We would like to acknowledge all of the many sources that have influenced this handbook.


- The original 2008 version of this document created by Mya Warren, Sandy Martinuk and Joss Ives

- The University of Minnesota: With their gracious permission, much of this handbook has been liberally copied and paraphrased from the University of Minnesota TA training materials. Many activities, such as the problem solving module, were also adapted directly from their course.

- The University of Maryland: For providing the videos and transcripts of TA-student interactions.

- Tomlinson Project in University Level Science Education, Faculty of Science, McGill University: For sharing their materials, advice and ideas on workshop activities, and especially for providing us with an excellent example of how to facilitate a teaching workshop.

- Teaching and Academic Growth, UBC: For financial support and advice during curriculum development.

- The Carl Wieman Science Education Initiative: For financial support and advice.

- The departments of Psychology and English for providing their handbooks as resources.

-Sophie Berkman, Liam Huber and Jonathan Massey-Allard
2013-2014 PHAS TAPD coordinators
# Contents

1 Introduction .......................................................... 7
  1.1 The Physics and Astronomy TA Professional Development Program .......... 7
  1.2 What is Physics Education Research? ........................................ 7
  1.3 Important Contacts and Resources ......................................... 8
  1.4 Important Dates .......................................................... 10
  1.5 Availability of Positions and How to Apply ............................. 10
  1.6 UBC TA Union ............................................................. 11
  1.7 International TA Resources ............................................. 11

2 Your Duties ............................................................ 13
  2.1 Teaching a Laboratory Section .......................................... 13
  2.2 Teaching a Tutorial Section ........................................... 14
  2.3 Office Hours ............................................................... 15
  2.4 Meeting with your Mentor TA ........................................... 16
  2.5 Grading ................................................................. 16
    2.5.1 Homework and Tutorial Problems .................................. 17
    2.5.2 Lab Reports .......................................................... 17
  2.6 Invigilating .............................................................. 18
  2.7 Team Meetings ........................................................... 18
  2.8 Maintaining Professionalism ........................................... 19

3 Interactive Engagement ................................................ 21
  3.1 Learner-centred Teaching ................................................ 21
  3.2 Socratic Questioning .................................................... 22
  3.3 Types of Effective Socratic Questions .................................. 23
  3.4 Techniques for Working with Groups ................................... 24
    3.4.1 Groups of Students .................................................. 24
    3.4.2 Conducting Class Discussions ..................................... 26
    3.4.3 Working the Room in Labs or Tutorials ............................ 26
  3.5 Body Language ............................................................ 26

4 Lesson Plans .......................................................... 29
  4.1 Learning Goals .......................................................... 29
  4.2 Introduction .............................................................. 30
  4.3 Conclusion ............................................................... 30

5 Solving Physics Problems ............................................... 33
  5.1 Problem Solving Strategies ............................................. 33
  5.2 Characteristics of a Good Problem ..................................... 34
  5.3 Other Teaching Tools .................................................... 35

6 Formative Evaluation ................................................... 37
# Problems and Resolution

## 7.1 Emergencies
- **7.1.1 Fire**
- **7.1.2 First Aid**
- **7.1.3 Earthquake**
- **7.1.4 Personal Security**
- **7.1.5 Other Emergencies**

## 7.2 Plagiarism

## 7.3 Truancy and Lateness

## 7.4 Student-Student Conflict

## 7.5 Boundaries
- **7.5.1 Social Media**

## 7.6 TA-TA Conflict

## 7.7 Classroom Diversity and Language

## 7.8 Students in Crisis

# First Day Checklist

---

---
Chapter 1

Introduction

1.1 The Physics and Astronomy TA Professional Development Program

The goal of the Physics and Astronomy TA Professional Development (TAPD) program is to provide you, our department’s Teaching Assistants (TAs), with the necessary instruction and resources to help you develop as educators. To accomplish this we offer both new and senior TAs various learning opportunities such as the fall training workshop, the mentor program and ongoing course-specific training. This handbook contains details on many of these topics.

