Physics 203, Fall 2023: General Physics I
01:750:203
Rutgers University Fall 2023

Course Professor and Administrator
Prof. A. Brahmia
abrahmia@physics.rutgers.edu

Active Learning Recitations Assistant
Shumaila Chishti
sfc62@physics.rutgers.edu

Office Hours (in-person and via WebEx/Zoom): TBD. Each recitation instructor will also host one in-person or online office hour per week.

Communications: Please send questions about the course to the Professor or Course Assistant using your Rutgers (ScarletMail) account.

Class meetings and Learning Management System
Two (2) 55-minute in person lectures/week in the Physics Lecture Hall (PLH), Busch Campus
One (1) 80-minute in person workshop recitation/week (see Schedule of Recitations on page 2)
Learning Management System: Canvas

Course Description: First of a two-semester physics sequence that covers the elementary but detailed analysis of fundamental topics: motion, forces, gravitation, momentum, energy, rotation, simple harmonic motion, fluids, heat, kinetic theory, and waves.

Course Overview: 01:750:203 General Physics I is a 3-credit course that provides students with a comprehensive foundation of Mechanics at an elementary level. Students who complete this course will understand the main principles and techniques, the ability to solve problems, and mastery of relevant mathematics appropriate for an introductory physics course. Physics 203 fulfills all the physics requirements for science majors, as well as admission to health profession schools and graduate schools. Students are expected to demonstrate mastery in some math such as vectors, simple derivatives, and algebra and trigonometry.

Prerequisites:
• Precalculus II 01:640:112 or Precalculus College Mathematics 01:640:115

Corequisites:
• General Physics Laboratory (01:750:205).

Requirements:
• License for the online homework software 4PAssign to access the “Online Assignments Platform.”
• Scientific or Graphing Calculator

Textbook (recommended): Cutnell & Johnson, 11th edition. This textbook is available in multiple versions:
• PRINT COMPANION-TEXT Text (ISBN: 9781119391869)
• E-Book (ISBN: 978-1119391852)
This course will focus on Chapters 1-17. Previous editions are acceptable.
Schedule of Recitations:

Students **must** attend one (1) 80-minute in person workshop recitation/week in the section in which they are registered.

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<th>Section #</th>
<th>Day</th>
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*This course meets SAS Core Curriculum Natural Science Requirements*

**SAS Core Curriculum Learning Goals for the Natural Sciences:**

- **NS-1.** Students will be able to understand and apply basic principles and concepts in the physical sciences.
- **NS-2.** Students will be able to explain and be able to assess the relationship among assumptions, method, evidence, arguments, and theory in scientific analysis.
Physics & Astronomy Departmental Learning Goals:
- Students who complete our introductory sequence of Physics courses demonstrate an understanding of Physics principles at a basic level.

Course-Level Learning Goals

1. **Physics Analysis and Ways of Thinking.** Students will be able break down a complex problem into simpler manageable steps, select and apply appropriate model(s) to analyze a given situation, apply appropriate mathematical concepts and principles, articulate a step-by-step solution, and judge how reasonable the result is within the constraints of the situation parameters.

2. **Vectors.** Students will be able to define vector quantities and vector properties, construct sums of vectors graphically and through components, and apply vector dot and cross products to a variety of physically significant situations, e.g., total displacement via vector sums, work done by a force via vector dot product, determining rotational vectors from linear analogues via vector cross product.

3. **Linear Kinematics and Dynamics: Newtonian Mechanics, Conservation of Energy, Linear Momentum.** Students will be able to characterize linear motion of objects in one- and two-dimensions, the causes of motion, and changes in motion using the models of Newton’s Laws, Conservation of Energy, and Conservation of Linear Momentum.

4. **Rotational Kinematics and Dynamics: Torques, Static Equilibrium, Rotational Kinetic Energy, Angular Momentum, Gravitation.** Students will be able to characterize motion of objects in curvy paths, the causes of rotational motion, and changes in rotational motion using rotational analogues for Newton’s Laws and Conservation of Energy and Momentum, and applications to Gravitation.

5. **Fluid Statics and Dynamics.** Students will be able to identify properties of fluids, analyze systems involving static fluids using Pascal’s and Archimedes’ Principle, and modeling and analyzing systems involving ideal fluid motion using volume flow rate and Bernoulli’s Principle.

6. **Thermodynamics.** Students will be able to identify the principles of thermodynamics with physical and chemical applications: thermal energy, heat and temperature, the three laws of thermodynamics, thermal processes, entropy, ideal gas law, and kinetic theory.

7. **Wave Motion and Wave Properties: Harmonic Oscillator, Mechanical, and Sound Waves.** Students will be able to construct and apply mathematical models of periodic motion exemplified by mass-on-spring harmonic oscillator, identify properties of traveling and standing transverse waves through matter, apply superposition and interference principles to analyze sums of waves, and analyze situations pertaining to travelling and standing sound waves.
**Course Structure**

There will be two 55-minute lectures per week in Physics Lecture Hall, Busch Campus. Each student is required to attend the one 80-minute workshop-style recitation in the section in which they are enrolled. Attendance and active participation in recitation is required. Recitations will provide an opportunity for students to work collaboratively in solving problems aligned with that week’s lectures and homework. Each recitation will end with a 10-minute quiz to assess mastery of the previous week’s lecture topics.

