Boston University
PY105 Fall 2025
Physics I

Section – Room SCI B-23	Instructor	Email (put PY105 in subject line)	Office Hours & Contacts
S1 MWF 8:00 – 9:45 AM	Yumi Kim	Office hours will be shown on our course calendar. For personal matters, please contact instructors through either: 1. Direct message feature in Piazza (private) 2. Course-wide email monitored by instructors: studiopy@bu.edu Do NOT email instructors' BU emails as responses will be delayed.	
S2 MWF 10:10 – 11:55 AM	Paul Trunfio		
S3 MWF 12:20 – 2:05 PM	Nick Gross		
S4 MWF 2:30 – 4:15 PM	Jim Miller		
S5 MWF 4:30 – 6:15 PM	Raj Mohanty		
S6 MW 6:30 – 9:15 PM	Raj Mohanty		

Course Description: The CAS PY 105/106 sequence satisfies premedical requirements. PY105 covers some basic principles underlying everyday life's physics, including forces, motion, momentum and energy, harmonic motion, and heat and thermodynamics. Carries natural science divisional credit (with laboratory) in the College of Arts and Sciences. This course fulfills a single unit in the BU Hub areas: Scientific Inquiry I, Quantitative Reasoning I, Critical Thinking.

Course Overview: We invite you to join us in creating and contributing to a positive, productive, and respectful classroom culture. We have planned a course with different teaching and learning modes to foster a rich and engaging experience. Everyone contributes to an environment that shapes the learning process. All students are expected to attend classes when scheduled. Participating during class is advantageous because your active participation will help you grasp concepts and develop problem-solving skills, plus it counts toward your participation grade.

Student Expectations: Physics is a skill-based subject -- more like learning an instrument or a sport than memorizing facts. That means success doesn't come from just watching others solve problems or Googling answers, just like you wouldn't become a good soccer player by only watching videos of Lionel Messi. This course trains you to apply tools to new situations, not just repeat steps. Think of it like medicine: when a patient walks in with nausea, a doctor doesn't jump to a diagnosis; they consider multiple explanations and work through the evidence. Physics works the same way. That kind of diagnostic problem-solving takes time. We expect you to engage actively and honestly with the material. Mistakes are not just okay; they're essential to the learning process. We're here as coaches: to support, challenge, and help you grow. What we ask you is to reflect on what's working and be willing to try new strategies.

Course Resources Overview:

- Course postings, worksheets, announcements and discussion board: **piazza.com**
- Homework, lecture participation, worksheet assessments, labs, and e-Book: **tophat.com**
- Grades on Blackboard Learn: **learn.bu.edu**
- Scanned and graded quizzes and hand-in homework with rubrics: **gradescope.com**
- Course calendar: **tinyurl.com/studiophysics**
    - To add the calendar to your personal G-Calendar, click "Add to Google Calendar" on the bottom left

Required Course Materials:

- **Scientific calculator** (NOT a mobile phone app) which has sine, cosine, exponential and their inverse functions. It will mainly be used for homework assignments, exams, labs, etc.
- **Top Hat** – **tophat.com –** See Getting Started with Top Hat (below). Registration for Top Hat is available for desktop/laptop or mobile device and is a paid subscription service. You must register before the first day of class. Follow the link in the email invitation you will receive a few days before the first class.
- **Textbook**: *Essential Physics*, by A. Duffy, Volume I which is an interactive e-Book integrated with our Top Hat course. If you would like another option, we post a free PDF version.

Course Grade: Your letter grade will be assigned based on the total score you accumulate throughout the course. By staying engaged, you can accumulate points for many of these factors. Each factor will contribute as follows:

- Studio worksheets & Attendance: 14%
- Homework Assignments (hand-in + Top Hat): 14%
- Labs: 14%
- Exams: 56% - There are four, with optional final cumulative exam replacing lowest scoring exam

Grading Scale: We will use an absolute grading scale, so you are not competing with your classmates. This is designed to encourage you to help each other learn. The scale is as follows:

90.00 – 100 = A- and A
75.00 – 89.99 = B-, B and B+
60.00 – 74.99 = C-, C and C+
50.00 – 59.99 = D
< 50.00 = F

Exams (rooms TBA): There will be four exams, spaced at the end of each unit of instruction. The schedule:

Tue. Sept. 23	Exam 1
Tue. Oct. 7	Exam 2
Tue. Nov. 4	Exam 3
Tue. Dec. 9	Exam 4
Final's Week (Date TBA)	Makeup Exams

Each exam will have an announcement and details posted to Piazza the week prior and practice problems with a review. All exams are paper-based. **Except for reasons due to religious observances, there are no makeups on exams, including for illness**. To account for this, we are offering a cumulative Final Exam during finals week that will replace your lowest scoring exam (including **one** missed exam).