The TAPD program was developed by and is facilitated by graduate students in the Department of Physics and Astronomy. Through this program, you will learn to:

1. Recognize the different ways that people learn, and be prepared to engage students in these ways.

2. Create appropriate introductions for use in the lab or tutorial.

3. Develop the ability to diagnose student difficulties and lead them through their learning via questioning.

4. Learn to analyze your own teaching, and be able to use this analysis to improve your teaching over time.

More information about the program can be found on our website http://www.phas.ubc.ca/~phas_ta/ or by contacting your TAPD coordinators at phas_ta@phas.ubc.ca.

1.2 What is Physics Education Research?

Over the last 25 years, a growing number of physicists, educators, and psychologists have been studying how students learn physics. This movement seeks to apply the tools of science to investigate what happens in our classrooms. Some of the major questions that Physics Education Research (PER) addresses are:

- What previous conceptions do students have about the physical world, and how are these affected by various types of instruction?

- What problem-solving strategies do students use, and how can these be improved?

- What beliefs do students have about physics as a science, and how do those beliefs affect the students’ performance?
How can we improve the quality of physics education?

Researchers have made significant progress in analyzing and improving physics education, and have extended their work to other areas of science. Many results from PER are now incorporated into both graduate and undergraduate physics courses at UBC. It is therefore strongly encouraged that you learn more about the current research in the field of physics. The following are good starting points (all links available via the PHAS TAPD website):

- PHAS Physics Education Research Library accessible online at [www.phas.ubc.ca/~phas_ta/perrl/](http://www.phas.ubc.ca/~phas_ta/perrl/)

- A resource letter intended to provide physics instructors - particularly graduate student teaching assistants - at the introductory university level with a small but representative collection of resources to acquire a familiarity with research in physics education for guidance in everyday instruction. The resources are in the form of books, articles, websites, journals, and organizations. [arxiv.org/abs/0808.3636](http://arxiv.org/abs/0808.3636)

- The Carl Wieman Science Education Initiative at UBC supports work at the departmental level to achieve sustained widespread improvement in learning based on evidence-based approaches. You will find a wide variety of resources on their website, from important education papers to specific classroom resources (such as on the usage of clicker questions, learning goals, etc.). [www.cwsei.ubc.ca/resources/index.html](http://www.cwsei.ubc.ca/resources/index.html)

The department also offers an excellent course which gives a nice overview of current research in physics education - Physics 520, Teaching Techniques in Physics and Astronomy. This course is a year-long seminar based course worth 2 credits and is often followed with a 1 credit independent project where you actually lead and/or participate in a PER project (often leading to publications!).

### 1.3 Important Contacts and Resources

Most questions that arise while you are TAing can be answered by your Head TA, mentor TA, the course instructor or an experienced TA. There are, however, a number of additional resources both in the department and at UBC which may be useful to you.

#### Key People in the Department of Physics and Astronomy:

See Table 1.1 on the next page.

#### External Contacts and Resources at UBC:

*The Carl Wieman Science Education Initiative (CWSEI)*

[http://www.cwsei.ubc.ca/](http://www.cwsei.ubc.ca/)

CWSEI is a multi-year project at UBC which is aimed at improving undergraduate science education through the use of scientifically proven teaching techniques. A number of resources for teachers and students can be found on their website, including documents about developing effective learning goals and links to important science education research papers. They also offer many workshops and events throughout the year.

