NJIT New Jersey Institute of Technology

Jordan Hu College of Science and Liberal Arts

Department of Physics

Course Outline **Physics 102** **Spring 2025**

General Information

- Description: Physics 102 is an algebra-based physics course introduction to Mechanics. 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, and principles of conservation.
- Number of Credits: 3
- Prerequisite: Satisfactory completion of two high school mathematics courses and two high school science courses.

Course-Section and Instructors:

Course-Section	Instructor
Phys 102-002	Professor S. Kane
Phys 102-004	Professor S. Kane
Phys 102-006	Professor S. Kane
Phys 102-008	Professor S. Kane
Phys 102-102	Professor R. Levy
Phys 102-104	Professor S. Azizighannad

Office Hours for All Physics 102 Instructors: https://physics.njit.edu/students/office

Laboratory - Physics 102A

The laboratory component of the course is Phys 102A. The lab course must be taken concurrently unless you have previously taken and passed Phys 102A. The grading for the

laboratory is separate from the course/recitation (Phys 102) and the grades are given by the laboratory instructors. Latest edition of **Lab manual "Physics 102A Laboratory Manual"** can be purchased from NJIT Bookstore.

YOU MUST REGISTER FOR THE LECTURE/RECITATION (Phys 102) AND THE LABORATORY COURSE (Phys 102A) SEPARATELY. WITHDRAWAL FROM ANY OF THESE WILL CAUSE A SIMULTANEOUS WITHDRAWAL FROM ALL Phys 102 COURSES.

Learning Outcomes:

For this course, you can expect to be assessed on the following learning outcomes:

1. Recall the definitions and relationships involving position, velocity, speed, acceleration, vectors, Newton's Laws, circular motion, free-body diagrams, friction, work, energy, linear and angular momentum, torque, angular velocity and acceleration, and gravitation.
2. Apply the equations governing 1-D and 2-D constant acceleration to mechanical systems for various initial conditions. Calculate unknown quantities based on physical relationships, initial conditions, and known quantities.
3. Comprehend the meaning of the equations governing net force and acceleration (Newton's Laws), and be able to manipulate them in conjunction with a free-body diagram to obtain any desired quantitative relationship. Understand the extension of these equations to rotational motion, and gravitation.
4. Generalize the concepts underlying the equations of motion, such as work, kinetic and potential energy, conservation of energy, and equilibrium.
5. 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.
6. 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.

Course Materials

Textbook:
Physics - Principles with Applications, 7th ed. by Giancoli (Publisher: Pearson)

Mastering Physics Online Homework System:
Be sure that your textbook is sold bundled with a Mastering Physics student access code card. You can also buy the student access code card separately either from NJIT bookstore or online. Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system. Instructions can be found on the student access code card.

Specific Information for the enrollment in Pearson Mastering (PM) homework system is given in the pdf "Student Registration Instructions for Canvas" which will be posted on 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.

Email:

NJIT email will be routinely used for announcements and to distribute material. Be sure to check the NJIT email every day.

Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) is excessive. For excused absences, please contact the Office of the Dean of Students for support and notify your course instructor promptly.

Office of the Dean of Students
Location: Central King Building (CKB), Room L71 (Lower Level)
Phone: (973) 596-3466
Email: dos@njit.edu
Website: https://www.njit.edu/dos/student-excusals.

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.

Reading Assignments

The text readings are listed below. You should read the assigned sections of the text before the lecture covering that material.

Homework

It is almost impossible to succeed in this course without working a lot of problems: do the homework. Each student must download the weekly homework assignments from Mastering Physics online homework system, work the problems, and submit the solutions online before each assignment is due. Late work will not be accepted. See Course Materials section above.

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 emailing 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, January 28, and run through Wednesday, May 7, 2025 (the last day of class). The tutoring schedule will be available at: https://physics.njit.edu/physics-tutoring-sign-sheet.

Grading

Final grades will be based on a composite score for the term's work that includes three common exams, the final exam, homework score, written quizzes, iClicker REEF quizzes, and class participation.
The approximate weights we expect to use in calculating the composite score are:

- **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 participation (in-class quizzes and clickers)
  IN-CLASS quizzes (during lecture or recitation period, be prepared to have canvas app on phone, iPad or laptop. Note: Quizzes taken remotely will be disregarded and counted against you).

The cutoff percentages for various letter grades will be in the range of 84.0% for A, 76.0 % for B+, 68.0% for B, 60.0% for C+, 52.0% for C, 44.0% for D, F below 44.0 %.
C or better grade is required to take further physics courses. If you get D in Physics 102, you cannot take the next level physics course.

Exams

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

• **Common Exam 1**: Wednesday, February 26, 2025; 4:15 -- 5:45 PM
• **Common Exam 2**: Wednesday, March 26, 2025; 4:15 -- 5:45 PM
• **Common Exam 3**: Wednesday, April 23, 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.

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.

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 102 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 quiz 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.

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 are required to agree to the NJIT Honor Code on each exam.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.
  Interfering with an instructor's ability to conduct the class or the ability for other students to learn is considered as "Disruptive Conduct".

