Ph 1a Fall 2017

General Information

Lecturer

Jonas Zmuidzinas
306 Cahill, Ext. 6229, jonas@caltech.edu
Lectures are on **Wednesdays and Fridays**, 11:00 - 11:55 am, in 201 E. Bridge.

Course Administrator

Meagan Heirwegh
heirwegm@caltech.edu, Ext. 4336
101 Math Building (Building #15)

Web Page

Course information such as assignments, quizzes, exams, review sessions, instructors, etc. is available on the Physics 1a web pages. The URL is: http://www.its.caltech.edu/~tmu/ph1a/

Section Changes

The recitation sections meet on Mondays and Thursdays, starting Thursday 9/28. You are encouraged to find a recitation section that is both enjoyable and beneficial. If you decide to change sections, first get the signature of the instructor of the new section on your yellow card. Then get the course administrator to sign the drop column of the yellow card. Room assignments are sometimes changed by the instructors. Get the newest version of this PDF to make sure you have the latest information.

Textbooks

The required textbook for this course is **Frautschi et al, The Mechanical Universe, Advanced Edition**. Required reading and homework problems will be assigned from this book. The **Feynman Lectures Volumes I & II** are recommended but not required.

Homework Assignments

Homeworks will generally be due on Wednesday by 4 PM. Please use the box for your section, located just outside the lecture hall, 201 E. Bridge. Homework will be accepted starting from the afternoon before it is due until 4PM on the due date. Each HW should be labeled with the student’s name and section number. For prompt and accurate grading, please follow
the guidelines for writing your homeworks and quizzes. Graded HW will be returned on the following Thursday in Recitation. Late HW will be accepted up to one week late for half-credit, and should be turned in to the box labeled LATE HOMEWORK, also located outside the lecture hall, 201 E. Bridge. If there are extenuating circumstances (e.g. illness), you may request an extension from your TA. If granted, please ask your TA to write a note on your HW before turning it in. Solutions to the HW will be made available on the course web site.

The HW you hand in must be your own and not copied from others or from the blackboard in Recitation. You are encouraged to work on the problems with others and to seek additional help if you find that useful, but the write-up must be your own. Also, you may not consult any prepared solutions for the problems, whether they are this year’s or from previous years, or from Caltech or external sources. As a guideline for the collaboration policy, you should be able to reproduce any solution you hand in without help from anyone else. It is possible to achieve high scores on the HW but still fail the quizzes and the final exam. This indicates poor adherence to the collaboration policy. The object of the HW problems and the collaboration policy is to help you learn the material.

The problems QP1 - QP53 are from real previous quizzes and FP1 - FP23 are from previous final exams. These are found on the course web site. They are intended to help you prepare for the level of difficulty you will encounter on the quizzes and on the final. Homework problems specified by chapter and problem number (e.g. 3.10) are from the Frautschi et al. textbook.

You are certainly welcome to work through extra problems other than those assigned to gain more practice. Your TA can assist you in selecting problems.

**Quizzes**

Quizzes will be due on four Mondays throughout the term: October 9, October 23, November 6, November 20. The completed problems should be STAPLED TOGETHER and turned in at the locked box outside 201 E. Bridge. This means you need to have a STAPLER, or a good supply of BLUE BOOKS. The quiz should be labeled with the student’s name, UID number, and section number. The quizzes will generally cover the material from the previous two weeks. The quizzes will be distributed on the preceeding Wednesday at lecture. The quizzes must be worked independently without collaboration.

**Exams**

There will be a final exam covering the entire term. The final will be handed out on Wednesday, November 29 at lecture, and will be due at noon on Wednesday, December 6. There will be no midterm exam.
Grading

Your grade for the course will be determined by your performance on the final exam (40%), quizzes (40%), and homework (20%). A combined grade of 50% is required to pass the course. Your attendance and performance in Recitation and your general level of effort may be used as a basis for extra credit according to the judgement of your instructor.