Our department has its own CWSEI team, which is directed by Georg Rieger (rieger@physics.ubc.ca). The PHAS CWSEI team is made up of several Science Teaching and Learning Fellows (STLFs) devoted to restructuring courses and improving teaching methods. The STLFs are: Ido Roll (ido@phas.ubc.ca), James Day (jday@phas.ubc.ca), Jim Carolan (carolan@phas.ubc.ca), and Louis Deslauriers (louisd@phas.ubc.ca). You can find out more
<table>
<thead>
<tr>
<th>Title</th>
<th>Person and Contact Info</th>
<th>Areas of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Head</td>
<td>Doug Bonn&lt;br&gt;E-mail: <a href="mailto:head@phas.ubc.ca">head@phas.ubc.ca</a>&lt;br&gt;Phone: 604-822-3150&lt;br&gt;Office: Henn 343</td>
<td>• Represents the interests of the PHAS dept. in the Faculty of Science&lt;br&gt;• Advises the TAPD program</td>
</tr>
<tr>
<td>Graduate Program Chair and Graduate Advisor</td>
<td>Marcel Franz&lt;br&gt;E-mail: <a href="mailto:grad_advisor@phas.ubc.ca">grad_advisor@phas.ubc.ca</a>&lt;br&gt;Phone: 604-822-6533&lt;br&gt;Office: Henn 336</td>
<td>• The first person you should go to if you need advice with regards to your graduate studies</td>
</tr>
<tr>
<td>TA Coordinator and Undergraduate 1st Year Physics Advisor</td>
<td>Fran Bates&lt;br&gt;E-mail: <a href="mailto:ug-phys1@phas.ubc.ca">ug-phys1@phas.ubc.ca</a>&lt;br&gt;Office: Henn 329</td>
<td>• Coordinates TA appointments&lt;br&gt;• Registrations and advising in PHYS 1XX courses</td>
</tr>
<tr>
<td>Assistant to Head</td>
<td>Bridget Phillips&lt;br&gt;E-mail: <a href="mailto:phillips@phas.ubc.ca">phillips@phas.ubc.ca</a>&lt;br&gt;Phone: 604-822-0610&lt;br&gt;Office: Henn 327A</td>
<td>• Assists with departmental administrative duties and TA appointments</td>
</tr>
<tr>
<td>Graduate Program Coordinator</td>
<td>Oliva Dela Cruz-Cordero&lt;br&gt;E-mail: <a href="mailto:gradcoord@phas.ubc.ca">gradcoord@phas.ubc.ca</a>&lt;br&gt;Phone: 604-822-4245&lt;br&gt;Office: Henn 333</td>
<td>• Admissions and other administrative duties related to the graduate program&lt;br&gt;• Graduate student appointments and scholarships</td>
</tr>
<tr>
<td>Receptionist</td>
<td>Bridget Hamilton&lt;br&gt;E-mail: <a href="mailto:hamilton@phas.ubc.ca">hamilton@phas.ubc.ca</a>&lt;br&gt;Phone: 604-822-3853&lt;br&gt;Office: Henn 325</td>
<td>• Room and projector bookings&lt;br&gt;• General inquiries</td>
</tr>
</tbody>
</table>

Table 1.1: Key contacts in the Physics and Astronomy Department
about our department’s initiatives to improve physics and astronomy education at the following website: [http://cwsei.ubc.ca/departments/physics-astro.htm](http://cwsei.ubc.ca/departments/physics-astro.htm)

**The Centre for Teaching, Learning and Technology (CTLT)**


Irving K. Barber Learning Centre, 214-1961 East Mall
Email: [gillian.gerhard@ubc.ca](mailto:gillian.gerhard@ubc.ca) Phone: 604-822-9696

CTLT focuses on professional development in teaching and learning, and integration of technology into teaching and learning. They provide free workshops, such as a session on mentor training, as well as an instructional resource guide for teaching assistants (see website) and information on developing your own teaching portfolio. CTLT is a driving force behind TA training programs throughout UBC.

**Centre for Intercultural Communication (CIC)**

[http://cic.cstudies.ubc.ca/](http://cic.cstudies.ubc.ca/)

410-5950 University Boulevard
Phone: 604-827-4203

CIC’s services relate to intercultural communication, diversity and immigration. They provide training and guidance for your Head TAs and mentors regarding sensitive diversity topics. If you have any concerns or questions about these issues, you can direct them toward your Head TA or mentor.

**Campus TA Union (CUPE 2278)**

[www.cupe2278.ca](http://www.cupe2278.ca)

Email: [administration@cupe2278.ca](mailto:administration@cupe2278.ca)

The campus TA union website contains information about TA pay rates, your health rebate and other useful facts relating to your rights and responsibilities as a UBC TA.

### 1.4 Important Dates

The Faculty of Graduate studies maintains a calendar with all important dates and deadlines for graduate students. [http://www.grad.ubc.ca/deadlines](http://www.grad.ubc.ca/deadlines)

Most department specific events are disseminated via email so make sure you are on the relevant mailing lists (e.g. grads, event-notifier). For more details contact the PHAS sysadmins: [http://www.phas.ubc.ca/contact-sysadmins](http://www.phas.ubc.ca/contact-sysadmins)

### 1.5 Availability of Positions and How to Apply

You will typically be contacted several months in advance of the new academic year via email to inform you that TA applications are open. Applications are completed on an online registration form on the PHAS intranet. Accessing the application requires either a connection to the PHAS network directly within Hennings, or by using the PHAS VPN. More information on setting up PHAS VPN can be found on [http://www.phas.ubc.ca/phas-vpn](http://www.phas.ubc.ca/phas-vpn).

