays, 10:00-11:30 pm

Instructor

Prof. Junjie Yang,

Email

jyang@njit.edu

Office Location & Hours

423C, Tiernan Hall, Fridays 11 am – 12 pm

Phys111 Course Supervisor

Prof. Vitaly Shneidman

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452 Tiernan Hall; by appointment

General Information

Description s

Prerequisite: MATH 131; Co-requisite: MATH 111 or MATH 132 and PHYS 111A. Our class is a section of multi-section PHYS 111, with common material and exams. The course covers an introduction to motion with an emphasis on its fundamental concepts, laws and applications. The Course Schedule below lists topics covered. Professors will make an effort to help the students succeed by using active learning. See: <https://physics.njit.edu/>

Learning Expectations, Goals and Outcomes

The student will be able to understand and calculate the following:

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.

Professors and students will measure Outcomes by the performance on assessments as listed below under final grade calculations.

National Science Standards: Students at engineering colleges need to learn to do the following. The labs are a particular opportunity to gain experience with these talents:

1. Identify questions and concepts that guide scientific investigations
2. Design and conduct scientific investigations
3. Use technology and mathematics to improve investigations and communications (uncertainty)
4. Formulate and revise scientific explanations and models using logic and evidence (how uncertainty affects data)
5. Recognize and analyze alternative explanations and models (analyze data)
6. Communicate and defend a scientific argument (data presentation)

Course Materials

Text

There are many copies of this economical and comprehensive text available on the web: University Physics Plus Modern Physics Plus MasteringPhysics with eText -- Access Card Package (13th Edition) ISBN-13: 978-0321675460

Our course only requires a Mastering access card and any text that covers our material. For example, the 14th edition is OK, but not required.

*Be sure that your purchase includes a Mastering Physics "student access code card" for the homework at www.masteringphysics.com

***Canvas is required for this course and supplements the text. Some quizzes may be online via Canvas> Assignments, information and grades will be on Canvas.

Final Grade Calculation:

The Weights for parts of the course are as follows:	
Quizzes and Class Participation	10%
Homework	10%
Exams (Exam 1= 16%, Exam 2= 16%, Exam 3= 16%, Final= 32%)	80%
	100%

In-class Quizzes: (10 % of grade) Students are expected to participate regularly in class

discussions by asking and answering questions, volunteering to solve problems, and working actively with others during in-class group assignments. When all students participate in each class, it creates an active learning environment that will help you understand the materials and be more successful in the class. There will be iClicker quizzes in class. They are very valuable because they are similar in content and format to exam questions.

Homework: (10% of grade) Half of the Homework questions are closely related to previous exams, so the understanding you gain from doing them is an added benefit. The masteringphysics.com homework course ID is **MPYANG3677951**. The homework is the greatest help for yourself if you figure it out by yourself. Then, if you need help, feel free to talk with the Physics Tutors in the Basement of the King Building.

Exams: (80% of grade) The three exams before the Final are scheduled from 4:15-5:45pm on dates listed on Page 4. The amount of new material covered determines the exam weight, unless otherwise specified. The exam questions are multiple-choice with content common to all students. The professors will help you as much as possible by covering all concepts and all settings of exam questions in class and with special review sessions. See the schedule below for details. Make-ups for missed exams 1, 2 and 3 are only at 6-7:30PM on the exam day and only with advance permission from both your instructor and the Dean of Students. The Final will emphasize the weeks of work after Exam 3, plus an overview of the whole course. The Final exam is not scheduled yet.

The conversion of numerical to letter grades is as follows: > 85% A; >80 to 85 B+; >70 to 80 B; >65 to 70 C+; >55 to 65 C; >50 to 55 D and <50 F

If you need any extra information about class, quiz or exam questions, ask a tutor. Tutors are a useful source throughout the course. After the Final exam, the course ends, and questions and grades are not open to discussion.

Course Policies

Honor Code: The NJIT Student Council dictates: “NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others.” The NJIT Student Senate has requested a zero-tolerance policy for cheating of any kind and for behavior that disrupts learning. The Senate wants fairness for all students. The Dean of Students determines punishments and requires professors to report any incidents. The penalties include failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where anyone could misinterpret your behavior 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.

Missed quizzes and exams: There are *no make-ups* for in-class activities. If you miss a quiz, you will receive a grade of zero. If you miss an exam and the evening make-up time (see below), you will receive a score of zero for that Exam. That score will be included in the calculation of

your final grade. If you miss two exams, you will automatically fail the course. To get credit for an exam, you must notify your instructor PRIOR TO the exam you will miss, as above. 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 student's 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 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 quiz.