Ombuds. Meeting

We would like have one ombudsperson from each House. Please feel free volunteer yourself. Those chosen should notify the course administrator of their identities.
Course Calendar

**Week 1**

9/25 Mon **Required Reading**: Frautschi Chapter 1, 3, 5 (background review)
9/26 Tues **Suggested Reading**: Feynman Vol. I Chapters 1, 2, 8, 11
9/27 Wed **Lecture #1**: Introduction
   **HW #1**: 3.13, 4.9, 5.4, QP1, QP9
9/28 Thurs **Required Reading**: Frautschi Chapters 2, 4
9/29 Fri **Lecture #2**: Free Fall and Reference Frames

**Week 2**

10/2 Mon **Required Reading**: Frautschi Chapter 6
10/3 Tues **Suggested Reading**: Feynman Vol. I Chapter 9, 12
10/4 Wed **Lecture #3**: Newton’s Laws
   **HW #2**: 6.24, 8.18, QP4, QP11, QP20
   **HW #1** due
   **Quiz #1** handed out
10/5 Thurs **Required Reading**: Frautschi Chapter 8 except Section 8.6
10/6 Fri **Lecture #4**: Forces of Nature

**Week 3**

10/9 Mon **Required Reading**: Frautschi Chapter 7 and Section 8.6
   **Quiz #1** due
10/10 Tues **Suggested Reading**: Feynman Vol. I Chapter 7
10/11 Wed **Lecture #5**: Circular Motion
   **HW #3**: 7.17, QP21, QP28, QP29
   **HW #2** due
10/12 Thurs **Required Reading**: Frautschi Chapter 9
10/13 Fri **Lecture #6**: Non-Inertial Frames

**Week 4**

10/16 Mon **Required Reading**: Frautschi Chapter 10
10/17 Tues **Suggested Reading**: Feynman Vol. I Chapter 4, 10, 13, 14
10/18 Wed **Lecture #7**: Energy
   **HW #4**: 10.21, 10.25, QP30, QP34
   **HW #3** due
   **Quiz #2** handed out
10/19 Thurs **Required Reading**: Frautschi Chapter 11
10/20 Fri **Lecture #8**: Momentum
**Week 5**

10/23 Mon **Required Reading**: Frautschi Chapter 13  
**Quiz #2** due

10/24 Tues **Suggested Reading**: Feynman Vol. I Chapters 18, 19, 20

10/25 Wed **Lecture #9**: Angular Momentum  
HW #5: 13.10, FP8, QP15, QP33  
HW #4 due

10/26 Thurs **Required Reading**: Frautschi Sections 14.1 – 14.7

10/27 Fri **Lecture #10**: Rotational Dynamics I

**Week 6**

10/30 Mon **Required Reading**: Frautschi Sections 14.10 – 14.14

11/1 Wed **Lecture #11**: Rotational Dynamics II  
HW #6: 14.5, 14.21, FP5, QP16  
HW #5 due  
**Quiz #3** handed out

11/2 Thurs **Required Reading**: Frautschi Sections 12.1 – 12.7, 14.8, 14.9

11/3 Fri **Lecture #12**: Simple Harmonic Oscillators

**Week 7**

11/6 Mon **Required Reading**: Frautschi Chapter 12.8 – 12.13  
**Quiz #3** due

11/7 Tues **Suggested Reading**: Feynman Vol. I Chapters 21, 23, 24

11/8 Wed **Lecture #13**: Oscillatory Motion  
HW #7: 12.9, FP10, FP13, QP40  
HW #6 due

11/9 Thurs **No Required Reading**

11/10 Fri **Lecture #14**: Oscillatory Motion Summary; Intro to Orbits

**Week 8**

11/13 Mon **Required Reading**: Frautschi Chapter 16

11/15 Wed **Lecture #15**: Kepler’s Laws  
HW #8: 17.14, 17.25, FP4, FP12  
HW #7 due  
**Quiz #4** handed out

11/16 Thurs **Required Reading**: Frautschi Chapter 17

11/17 Fri **Lecture #16**: Solving the Kepler Problem
Placement Exam

The summer before coming to Caltech, you received a physics placement exam. Your score on the exam was used to place you in one of the ten recitation sections of Ph1a. There are three different types of Ph1a sections:

• Sections 1 & 2: These sections are designed for students who were exposed to less physics in high school than is the norm. These sections provide extra review of basic physics, in order to bring everyone up to speed by the end of the term.

• Sections 3 - 8: These are typical sections.

• Sections 9 & 10: These are advanced sections for students who have already seen a lot of physics. They cover the material in more depth, and may include some additional special topics.

Other Physics Courses

Please visit the PMA web pages to find information on other physics courses available to freshmen.
## Ph 1a 2017 Section Instructors

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<th>Section</th>
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*Sections 1 & 2 provide extra review of basic physics.

†Section 3 is half “flipped”. The Monday session each week (starting week 2) will be held in the common area outside 469 Lauritsen. On these days, students will work practice problems in small groups or on their own. The TA will be present to provide the practice problems and to help students work through them.

‡Sections 9 & 10 cover material in more depth and include special topics.