Makeup Policy: It is your responsibility to do all assignments, exams, and labs according to the posted schedules. Many of the assignments will routinely appear in Top Hat during the course, while dates for exams and labs are shown in the course schedule.

Attendance Policy: Attendance will be taken during each studio class using Top Hat's geo-locating feature. If you were marked absent in error, which sometimes happens, you must clear that up with your instructor by end of class. We will not over-ride attendance retroactively or based on emails.

Proprietary material: Almost all the material in the course is created by us and is copyrighted. You are not allowed to post any course material anywhere outside of our course websites. Using sites such as Chegg or Discord servers is strictly not allowed. We urge you to refrain from use of AI (e.g., GenAI, ChatGPT, etc.) for all work in this course as our worksheets and homework is geared toward helping you learn to develop skills that you will then apply on exams.

Important Registrar Dates:

- Monday, October 6, 2025 at 11:59 pm: Last day to drop without a "W" grade
- Friday, November 7, 2025 at 11:59 pm: Last day to drop with a "W" grade

PY105 Fall 2025 Course Schedule for S1-S5 (2-hour classes)* - Page 1
*** Note: S6 section follows a similar schedule except classes are 3 hours and held on Mon/Wed**

	Date	Topic	Sections (Essential Physics) & Worksheet #
-	*Mon. 9-1*	*Holiday (Labor Day)*	-
1	Wed. 9-3	Physical Laws & Vectors	Chapter 1, WS-1
2	Fri. 9-5	Motion in One-Dimension	2.1 - 2.8, WS-2
3	Mon. 9-8	Forces & Free Body Diagrams | **HW1 Due**	3.1 - 3.2, WS-3
4	Wed. 9-10	Forces in One-Dimension	3.3 - 3.9, WS-4
5	Fri. 9-12	LAB 1 – Forces Between Carts	
6	Mon. 9-15	Motion in Two-Dimensions | **HW2 Due**	4.4 – 4.5, WS-5
7	Wed. 9-17	Projectile Motion	4.6 – 4.9, WS-6
8	Fri. 9-19	LAB 2 – Projectile Motion	-
9	Mon. 9-22	Exam 1 Review | **HW3 Due**	-
Q1	**Tues. 9-23**	**Exam 1, 6:30-7:45 pm**	**Ch. 1-4**
10	Wed. 9-24	FBD Review + Friction	5.1 – 5.3, WS-7
11	Fri. 9-26	Applying Newton's 2nd Law	5.4, WS-8
12	Mon. 9-29	Applying Newton's Second Law | **HW4 Due**	5.4, WS-9
13	Wed. 10-1	Circular Motion	5.5 – 5.8, WS-10
14	Fri. 10-3	LAB 3 – Constant Acceleration	-
15	Mon. 10-6	Circular Motion & Exam 2 Review | **HW5 Due**	5.5 – 5.8, WS-11
Q2	**Tues. 10-7**	**Exam 2, 6:30-7:45 pm**	**Ch. 5**
16	Wed. 10-8	Impulse and Momentum	6.1 – 6.7, WS-12
17	Fri. 10-10	LAB 4 – Momentum & Collisions	-
!	*Mon. 10-13*	*Holiday – Indigenous Peoples' Day*	-
18	Tues. 10-14	(Mon. sched) Work & Center-of-Mass | **HW6 Due**	7.1 – 7.3, WS-13
19	Wed. 10-15	Energy Conservation & Collisions	7.4 – 7.5, WS-14
20	Fri. 10-17	LAB 5 – Energy	-