The PHAS TAPD program hires head TAs, mentor TAs and TAPD coordinators towards the end of the second term of the academic year. You should receive an email from the coordinators reminding you to apply. Applications and job descriptions can be found on the TAPD website.
1.6 UBC TA Union

As a TA, you are a member of CUPE local 2278. Your collective agreement provides for an effective hourly wage of either $29.57 or $30.73/hour, as of December 2012, depending on whether you are enrolled in a Masters or Doctoral program, respectively. Each “unit” of 76.8 hours, as defined by the Department of Physics and Astronomy is 1/5th of what the union describes as a full TAship. In practice these units are designed to be approximately 72 hours of work; the remaining hours are vacation pay. Any work you do as a TA counts towards these hours, e.g. the fall training session for new TAs, attending course-specific meetings, answering course-related e-mails from your students, marking, etc. Note that working more than the hours you are being paid for is a violation of your contract. This rule exists to prevent you from being exploited, but it also means that you need to be proactive and responsible about ensuring you will complete the tasks assigned to you in a timely manner. Keep a written record of your hours and if you are concerned you may run out of time, contact your Head TA or course supervisor to alert them to your concern. There are a number of solutions, including the possibility of getting paid for your extra work.

Your contract also provides for:

- Sick leave: Equivalent of 6 hours/unit sick leave. Unused leave can be carried forward one term. If you are ill, contact your Head TA and course supervisor immediately; it is the responsibility of the department to organise a replacement for you.

- Maternity leave: More complex. If needed, contact your Head TA or a member of the TAPD team for assistance setting this up.

- Conferences: Traveling to conferences is not a special part of your contract. If you need to miss work for any reason not discussed above, you are responsible for finding your own replacement. Trading labs for a week with another TA is the most common solution.

- For information on other benefits, visit www.cupe2278.ca

Being a TA is a serious and well paid job. When the department designs TA positions any training sessions and weekly TA meetings are incorporated into the TA position’s hours on a course-by-course basis. These activities are a scheduled part of your billable hours and are not to be skipped.

1.7 International TA Resources

UBC offers a variety of programs for practicing and improving English language skills. In particular, you may wish to get in contact with the Academic English Support Program (aes.ubc.ca), which offers free support and training.
Chapter 2

Your Duties

Incoming TAs are typically assigned to one of the following courses:

**Physics 100**  Algebra-based for students without high school physics

**Physics 101**  Calculus-based for non-physics science students

**Physics 102**  A second semester course building on Physics 101 knowledge

**Physics 153**  Calculus-based with a lab component for engineers in terms 1 and 2

You will be assigned to a laboratory, tutorial, marking, lecture section, or some combination of the previous. One typical TA unit represents approximately 6 hours per week, including:

- Preparation time
- Time interacting with students in the classroom and/or office hours
- Group meetings with your course-specific teaching team
- Marking

The exact amount of time you need to spend on your TA position will vary from week to week, and you may need to spend more time at the beginning as you are familiarizing yourself with the course. If you find that you are spending considerably more time than this on your TA duties, you should ask your mentor TA and/or Head-TA about ways of becoming more efficient. Your studies should not suffer as a result of your teaching.

Note that failure to fulfill your TA duties in a serious way could result in the loss of your teaching assistantship and associated funding during your graduate studies. Your Head TA and Mentor TA are available to help you throughout the term, and to assure that this does not become an issue. At the other extreme, excelling in your TA duties is highly rewarding and reflects well on the department, the university, and, most importantly, the field of physics at large.

