

Fall 2023

## PHYS 102 - 009: General Physics I Lecture

Aabha Monga

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## DEPARTMENT OF PHYSICS

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**COURSE OUTLINE  
2023**

**PHYSICS 102 (Section 009)**

**Fall**

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### **Class Schedule**

Day and Time: Wednesday 11:30 AM to 12:50 PM, Friday 08:30 AM to 09:50 AM

Room: KUPF 104, KUPF 206

Delivery Mode: Face-to-Face (Delivery of instruction is structured around in-person classroom meeting times. Instruction is delivered in person and students are expected to attend class).

### **Instructor Information**

Instructor: Dr. Aabha Monga

Office: Tiernan Hall - 323

Office Hour: Thursday, 2 to 4 PM, or by appointment

Phone: +1 346 520 9760

E-Mail: [aabha.monga@njit.edu](mailto:aabha.monga@njit.edu)

Webex room: <https://meet330.webex.com/meet/pr26304176139>

### **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.
- Prerequisite: Satisfactory completion of two high school mathematics courses and two high school science courses.

### **Laboratory - Physics 102A**

The laboratory component of the course is Phys 102A. This laboratory course may be optional for your major; confirm it with your department. If it is required for your major, it 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. Instruction can be found on the student access code card. **To enroll for this section of the course, use course ID “vataj55078”.** **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 check the NJIT email every day.

**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, Room 255 Campus Center). 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.

<https://www.njit.edu/dos/sites/njit.edu.dos/files/Code%20of%20Student%20Conduct-Updated%20October%202022.pdf>

## 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

Students are encouraged to meet with their instructor during their office hours. Physics Department also offers tutoring as posted on <http://physics.njit.edu/>, for which students do not need to sign up but just can go to open sessions provided in the schedule.

## 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:

- **10%** Common Exam 1
- **19%** Common Exam 2
- **19%** Common Exam 3
- **32%** for the final exam
- **10%** for the total of homework work
- **10%** for the in-class participation (in-class quizzes and clickers)

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, September 20, 2023; 4:15 -- 5:15PM
- **Common Exam 2:** Wednesday, October 18, 2023; 4:15 -- 5:45 PM
- **Common Exam 3:** Wednesday, December 6, 2023; 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:** Common Exams and Final Exam are all going to be Multiple-Choice questions. Students are going to submit exam questions and scantron cards to be collected at the end of each exam. There is not going to be any partial credit for multiple-choice questions, however students are required to show work to support their answers.

**It is the student's responsibility to take the exam in the class that is scheduled.**

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, Room 255 Campus Center** for evaluation. BOTH the Physics 121 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](mailto:christine.a.oertel@njit.edu)) for arrangements.

## 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](mailto: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".

<https://www.njit.edu/dos/sites/njit.edu.dos/files/Code%20of%20Student%20Conduct-Updated%20October%202022.pdf>

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.

- Turn off all phones, wireless devices, laptops, and messaging devices of all kinds during classes and exams.
- Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
- **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).  
<https://www.njit.edu/registrar/njit-policy-recording-classes>
- 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 Fall 2023

Weeks	Lecture Topics	Text Reading	Recommended Problems
Week 1	Math Review, Introduction Measurement and Units	Appendix A-4, Ch 1, Sec 1-6	14, 18, 25, 56, 57
Week 2	Motion in One Dimension	Ch 2, Sec 1-8	3, 7, 12, 17, 19, 22, 27, 39, 43
<b>Common Exam 1 – September 20</b>		<b>Covers: Math Review, Chapter 1</b>	
Week 3	Vectors and Two-Dimensional Motion	Ch 3, Sec 1-6	3, 9, 7, 9, 15, 20, 21, 22
Week 4	The Laws of Motion - Forces and Newton’s Laws	Ch 4, Sec 1-5	3, 6, 10, 16, 23, 32, 33
Week 5	The Laws of Motion - Applications of Newton’s Laws	Ch 4, Sec 6-8	39, 47, 49, 53, 59, 63
Week 6	Circular motion	Ch. 5, Sec. 1, 2, 4	1, 4, 7, 9, 10, 24
<b>Common Exam 2 – October 18</b>		<b>Covers: Chapters 2, 3, 4, 5 (sec. 1-4)</b>	
Week 7	Energy -Work, Kinetic Energy, Work-Energy Theorem	Ch. 6, Sec. 1, 3	3, 5, 10, 17, 18, 23
Week 8	Energy -Potential Energy, Mechanical Energy, Energy conservation, Power	Ch. 6, Sec. 4-7, 9, 10	26, 27, 31, 33, 35, 42, 48, 57
Week 9	Momentum and Collisions -Momentum, Impulse, Conservation of Momentum	Ch. 7, Sec. 1-3	2, 3, 11, 15, 16, 18
Week 10	Momentum and Collisions -Collisions	Ch 7, Sec. 4-8, 10	25, 30, 37, 44, 49, 50
Week 11	Rotational Motion, Rotational Dynamics I	Ch 8, Sec 1-3	4, 10, 16, 18, 20, 21

<b>Common Exam 3 – December 6</b>		<b>Covers: Chapters, 6, 7, 8 (sec. 1-7)</b>	
Week 12	Rotational dynamics II	Ch.8, Sec. 4-8	24, 27, 30, 32, 39, 50, 55, 61, 63
Week 13	Static Equilibrium	Ch. 9, Sec. 1-4	4, 6, 7, 12, 17, 18
Week 14	The Law of Gravity	Ch 5, Sec. 5-7 (excluding Kepler's Laws)	31, 35, 37, 39, 45, 49
<b>Date to be announced</b>	<b>Final Exam</b>	Everything learned in class	

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

### Fall 2023 Academic Calendar

Sep t	4	Labor Day. University Closed
Sep t	5	First Day of Classes
Sep t	11	Last Day to Add/Drop a Class
Sep t	11	Last Day for 100% Refund, Full or Partial Withdrawal
Sep t	12	W Grades Posted for Course Withdrawals
Sep t	18	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
Oct	2	Last Day for 50% Refund, Full Withdrawal
Oct	23	Last Day for 25% Refund, Full Withdrawal
<b>No v</b>	<b>13</b>	<b>Last Day to Withdraw from Classes</b>



No v	21	Thursday Classes Meet
No v	22	Friday Classes Meet
No v	23	Thanksgiving Recess Begins. No Classes
No v	26	Thanksgiving Recess Ends
Dec	13	Last Day of Classes
Dec	14	Reading Day 1
Dec	15	Reading Day 2
Dec	16	Saturday Classes Meet
Dec	17	Final Exams Begin
Dec	23	Final Exams End
<b>Dec</b>	<b>25</b>	<b>Final Grades Due</b>