



Boston University
PY105 Fall 2024
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	cmk99@bu.edu	Office hours will be shown on our course calendar Note that while you can contact your instructor via email, it's advisable to contact instructors through the direct message feature in Piazza (which is private)
S2 MWF 10:10 – 11:55 AM	Graciela Mohamedi	mohamedi@bu.edu	
S3 MWF 12:20 – 2:05 PM	Paul Trunfio	trunfio@bu.edu	
S4 MWF 2:30 – 4:15 PM	Indara Suarez	is Suarez@bu.edu	
S5 MWF 4:30 – 6:15 PM	Graciela Mohamedi	mohamedi@bu.edu	
S6 MW 6:30 – 9:15 PM	Raj Mohanty	mohanty@bu.edu	

Course Description: The CAS PY 105/106 sequence satisfies premedical requirements. PY105 covers some of the basic principles underlying the physics of everyday life, including forces and motion, momentum and energy, torque and equilibrium, 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 each of the following BU Hub areas: Scientific Inquiry I, Quantitative Reasoning I, Critical Thinking.

Course Overview: Studio Physics is a survey course of essential physics concepts designed around collaboration, fostering a rich and engaging experience. Each studio class will generally consist of a short lecture, introducing physics concepts including simulations and physical demonstrations. All laboratory experiments are integrated into the regular studio classes. The bulk of studio time will be actively collaborating with fellow students on conceptual and problem-based worksheets, supported by teaching fellows and learning assistants. The studio classroom is a large flexible space that has round tables each seating up to nine students, with whiteboards and smart boards all throughout and hands-on experiments to explore the concepts you are learning about. By active collaboration during these studio sessions, with peer and instructor support, you should be able to reduce the amount of time you will need to study on your own as well as gauge your progress. While none of the worksheets are graded, there will be a brief assessment of your effort on each worksheet on Top Hat. This graded element is not meant to be onerous, but rather to help you keep up with the pace of the course and earn credit for your effort. Each Top Hat “assessment” is due at the end of the studio time.

Student Expectations: While it is important to work collaboratively with other students in the course, you also have to make sure that you can answer questions and solve problems on your own. We expect you to learn the material yourself - that takes time and effort - and we expect all your submitted work to be done by you. Just like you can't become a good soccer player just by watching videos of Lionel Messi or Ashley Morgan (instead, you have to practice yourself), you can't get good at solving physics problems by trying to Google the answers. We are happy to help by answering questions but, continuing the soccer analogy, think of us as coaches. You may not always get the correct answer, but that's okay, because learning from mistakes is more important than always getting the right answer.

Course Resources Overview:

- Course postings, worksheets, calendar, 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 with rubrics: gradescope.com
- Weekend office hours and virtual appointments: bostonu.zoom.us/my/buphysics/

Required Course Materials:

- **Scientific calculator** (NOT a mobile phone app) which has sine, cosine, exponential and their inverse functions. This will mainly be used for homework assignments, quizzes, 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 received.
- **Textbook:** *Essential Physics*, by A. Duffy, Volume II which is an interactive e-Book integrated with our Top Hat course. If you would like another option, we will post a free PDF version.

Course Grade: Your letter grade will be assigned on the basis of 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: 14% - based on 91% of possible total points
- e-Book Assignments: 5% - based on 50% of possible total points
- Labs: 12%
- Quizzes: 55% - five quizzes, each weighted 11%

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

Makeup Policy: It is your responsibility to do all assignments, quizzes, and labs according to the posted schedules. Many of the assignments will routinely appear in Top Hat during the course, while dates for quizzes and labs are shown in the course schedule. There are no makeups. *In exceptional circumstance please contact your professor as soon as possible to coordinate alternatives.*

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.

Important Registrar Dates:

- Tuesday, October 8, 2024: Last day to drop without a "W" grade
- Tuesday, November 12, 2024: Last day to drop with a "W" grade

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 like Chegg, Reddit, or even discord servers is strictly not allowed. Similarly, you are not allowed to post any course material to any artificial intelligence system. All students are expected to refrain from use of AI (e.g., GenAI, ChatGPT, etc.) for all work in this course. College is a space for learning to think and developing skills, and this course is specifically a space for learning skills, which includes writing and argumentation. In addition, the course material is the professor's creative work, and you have no right to upload that work to any AI systems or anywhere else.

