New Jersey Institute of Technology

Jordan Hu College of Science and Liberal Arts

Department of Physics

Course Outline	Physics 103	Spring 2025

General Information

- Description: Physics 103 is an algebra-based physics introductory college-level physics course in which students explore fluid statics and dynamics; thermodynamics; simple harmonic motion and waves; electrostatics; electrical circuits with capacitors; electromagnetism; reflection, mirrors, refraction, interference and diffraction. Through inquiry-based learning, students develop scientific critical thinking and reasoning skills.
- Number of Credits: 3
- **Pre-requisites: Phys 102 with grade C or better**
- **Co-requisites: Phys 103A (the lab course) unless previously taken**

Course-Section and Instructors:

Course-Section	Instructor
Phys 103-002	Professor H. Opyrchal
Phys 103-004	Professor H. Opyrchal
Phys 103-102	Professor A. Sirenko

Office Hours for All Physics 103 Instructors: https://physics.njit.edu/students/office

FAILURE TO MEET EITHER CO-Requisites or PRE-Requisites will result in student being dropped from class.

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

1. Comprehend the meaning of equations governing the fluid at rest and fluid in motion. Understand the extension of conservation of energy and mass equations to fluid dynamics.
2. Define temperature scales.
3. Understand the phenomena of thermal expansion and Ideal Gas Law,
4. Understand the concept of heat and comprehend the meaning of equations governing the calorimetry and heat transfer.
5. Understand the basics concepts of thermodynamics.
6. Comprehend the meaning of equations governing oscillations and mechanical waves and apply those concepts to solve related problems.
7. Understand the concept of electric charge, electric field, electric potential, and electric current. Apply those concepts to solve simply circuits.
8. Understand the basic concepts of geometrical optics and learn how to apply them for mirrors, lenses and optical fibers.
9. Comprehend the wave theory of light and apply it the phenomena of interference and diffraction.

Course material:

- **Textbook***:* "Physics: Principles with Application, Seventh Edition by Douglas C. Giancolli, Prentice Hall, ISBN – 13: 978-0-321-62592-2

- **Mastering Physics Homework System: Be** sure that your textbook is sold bundled with a Mastering Physics student access code card. Each student must enroll in the course specified by his/her instructor. Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system.

NOTE: THE LABORATORY COURSE, PHYS 103A, MUST BE TAKEN CONCURRENTLY WITH PHYS 103 THE STUDENT MUST REGISTER FOR BOTH THE LEC/REC AND THE LAB COURSE. WITHDRAWAL FROM EITHER COURSE WILL CAUSE A SIMULTANEOUS WITHDRAWAL FROM BOTH COURSES.

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

Counseling and academic support: The Center for Counseling and Psychological Services **is committed to assisting students experiencing high levels of personal challenge and stress.** If you need accommodations due to a disability please contact Associate Director of Disability Support Services.

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.

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.
Homework assignments will be posted on-line using the Mastering Physics Homework System. Please register for your section using. login: www.masteringphysics.com.

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

Grading: Final letter grades will be based on a **term average** for the semester's work that includes the three common exam scores, the final exam, the homework score, and in-class quiz score.

Here are the approximate weights to be used for calculating term averages:

- **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 (canvas quizzes)

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:

Percentage	Letter Grade
≥ 85%	A
≥75 %	B+
≥65 %	B
≥56 %	C+
≥50 %	C
≥45 %	D
< 45	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**: 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, Room 255 Campus Center** for evaluation. BOTH the Physics 103 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 103 (Section) Class Schedule for Spring 2025

	Topic	Text Study	Recommended Problems	
Week 1	Elasticity, Density and Pressure, Fluids at Rest	Chapt. 9 Sect. 5-6 Chapt.10 Sect. 1-7	p. 256 pr. 40, 45, 50 p. 285 pr. 2, 12, 14, 19, 23, 27, 34	Intro
Week 2	Fluids in Motion	Chapt. 10 Sect. 8-10	p. 285 prob. 47, 48. 49, 50, 53, 80	**A**
Week 3	Temperature, Thermal Expansion, The Ideal Gas Law	Chapt. 13 Sect. 1-8	p.385 prob. 5, 12, 15, 19, 24, 31, 39, 78	**7**
Week 4	Specific Heat, Calorimetry, Latent Heat,	Chapt. 14 Sect. 1-5	p.408 pr. 2, 13, 14, 25, 27, 34	**D**
Week 5	Transfer of Heat	Chapt. 14 Sect. 6 - 8	p.408 pr. 38, 42, 43, 54	**E**
Week 6	Thermodynamics	Chapt. 15 Sect. 1-7	p. 438 pr. 1, 18, 19, 24, 32	**F**
Week 7	Simple Harmonic Motion, Waves, Standing Waves	Chapt. 11 Sect. 1-12	p. 322 pr.3, 7, 8, 14,18, 27, 36, 37, 40, 49, 52	**G**
Week 8	Sound	Chapt. 12 Sect.1-7	p. 354 pr. 3, 4, 9, 14, 27, 28, 56, 63	**B1**
Week 9	Electric Charges, Electric Field, Electric Potential	Chapt.16 Sect.1-5, 7 Chapt. 17 Sect. 1-2	p. 468 pr. 2, 3, 19, 21 p. 496 prob. 3, 4, 6, 9	**W**
Week 10	Electric Current, Resistance, Electric Power	Chapt.18 Sect. 1-7	p.521 pr.1, 9, 13, 17, 28, 37, 47, 54	**J**

Week 11	Electric Circuits	Chapt.19 Sect. 1- 5, 7	p. 552 pr. 1, 4, 12, 15, 16, 77	**H**
Week 12	Light: Reflection, Mirrors, Refraction	Chapt. 22 Sect. 3-4 Chapt. 23 Sect. 1-3	p. 673 pr. 4, 9, 12, 25, 26, 28, 29, 72	**215**
Week 13	Light: Total Internal Reflection, Lenses	Chapt. 23 Sect. 4-8	p. 673 pr. 35, 36, 41, 43, 47, 48	**M**
Week 14	Interference, Diffraction Grating, Resolution			

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 103 Course Syllabus, Spring 2025