PY105 Fall 2025 Course Schedule for S1-S5 (2-hour classes) - Page 2

	Date	Topic	Sections (Essential Physics) & Worksheet #
21	Mon. 10-20	Torque | **HW7 Due**	10.3 – 10.8, WS-15
22	Wed. 10-22	Static Equilibrium	10.3 – 10.8, WS-16
23	Fri. 10-24	Static Equilibrium & Rotation	10.3 – 10.8, WS-17
24	Mon. 10-27	Simple Harmonic Motion | **HW8 Due**	12.1 – 12.7, WS-18
25	Wed. 10-29	Simple Harmonic Motion	12.1 – 12.7, WS-19
26	Fri. 10-31	LAB 6 – Simple Harmonic Motion	-
27	Mon. 11-3	Exam 3 Review | **HW9 Due**	-
Q3	**Tue. 11-4**	**Exam 3, 6:30-7:45 pm**	**Ch. 6, 7, 10, 12**
28	Wed. 11-5	Buoyant Force	9.1 – 9.4, WS-20
29	Fri. 11-7	Pressure	9.5 – 9.7, WS-21
30	Mon. 11-10	Fluid Dynamics | **HW10 Due**	9.8, 9.9, WS-22
31	Wed. 11-12	Viscosity & Drag Force	9.10-9.11, WS-23
32	Fri. 11-14	LAB 7 - Fluids	-
33	Mon. 11-17	Macroscopic Thermal Physics | **HW11 Due**	13.1 – 13.6, WS-24
34	Wed. 11-19	Microscopic Thermal Physics	14.1 – 14.7, WS-25
35	Fri. 11-21	LAB 8 - Calorimetry	-
36	Mon. 11-24	First Law of Thermodynamics | **HW12 Due**	15.1 – 15.4, WS-26
!	*Wed. 11-26*	***Thanksgiving Break***	-
!	*Fri. 11-28*	***Thanksgiving Break***	
37	Mon. 12-1	Thermodynamic Processes	15.5, WS-27
38	Wed. 12-3	Thermodynamic Cycles & 2nd Law	15.6, 15.8, WS-28
39	Fri. 12-5	Gravitation & Special Relativity	8.1 – 8.7, WS-29
40	Mon. 12-8	Exam 4 Review | **HW13 Due**	-
Q4	**Tue. 12-9**	**Exam 4, 6:30-7:45 pm**	**Ch. 9, 13 - 15**
41	Wed. 12-10	Final Class	-
-	TBD	Optional Cumulative Final (during finals week)	-

Homework Assignments: Physics is a skill-based subject and problem-solving is the core way to develop skills to be successful in the course. In short, the more problems you work through (which may mean struggling with) the better you will understand the concepts and be able to apply them to new situations. It is important to know that unlike some other courses, **it is not advantageous to memorize how to solve certain problems** we assign in hopes that bodes well for success in exams. *Exams will be about applying concepts to new situations*. Please keep that in mind when approaching homework problems.

New for Fall 2025, we have two types of homework assignments: hand-in assignments and online Top Hat assignments. We added the hand-in assignment component this year based on feedback from students asking for homework problems that help build skills directly applicable to success in exams, since exams are based on your showing step-by-step work. Both homework components are due on Mondays at 11:59 pm (see schedule below). You can always use the Course Calendar to track deadlines.

Hand-in Homework Assignments (uploaded to Gradescope): Each week's homework assignment will consist of a single page (front-to-back) with two problems. The intent here is to help you build skill in showing your work and problem solving process that we also require on exams. We see this component as a helpful exam prep. The problems will be available as a PDF and hardcopy. We urge you to try your best on your own (emulating an exam environment). We ask you to refrain from posting to Piazza on help for these hand-in problems. Please use Piazza only for clarifying questions. **There will be no extensions granted.**

Homework Assignments (on Top Hat): Each assignment will include relevant simulations and problems. **There will be no extensions granted**, so plan early and use studio time and office hours wisely (as well as posting to Piazza for tips from fellow students or open study in SCI 202). Consistent with our philosophy of learning from mistakes, **we will base your final homework score on obtaining 83% of the maximum possible points –** each homework is worth 12 points, so this equates to a perfect score being 10 out of 12. You have **five** chances to submit each answer on each online homework assignment. Use your submissions wisely. Each time you submit, Top Hat tells you whether you are correct or incorrect, and then (on the homework) you get more chances to correct anything you got wrong. In general, Top Hat expects numerical answers to be within 1% of the correct answer, so do not round off until the very end and use at least three significant figures in your answers.