Late work: Homework is due by times and dates indicated in the Mastering web site. You cannot make up a Quiz that you miss.

Class attendance: The NJIT attendance policy is the following: "It is expected that students will attend all classes. Your teacher will take attendance at all classes and exams. More than 3 unexcused absences (in total) are excessive." If you have excusable absences, contact your instructor or the Dean of Students - (973) 596-3466, Room 255 Campus Center. If you have to miss class, attend the next physics tutoring session and let your professor know. Some professors use i-clickers.

Withdrawal: If you must withdraw from the course, do it officially through the Registrar, otherwise your course grade will be F.

Electronics: Cell phones and laptops must be off during classes and exams, except as indicated by the instructor.

Course Schedule

Classes start Tuesday Sept 4; Grades are due on or before Friday December 21.

Mastering Physics software cuts off homework submission at midnight before the first day of each week.

We recommend that you read all chapters in our textbook as indicated below before class. Professors may give quizzes both before and after they cover material in class. The combination of reading and discussion helps learning.

Note as below that professors will help you by making an effort to teach all topics in class the week before the Lab on that topic.

Our intention is to include, whenever possible, topics in exams only after students have completed both the Lab work and the class work on that topic to help you learn the concepts.

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

Exams:

Three common exams:

1. 10/7/2019, 1D motion; 2D motion and vectors; Newton's laws; Linear static forces, Weeks 1-4
2. 10/28/2019, Friction; Work and 3D dot products; Kinetic, potential and conservation of energy; Weeks 5-7
3. 11/18/2019, Momentum and collisions; circular motion; angular energy, Weeks 8-10

Final exam: Exam Comprehensive Final Exam will be given during Final Exam Period (Dec. 14-20); Content: some coverage of Weeks 1-10; more coverage of Weeks 11-14.

Additional Information and Resources

Resources for NJIT Students

Academic Advising Success Center "...assist in the advisement of students who are undecided in their major, transitioning into another major at NJIT, and those students who need additional support to graduate successfully and in a timely manner."

Academic Support and Student Affairs "From questions about becoming a student at NJIT – to student engagement – to searching for information on career development, the Division of Academic Support and Student Affairs Staff is here to help."

Additional Tutoring Centers Physics Learning Center; Math Learning Center; Chemistry Learning

Center; The Writing Center; ECE Study Groups Center for Counseling and Psychological Services
“The NJIT Center for Counseling and Psychological Services (C-CAPS) is committed to assisting students in the achievement of their academic goals as well as benefiting from their personal experience on campus. College life can be personally challenging and stressful at times. We believe that the educational process is an important component of the development of the individual as a whole person. Our goal is to optimize the college experience and improve the quality of the lives of our students by promoting their mental health and facilitating students’ personal, academic and professional growth.”

Department of Public Safety “The Department of Public Safety, conveniently located at 154 Summit St. on the first level of the Parking Deck, provides police protection 24 hours a day, seven days a week.”

Disability Support Services “If you need accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.”

Health Services “To ensure the good health of our students, the NJIT Student Health Service provides quality healthcare to all eligible NJIT registered students.”

IST Service Desk “The IST Service Desk is the central hub for computing information and first point of contact for getting help and reporting issues related to computing technology at NJIT. There is much technology here at NJIT, and many ways to find information or get help with it.” The Learning Center “Our mission is to assist students both in the classroom and beyond by providing tutorial services, academic coaching, academic and personal enrichment workshops and staff and peer support so students can meet the demands of their coursework and are prepared for life after graduation.”

NJIT/Rutgers Shuttle Service “The shuttle bus is operated jointly with Rutgers-Newark and provides transportation for the University community between the two campuses, major mass transit systems, and Harrison and Kearny. As a courtesy, shuttle service is free to the Rutgers/NJIT community who present identification.”

Office of Global Initiatives Resources for international students and study abroad programs. Robert W. Van Houten Library “The Van Houten Library offers electronic and print resources essential to the mission of New Jersey's science and technology university, including a core collection of academic books, databases, and journals, as well as research and consultation services.”

Student Financial Aid Services “Student Financial Aid Services (SFAS) at NJIT is committed to providing you with every opportunity to obtain funding to support your educational costs at NJIT.”

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