Homework will be assigned weekly in the Online Assignment Platform.

There will be two (2) non-cumulative in-class exams and a cumulative final exam. **All exams are closed book, closed notes.**

**Topics (covering Chapters 1-17):**

- Measurement and Motion Along a Straight Line
- Vectors and Motion in Two Dimensions
- Dynamics of Linear Motion: Newton’s Laws
- Circular Motion and the Law of Gravitation
- Center of Mass and Linear Momentum and Collisions
- Rotation and Rotational Dynamics: Rolling, Torque, and Angular Momentum
- Static Equilibrium
- Simple Harmonic Oscillators (Springs and Pendula)
- Fluids: Statics and Dynamics
- Temperature and Heat
- Ideal Gas Law and the Laws of Thermodynamics
- Mechanical waves (traveling plane wave + wave on string, standing wave on string, boundary conditions, superposition and interference)
- Sound waves (intensity, interference via path length difference, standing waves in air columns and boundary conditions, Doppler)

**Grading Scheme:**

Your final course grade will be based on a ranking system, based on your performance on the different activities in this class. Students will be periodically updated regarding their letter grade standing throughout the semester, and particularly after the common hour exams. Your final standing in the class at the end of the semester will determine your grade.

The grade distribution for this class will be as follows:

- The top 20% of the class (or 90% overall grade) will receive an A
- The next 10% of the class (or 84% overall grade) will receive a B+
- The next 20% of the class (or 77% overall grade) will receive a B
- The next 10% of the class (or 73% overall grade) will receive a C+
- Any student averaging a total grade of 62% in the class will receive a C. This is approximately the next 25% of the class.
• Any student averaging a total grade of 55% in the class will receive a D. This is usually less than 5% of the class.
• Finally, any student averaging a total grade that is less than 55% in the class will receive an F. This is usually less than 10% of the class.

Assessment

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<tr>
<th>Component</th>
<th>Weight</th>
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<tr>
<td>On-line homework</td>
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<tr>
<td>Recitation and Quiz</td>
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<tr>
<td>Midterm #1 exam</td>
<td>15%</td>
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<td>Midterm #2 exam</td>
<td>15%</td>
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<tr>
<td>Final exam</td>
<td>30%</td>
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*Lowest score(s) in category is dropped at the end of the semester. Late submissions are not accepted.

Policies

Changes: The course schedule and guidelines are subject to change. Any changes will be communicated promptly and clearly.

Recitation Makeup: If you miss a recitation because of any illness or other reasons, only ONE makeup during the semester will be allowed during the same week in a different section. To participate in a different section, you need permission via E-mail from the Recitation Course Assistant. Attendance in a different section without prior approval will result in ZERO credit for the recitation. To account for all types of absences, the Professor will drop the two (2) lowest recitation scores at the end of the semester. These dropped scores are strictly related to absences and are unrelated to student performance.

If you have been told to quarantine, or are experiencing symptoms of any transmissible disease, please do not attend in-person class meetings. Contact the Professor and Course Assistant to make arrangements for handling such absences.

Academic Integrity Policy

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume full responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

• Cheating
• Plagiarism
• Aiding others in committing a violation or allowing others to use your work
• Failure to cite sources correctly
• Fabrication
• Using another person’s ideas or words without attribution–re-using a previous assignment Unauthorized collaboration
• Sabotaging another student’s work
Use of external website resources (such as Chegg.com or others) to obtain solutions to homework assignments or exams is cheating and a violation of the University Academic Integrity policy. Cheating in the course may result in grade penalties, disciplinary sanctions or educational sanctions. Posting homework assignments or exams to external sites without the instructor’s permission may be a violation of copyright and may constitute the facilitation of dishonesty, which may result in the same penalties as cheating.

**Student Wellness Services**

The University provides a number of resources to support your physical and mental well-being. Several valuable resources and listed here and you are encouraged to contact the Professor for more guidance about university resources.

**Report a Bias Incident** If you experience or witness an act of bias or hate, report it to someone in authority. You may file a report online and you will be contacted within 24 hours. The bias reporting page is [here](http://www.vpva.rutgers.edu/).

Bias is defined by the University as an act, verbal, written, physical, psychological, that threatens, or harms a person or group on the basis of race, religion, color, sex, age, sexual orientation, gender identity or expression, national origin, ancestry, disability, marital status, civil union status, domestic partnership status, atypical heredity or cellular blood trait, military service or veteran status.

[Click here to report a bias incident](http://www.vpva.rutgers.edu/).

**Counseling, ADAP & Psychiatric Services (CAPS)**

(848) 932-7884, 17 Senior Street, New Brunswick, NJ 08901 [http://health.rutgers.edu/medical-counseling-services/counseling/](http://health.rutgers.edu/medical-counseling-services/counseling/)

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health services to support students’ efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community, and consultation and collaboration with campus partners.


**Violence Prevention & Victim Assistance (VPVA)**

(848) 932-1181, 3 Bartlett Street, New Brunswick, NJ 08901, [http://www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling, and advocacy for victims of sexual and relationship violence and stalking to students, staff, and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.
Rutgers University welcomes students with disabilities into all of the University’s educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus’s disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/getting-registered.