PY105 Fall 2024 Course Schedule for S1-S5 (2-hour classes) - Page 1

	Date	Topic	Sections (Essential Physics) & Worksheet #
-	Mon. 9-2	<i>Holiday (Labor Day)</i>	-
1	Wed. 9-4	Physical Laws & Vectors	Chapter 1, WS-1
2	Fri. 9-6	Motion in One-Dimension	2.1 - 2.4, WS-2
3	Mon. 9-9	Constant Acceleration	2.5 - 2.8, WS-3
4	Wed. 9-11	LAB 1 – Forces Between Carts	WS-3.5
5	Fri. 9-13	Forces & Free Body Diagrams	3.1 - 3.2, WS-4
6	Mon. 9-16	Forces in One-Dimension	3.3 - 3.9, WS-5
7	Wed. 9-18	Motion in Two-Dimensions	4.4 – 4.5, WS-6
8	Fri. 9-20	Projectile Motion	4.6 – 4.9, WS-7
9	Mon. 9-23	LAB 2 – Projectile Motion & Quiz 1 Review	-
Q1	Tues. 9-24	Quiz 1, 6:30-7:30 pm	Ch. 1-4
10	Wed. 9-25	Friction	5.1 – 5.3, WS-8
11	Fri. 9-27	<i>No Class – President's Inauguration (Online - Applying Newton's 2nd Law)</i>	5.4, WS-9
12	Mon. 9-30	Applying Newton's Second Law	5.4, WS-10
13	Wed. 10-2	LAB 3 – Constant Acceleration	-
14	Fri. 10-4	Circular Motion	5.5 – 5.8, WS-11
15	Mon. 10-7	Circular Motion & Quiz 2 Review	5.5 – 5.8, WS-11.5
Q2	Tues. 10-8	Quiz 2, 6:30-7:30 pm	Ch. 5
16	Wed. 10-9	Impulse and Momentum	6.1 – 6.7, WS-12
17	Fri. 10-11	LAB 4 – Momentum & Collisions	-
!	Mon. 10-14	<i>Holiday – Indigenous Peoples' Day</i>	-
18	Tues. 10-15	(Mon. sched) Work, Center-of-Mass & Collisions	7.1 – 7.3, WS-13
19	Wed. 10-16	Energy Conservation	7.4 – 7.5, WS-14
20	Fri. 10-18	LAB 5 – Energy	-

PY105 Fall 2024 Course Schedule for S1-S5 (2-hour classes) - Page 2

	Date	Topic	Sections (Essential Physics) & Worksheet #
21	Mon. 10-21	Energy Conservation & Collisions	7.6 – 7.7, WS-15
22	Wed. 10-23	Torque	10.3 – 10.8, WS-16
23	Fri. 10-25	Static Equilibrium	10.3 – 10.8, WS-16.5
24	Mon. 10-28	Rotational Inertia & Quiz 3 Review	11.1 – 11.4, WS-16.8
Q3	Tues. 10-29	Quiz 3, 6:30-7:30 pm	Ch. 6, 7, 10
25	Wed. 10-30	Simple Harmonic Motion	12.1 – 12.7, WS-17
26	Fri. 11-1	Simple Harmonic Motion	12.1 – 12.7, WS-17.5
27	Mon. 11-4	LAB 6 – Simple Harmonic Motion	-
28	Wed. 11-6	Buoyant Force	9.1 – 9.4, WS-18
29	Fri. 11-8	Pressure	9.5 – 9.7, WS-19
30	Mon. 11-11	LAB 7 – Fluids & Quiz 4 Review	-
Q4	Tues. 11-12	Quiz 4, 6:30-7:30 pm	9.1-9.7, 12
31	Wed. 11-13	Fluid Dynamics	9.8, 9.9, WS-20
32	Fri. 11-15	Viscosity & Drag Force	9.10-9.11, WS-20.5
33	Mon. 11-18	Macroscopic Thermal Physics	13.1 – 13.6, WS-22
34	Wed. 11-20	LAB 8 – Calorimetry	-
35	Fri. 11-22	Microscopic Thermal Physics	14.1 – 14.7, WS-24
36	Mon. 11-25	First Law of Thermodynamics	15.1 – 15.4, WS-26
!	<i>Wed. 11-27</i>	<i>Thanksgiving Break</i>	-
!	<i>Fri. 11-29</i>	<i>Thanksgiving Break</i>	
37	Mon. 12-2	Thermodynamic Processes	15.5, WS-27
38	Wed. 12-4	Thermodynamic Cycles & 2 nd Law	15.6, 15.8, WS-28
39	Fri. 12-6	Gravitation & Special Relativity	8.1 – 8.7, WS-30
40	Mon. 12-9	Quiz 5 Group Quiz	Ch. 8, 13 - 15

