NJIT
New Jersey Institute of Technology

Jordan Hu College of Science and Liberal Arts

Department of Physics

Course Outline	**Physics 111**	**Fall 2025**

General Information
- Description: Physics 111 is a calculus-based introduction to Mechanics, emphasizing fundamental concepts and applications. It is the first course in a three-course sequence. It includes motion in one and two dimensions, Newton's laws of motion and their applications, work and energy, linear momentum and collisions, rotational motion, fluid dynamics and gravity.
- Number of Credits: 3
- Corequisite: Math 111, Phys 111A.

Note: The Laboratory Course, PHYS 111A, must be taken concurrently with PHYS 111. The student must register for both the LECT/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 Lect/Rec course **– see** https://centers.njit.edu/introphysics/welcome/.

Course Sections and Instructors:

Course-Section	Instructor
Phys 111-001	Professor S. Kane
Phys 111-003	Professor S. Kane
Phys 111-005	Professor C. Dias
Phys 111-007	Professor C. Dias
Phys 111-009	Professor H. Hijazi
Phys 111-011	Professor H. Hijazi
Phys 111-013	Professor H. Wang

Phys 111-015	Professor H. Wang
Phys 111-017	Professor Ch. Zhou
Phys 111-019	Professor Ch. Zhou
Phys 111-021	Professor H. Hijazi
Phys 111-023	Professor H. Hijazi
Phys 111-025	Professor H. Hijazi
Phys 111-027	Professor E. Vataj
Phys 111-029	Professor E. Vataj
Phys 111-031	Professor J. Opyrchal
Phys 111-033	Professor J. Opyrchal
Phys 111-035	Professor S.Yu
Phys 111-037	Professor I. Kuzichev
Phys 111-101	Professor I. Kuzichev
Phys 111-103	Professor Y. Chen
Phys 111-105	Professor R. Levy

Office Hours for All Physics 111 Instructors: https://physics.njit.edu/students/office

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.

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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.

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), 15th edition, ISBN: 0135491193**. Note: only the card for the 15th 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.

For your own reference, record your login ID and password. Instructors cannot access forgotten logins or passwords.

Details for enrolling in the Pearson Mastering (PM) homework system can be found in the PDF titled "Student Registration Instructions for Canvas." This document will be available on the Canvas course.

- **Verify Enrollment Duration: During the registration process, double-check the duration of your enrollment to ensure that it covers the entire duration of the semester.**

NJIT Canvas System: lecture notes, problems, grades, etc. are posted on Canvas (PHYS 111-). So, check there often.

Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) is excessive. If you have excusable absences, contact your instructor or the Dean of Students (973.596.3466, Central King Building (CKB), Room L71 (Lower Level)). Students may sign in only for themselves on attendance sheets; do not sign in for absent students.

Attendance sheets are the official university documents; signing the attendance sheet on behalf of another student is considered as "Misuse of Documents". No student shall intentionally furnish false information nor shall a student forge, alter, destruct, or misuse any university documents or data.

Withdrawal: If you must withdraw from the course, do it officially through the Registrar before the last withdrawal date. If you simply stop attending and taking exams your instructor will have to assign a failing grade in the course.

Help: If you are struggling with the course, do not wait for a miracle, reach out to your instructor by visiting them in person or e-mailing them for assistance.

Additionally, you can get support from tutors at the Physics Tutoring Center, located in CKB G12.
In-person tutoring sessions will begin on **Tuesday, September 09**, and run through **Thursday, December 11, 2025** (the last day of class). The tutoring schedule will be available at: 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/recitation quizzes, and the homework score.

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 total of homework work
- **10%** for the **IN-CLASS** quizzes

The cutoff percentages for various letter grades will be:

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

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

Exams

There will be three Common Exams plus a comprehensive Final Exam. The schedule is:

- **Common Exam 1**: Monday, October 06, 2025;   4:15 -- 5:45 PM
- **Common Exam 2**: Monday, November 03, 2025;   4:15 -- 5:45 PM
- **Common Exam 3**: Monday, November 24, 2025;   4:15 -- 5:45 PM

- **Comprehensive Final Exam** TBA, 2.5 hours long

The final exam will emphasize the work covered after common exam 3, but also re-caps the whole course.

Note: All Common Exams and the Final Exam will consist of multiple-choice questions. Students must submit both their completed exam and scantron card at the end of each exam. No partial credit will be awarded for multiple-choice questions. Although students are required to show their work, grading will be based exclusively on the answers recorded on the scantron card. It is the student's responsibility to ensure their responses are accurately marked on the scantron.
Additionally, students must take the exam during their scheduled class time and in the assigned classroom.

Quizzes

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.

If your instructor assigns quizzes through Canvas, you must have the Canvas app installed on your laptop. Quizzes taken remotely will not be accepted.

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 the Dean of Students PRIOR TO their absence. In order to be qualified to receive an "excused absence" for the common exam (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, Central King Building (CKB), Room L71 (Lower Level)** for evaluation. BOTH the Physics 111 instructor and Dean of Students must concur in permitting a "excused absence" for the 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.

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

Accommodation of Disabilities

Students who need academic accommodations in connection with a disability must initiate the request with NJIT Office of Accessibility and Resources (OARS). Students need to register with the Office of Accessibility in order to officially disclose their disability status to the College and to determine eligibility for appropriate reasonable accommodations (including any prior IEPs or 504s). Please contact OARS at the start of the semester (or as soon as possible) to coordinate any accommodation request/s: https://www.njit.edu/accessibility/, Room 201 (Kupfrian Hall) or email us at OARS@NJIT.EDU

Course Policies

It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course.