The homework schedule is as follows:

Mon. Sept. 8	Assignment 1		Mon. Oct. 27	Assignment 8
Mon. Sept. 15	Assignment 2		Mon. Nov. 3	Assignment 9
Mon. Sept. 22	Assignment 3		Mon. Nov. 10	Assignment 10
Mon. Sept. 29	Assignment 4		Mon. Nov. 17	Assignment 11
Mon. Oct. 6	Assignment 5		Mon. Nov. 24	Assignment 12
Tue. Oct. 14*	Assignment 6		-	Thanksgiving Break
Mon. Oct. 20	Assignment 7		Mon. Dec. 8	Assignment 13

Both components of each assignment (on Gradescope & Top Hat) are due on Mondays at 11:59 pm

Top Hat e-book Assignments & Pre-Sessions for Extra Credit: The Top Hat e-book questions (as well as content pre-sessions) aim to incentivize you to read and practice outside of class and help you prepare for learning new concepts. Your goal is to do as many questions as you assess are required to grasp the concepts. The Top Hat e-book modules are split into parts that match the topics of each exam with due dates (exam dates). **The e-book on Top Hat is not required, but completing the e-book modules by the due date will offer you a significant grade boost at the end of the semester**.

Laboratory Experiments: All labs are assigned on Top Hat, with a pre-lab due by the beginning of class on lab day. We ask that you work in groups of 3-4 when conducting the labs. However, all written responses (analyses) must be in your own words, not copy and pasted from a group member. The lab itself is **due on Top Hat at the end of the studio class when the lab is held**. Lab schedule is as follows*:

Fri. Sept. 12	Lab 1 - Forces Between Carts
Fri. Sept. 19	Lab 2 - Projectile Motion
Fri. Oct. 3	Lab 3 - Constant Acceleration
Fri. Oct. 10	Lab 4 - Momentum and Collisions
Fri. Oct. 17	Lab 5 - Energy
Fri. Oct. 31	Lab 6 - Simple Harmonic Motion
Fri. Nov. 14	Lab 7 - Fluids
Fri. Nov. 21	Lab 8 - Calorimetry

*** Note:** The S6 section, meeting on Mon/Wed will follow a different lab schedule (typically Wednesday of the same week)

Getting support through Office Hours: The PY105 teaching staff hold about 40 office hours per week. The office hour schedule will be posted on the course's Google Calendar and Piazza. Some of the hours will be for specific types of help, content review, prior week's homework walkthrough, etc.

Getting online support through Piazza: Please ask questions about the course through the PY105 site on Piazza. You should also feel free to answer any questions posted by other students – but you should be careful to be helpful without simply giving away answers to homework questions. With all PY105 students, Learning Assistants, Teaching Fellows, and professors monitoring the Piazza site, this should be the best way to get questions answered quickly.

Getting Started with Top Hat: At the start of the semester, you will get an e-mail invitation to join your PY105 section on Top Hat. Here are the pricing options – note that, if you don't yet have an existing Top Hat subscription, the full year option is cheaper in the long run if you are planning to do PY106 with us.

Top Hat pricing options	Price (with tax extra)
No existing Top Hat subscription, one semester access	$46 (includes e-book access)
No existing Top Hat subscription, full year access	$80 (includes e-book access)
No existing Top Hat subscription, lifetime access	$125 (includes e-book access)
Existing Top Hat subscription, one semester access	$20 for the Physics 1 e-book
Existing Top Hat subscription, PY105+PY106 access	$40 for the Physics 1 and 2 e-books

Ethics Policy: As a student at Boston University, you are expected to be familiar with and adhere to the College of Arts and Sciences Academic Conduct Code. In particular, cheating on exams and quizzes or unauthorized collaboration on lab work will not be tolerated. Evidence of cheating will be reported immediately to your Academic Conduct Committee. Students found guilty of cheating on exams may be penalized by suspension or even expulsion. Link to the code: www.bu.edu/academics/policies/academic-conduct-code/