Quizzes (rooms TBA): There will be five quizzes, spaced at the end of each unit of instruction. The schedule:

Tue. Sept. 24	Quiz 1
Oct. 8	Quiz 2
Oct. 29	Quiz 3
Nov. 12	Quiz 4
Dec. 9	Quiz 5 (group quiz)

Each quiz will have an announcement and details posted to Piazza the week prior, along with an equation sheet, and practice problems with a review. All quizzes are paper-based.

Homework Assignments (on Top Hat): Each assignment will include relevant simulations and problems. Solutions will be posted immediately after the due date, to help you prepare for the unit quiz. These solutions should help you verify that your approach to problem solving was valid. They should not be used as a substitute for the learning that can only come from practice doing the problems. This is especially important because there will be a homework assignment due a few hours before each quiz. **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). **Each assignment is due at 12 pm (NOON) according to the following schedule (except Assignment 13):**

Sept. 10	Assignment 1		Oct. 29	Assignment 8
Sept. 17	Assignment 2		Nov. 5	Assignment 9
Sept. 24	Assignment 3		Nov. 12	Assignment 10
Oct. 1	Assignment 4		Nov. 19	Assignment 11
Oct. 8	Assignment 5		Dec. 3	Assignment 12
Oct. 15	Assignment 6		Dec. 8*	Assignment 13
Oct. 22	Assignment 7			

Consistent with our philosophy of learning from mistakes, **we will base your final homework score on obtaining 91% of the maximum possible points (which is equivalent to dropping one assignment).**

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. Additional attempts will not be granted if you were marked wrong for rounding errors.

E-book Assignments (on Top Hat): The e-book is graded out of 50% of the possible total points (i.e., 50% points earns you 100% points). Further, all questions are graded half on correctness and half on participation, so even if you are incorrect in an answer, you will earn half points. All this means is that you should not stress about getting every answer correct or even answering every question/problem, though the more you work on, the more confidence you will likely gain. After a few incorrect answers, Top Hat will show you the correct answer as well as an explanation. The goal of the Top Hat e-book assignments is to give you some incentive to read and practice outside of class. Your goal should be simply to do as many questions **you** assess are required to grasp the concepts. The Top Hat e-book modules are split into parts that match the topics and align with the dates of each quiz. The ideal way to use the e-book is to keep up with the class material, rather than waiting until just before the due date to do it. This should help you build a routine.

Laboratory Experiments: All labs are assigned on Top Hat. All have a pre-lab that is due by the beginning of the studio class on the day the lab is held. 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:

Wed. Sept. 11	Lab 1 - Forces between carts
Mon. Sept. 23	Lab 2 - Projectile Motion
Wed. Oct. 2	Lab 3 - Constant Acceleration
Fri. Oct. 11**	Lab 4 - Momentum and Collisions
Fri. Oct. 18**	Lab 5 - Energy
Mon. Nov. 4**	Lab 6 - Simple harmonic motion
Mon. Nov. 11	Lab 7 - Fluids
Wed. Nov. 20	Lab 8 - Calorimetry

**** For the S6 section: Lab 4 is Wed. Oct. 9; Lab 5 is Wed Oct. 16; Lab 6 is Wed. Nov. 6**

Getting support through Office Hours: The PY105 professors and teaching fellows hold about 40 office hours per week. The office hour schedule will be posted on Piazza and there will be some targeted office hours for specific types of help, review, 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. You can also contact your professor (or several professors) directly and privately in Piazza as an individual message.

Extra support: If you are struggling in our course, you need more support than available in office hours and Piazza, or a personal issue arises that impacts your participation in our course, please reach out to your professor directly via e-mail (make sure to put PY105 in the subject heading). Extra academic support is also available through the Educational Resource Center physics tutors.

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/