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

- Students must affirm the NJIT Honor Code on each exam.

- Eating in the classroom is prohibited. Beverages are allowed only in containers with secure lids and must not cause distractions. Designated breaks will be provided for courses of extended duration.

- Internet use is permitted solely for accessing the instructor's course notes and the official e-textbook. All other internet activity is prohibited.

- Phones, earphones, headphones, smartwatches, wireless devices, laptops, and messaging devices are strictly prohibited during exams.

- Only calculators without wireless capabilities are permitted. Calculator sharing is prohibited.

- Unauthorized recordings of class sessions are prohibited. Students must follow NJIT's Policy for Recording Classes: NJIT Recording Policy.

- Students unable to remain in the exam room for the full scheduled duration due to a documented medical or physical condition must seek accommodation through OARS.

- Contacting or receiving assistance from tutoring services or other unauthorized sources during an exam is strictly prohibited.

- **By enrolling in this course, students acknowledge that examination rooms may be recorded to protect both the integrity of the exams and the students themselves.**

- Student use of artificial intelligence (AI) is permitted in this course as a study tool. It is not permitted to be used in exams, quizzes, and other assignments, as doing so would undermine student learning and achievement of course learning outcomes. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments

Physics 111 Class Schedule for Fall 2025

TOPIC	TEXT STUDIES	NOTES	Recommended Problems
Week 1 Units, Physical Quantities, and Vectors	Chapt.1		6, 31, 36, 40, 56,71, 85
Week 2 Motion in One Dimension	Chapt. 2		1, 7, 15, 30, 31, 38, 68
Week 3 Motion in Two Dimensions	Chapt. 3	Optional: Sect. 3.5	8, 10, 16, 28, 30, 34, 57,
Common Exam 1 - October 06, 2025	**Chapters 1, 2, 3**	**Covers: Units, Vectors, Motion in One Dimension, Kinematics in 1D & 2D motion**	
Week 4 Newton's Laws of Motion	Chapt. 4		2, 7, 8, 19, 23, 30, 38
Week 5 Applying Newton's Laws, I	Chapt. 5	Optional: Sect. 5.5	1, 6, 15, 25, 34, 36, 45, 74
Week 6 Work, Kinetic Energy	Chapt. 6	Refresh: scalar (dot) product	1, 7, 8, 10, 28, 37, 45, 85
Week 7 Potential Energy, Conservation of Energy	Chapt. 7	Optional: Sect. 7.5	5, 14, 30, 31, 39, 57, 60, 72
Common Exam 2 – November 03, 2025	**Chapters 4, 5, 6, 7**	**Covers: Newton's laws and Applications, Work, Kinetic Energy, Potential Energy and Energy Conservation,**	
Week 8 Linear Momentum and Collision	Chapt. 8	Optional: Sect. 8.6	10, 21, 30, 42, 44, 46, 75
Week 9	Chapt. 9		6, 9, 12, 27, 33, 37, 49, 53

Rotation, Moment of Inertia, Rotational Energy			
Week 10 Dynamics of Rotational Motion	Chapt. 10 – Sections 1-6	Refresh: vector (cross) product	1, 6, 14, 15, 16
Week 11 Dynamics of Rotational Motion (cont.); angular momentum	Chapt. 10 – Sections 1-6		24, 38, 42
Common Exam 3-November 24, 2025	**Chapters 8, 9 and 10**	**Covers: Momentum and Collisions, Rotational Kinematics and Dynamics of Rotational**	
Week 12 Static Equilibrium	Chapt. 11 – Sections 1-3		13, 15, 17, 23, 51, 53, 69
Week 13 Fluid Mechanics	Chap.12 – Sections 1-5		11, 21, 26, 34, 41, 49
Week 14 Universal Gravitation Review	Chap. 13	Optional: Sect. 13.6, 13.7	4, 14, 18, 25, 31, 32
Final Exam		**Comprehensive Exam Chapters 1 to 13**	

<u>* The professor will discuss any changes to the syllabus during class, should they occur.</u>

Fall 2025 Academic Calendar

Sept	1	Labor Day. University Closed
Sept	2	First Day of Classes
Sept	8	Last Day to Add/Drop a Class
Sept	8	Last Day for 100% Refund, Full or Partial Withdrawal
Sept	9	W Grades Posted for Course Withdrawals
Sept	15	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
Sept	29	Last Day for 50% Refund, Full Withdrawal

Oct	2	Wellness Day. No Classes
Oct	20	Last Day for 25% Refund, Full Withdrawal
Nov	10	Last Day to Withdraw from Classes
Nov	25	Thursday Classes Meet
Nov	26	Friday Classes Meet
Nov	27	Thanksgiving Recess Begins. No Classes
Nov	30	Thanksgiving Recess Ends
Dec	11	Last Day of Classes
Dec	12	Reading Day
Dec	13	Saturday Classes Meet
Dec	14	Final Exams Begin
Dec	20	Final Exams End
Dec	22	Final Grades Due

Updated by Dr. E. Vataj – September 2025
Department of Physics, Physics 111 Course Syllabus, Fall 2025