  The use of any internet services other than following the instructor's course notes and e-textbook is disruptive for the instructor and the other students.

- **Students are strictly prohibited from using phones, earphones, headphones, smartwatches, wireless devices, laptops, or any messaging devices during exams.**
- Calculators without wireless capabilities are allowed during exams, but sharing calculators is not permitted.

- **Student recordings**: Unauthorized student recordings of class sessions are prohibited. If a student needs to record a class because of accommodation, they need to reach out to the Office of Accessibility Resources and Services (OARS).

- If the student cannot be continuously present in the exam room for the entire duration of the scheduled exam for any physical/medical reason, the student needs to seek accommodation through OARS in order to take the exam separately.

- Needless to say, do not contact any "tutoring services" for help during an exam.

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.

Physics 102 (Section) Class Schedule for Spring 2025

Weeks	**Lecture Topics**	**Text Reading**	**Recommended Problems**
Week 1	Math Review, Introduction Measurement and Units	Appendix A-4, Ch 1, Sec 1-6	3, 13, 17, 18, 22
Week 2	Motion in One Dimension	Ch 2, Sec 1-8	4, 8, 12, 13, 17, 19, 26, 27
Week 3	Vectors and Two-Dimensional Motion	Ch 3, Sec 1-6	2, 13, 17, 18, 20, 21, 22, 27, 29
Common Exam 1 – February 26		**Covers: Math Review, Chapter 1,**	

		2 and 3	
Week 4	The Laws of Motion - Forces and Newton's Laws	Ch 4, Sec 1-5	1, 5, 7, 8, 12, 16,
Week 5	The Laws of Motion - Applications of Newton's Laws	Ch 4, Sec 6-8	40, 42, 49, 56, 60,
Week 6	Circular motion	Ch. 5, Sec. 1, 2, 4	1, 3, 5, 7, 9
Common Exam 2 – March 26		**Covers: Chapters 4, 5 (sec. 1-4) and 6 (sec. 1, 3)**	
Week 7	Energy -Work, Kinetic Energy, Work-Energy Theorem	Ch. 6, Sec. 1, 3	3, 9, 15, 17, 18, 21
Week 8	Energy -Potential Energy, Mechanical Energy, Energy conservation, Power	Ch. 6, Sec. 4-7, 9, 10	28, 31, 35, 47, 54, 59, 64
Week 9	Momentum and Collisions -Momentum, Impulse, Conservation of Momentum	Ch. 7, Sec. 1-3	1, 3, 10, 15, 21
Week 10	Momentum and Collisions -Collisions	Ch 7, Sec. 4-8, 10	25, 26, 39, 41, 49, 50
Week 11	Rotational Motion, Rotational Dynamics I	Ch 8, Sec 1-3	6, 14, 17, 18, 20
Week 12	Rotational dynamics II	Ch.8, Sec. 4-8	24, 28, 32, 37, 39, 52, 58, 61
Week 13	Static Equilibrium	Ch. 9, Sec. 1-4	2, 4, 6, 12, 13, 17
Common Exam 3 – April 23		**Covers: Chapters 6 (sec. 4-7, 9, 10), 7, 8**	
Week 14	The Law of Gravity	Ch 5, Sec. 5-7 (excluding Kepler's Laws)	28, 30, 31, 46
Date to be announced	**Final Exam**	Everything learned in class	

*** The professor will discuss changes to the syllabus during class if they arise.**

Spring 2025 Academic Calendar

Date	Day	Event
January 20, 2025	Monday	Martin Luther King, Jr. Day
January 21, 2025	Tuesday	First Day of Classes
January 25, 2025	Saturday	Saturday Classes Begin
January 27, 2025	Monday	Last Day to Add/Drop a Class
January 27, 2025	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January 28, 2025	Tuesday	W Grades Posted for Course Withdrawals
February 03, 2025	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February 17, 2025	Monday	Last Day for 50% Refund, Full Withdrawal
March 10, 2025	Monday	Last Day for 25% Refund, Full Withdrawal
March 16, 2025	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March 22, 2025	Saturday	Spring Recess Ends
April 03, 2025	Thursday	Wellness Day - No Classes Scheduled - University Open
April 07, 2025	Monday	Last Day to Withdraw
April 18, 2025	Friday	Good Friday - No Classes Scheduled - University Closed

April 20, 2025	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May 06, 2025	Tuesday	Thursday Classes Meet
May 07, 2025	Wednesday	Friday Classes Meet
May 07, 2025	Wednesday	Last Day of Classes
May 08, 2025	Thursday	Reading Day 1
May 09, 2025	Friday	Reading Day 2
May 10, 2025	Saturday	Final Exams Begin
May 16, 2025	Friday	Final Exams End
May 18, 2025	Sunday	Final Grades Due
May 19, 2025	Monday	Master's and PhD Candidate Commencement - Bloom Wellness and Events Center
May 21, 2025	Wednesday	Undergraduate Candidate Commencement - Prudential Center

Updated by Dr. E. Vataj – January 2025
Department of Physics, Physics 102 Course Syllabus, Spring 2025