2.1 Teaching a Laboratory Section

1. *Prepare yourself*

- Before your lab section, make sure that you are familiar with the equipment. Also consult the lab manual and experienced TAs to find out what might go wrong and what kinds of mistakes students might make. Your Head TAs are available to explain anything in the lab that you do not understand.
• Review the relevant physics covered by the lab, and how it fits in with what the students are doing in the rest of the class.
• If you found any common confusion during your marking of the last lab, decide if you will discuss it with the students.
• Have a goal for each lab session, or something specific you want your students to learn. This should be decided in your team meetings with your lab professor and the other TAs.
• Prepare an introduction to the lab addressing the above points in order to guide your students’ learning during the lab.

2. Prepare the classroom

• Make sure that you get to your lab session 5-10 minutes in advance of the class, and do not let the students in until you are ready.
• Use this time to check that the lab equipment is all there, neatly arranged, and in working order. If your lab has computer equipment, make sure that all computers are working properly.
• You may also use this time to write on the blackboard anything that will help students understand the learning focus of the experiment, and any background material they may need to know.

3. Teach the lab

• Give your introduction.
• Wander through the entire lab and monitor each group before helping any one of them. This will ensure that you can prioritize your interactions with students, and can help them most efficiently.
• Don’t automatically answer the students’ questions. Sometimes a helpful hint or a guiding question can allow them to figure it out on their own.

4. Summarize

• Before the students leave at the end of a lab, summarize the key points that they have learned by referring to the learning goals you have identified.

5. Clean up

• Make sure that the lab is in order before you leave.

More information on these points can be found in Chapter 3 Interactive Engagement and Chapter 4 Lesson Plans.

2.2 Teaching a Tutorial Section

1. Prepare yourself

• Solve the group problem in advance.
• Discuss the parts of the problem with which your students are likely to have difficulty in your team meetings.
• Be prepared to give your students an introduction to the problem, and to tell them what they will be learning with this particular problem.
2. Prepare the classroom

- Get to your assigned classroom several minutes in advance and tidy up the desks and chairs.

3. Teach the tutorial

- Remember, your job is to coach students through problem solving. Give the students feedback, a little push or a hint to get them moving if they are stuck. Do not solve the problems for them.
- Wander around the whole room to get a feel for the students’ progress before settling on any one group to help.
- Encourage the students to interact with each other to prevent dysfunctional group dynamics.
- Call on shy or reticent members to explain concepts, or ask the dominant member to explain his or her ideas to the group. Chapter 5 has more information on handling groups.

4. Summarize

- Leave time at the end of the class for a summary. Help the students make connections between what was learned in the tutorial and the students’ existing knowledge and real world experience. This will improve their understanding and retention of the lesson.

5. Clean up

- Clean the blackboard and leave the room in a tidy state.

More information on these points can be found in Chapter 3 Interactive Engagement and Chapter 4 Lesson Plans.

2.3 Office Hours

Office hours will likely be part of your TA position at some point in your career, although they are not generally required for TAs of first year courses.

Office hours are typically held in your office in Hennings or Hebb, however they may be held in another room in Hennings or Hebb, such as the TA room in the basement of Hebb (Hebb 2), if you work at one of the labs elsewhere on campus or off campus (eg. AMPEL, TRIUMF or VGH) and do not have an office in one of the physics buildings.

The following are some tips on productive office hours:

- Prepare a clean space for students to sit and work out problems.
- The problem solving tips in the section on tutorials apply here as well: do not do the students’ homework for them!
- This is your chance to interact one on one with your students, and may help you to identify gaps in their knowledge that you may want to bring up for the whole class in your next lab or tutorial section.
2.4 Meeting with your Mentor TA

As a first year TA, you will formally meet with your Mentor TA a few times over the course of your first semester teaching. These meetings fall into two observation cycles. The first observation cycle involves an observation by your mentor TA, and the second cycle can either be a peer-observation with another new TA facilitated by your mentor TA, or another observation by your mentor TA.

The meetings for each of these cycles are as follows:

1. First Observation Cycle

   - **Pre-observation**: Meet early in the term to set goals for your teaching improvement over the semester. Your mentor will use this discussion to focus his/her observation, and as a starting point for giving you concrete feedback for improving your teaching.
   - **Observation**: Your mentor observes you teach a lab or tutorial.
   - **Post-observation**: Meet to discuss the observation. Your mentor TA will discuss the class he/she observed, and give you feedback. Based on the observation and feedback you and your mentor TA will discuss either refining your improvement goals, or making new ones if the first were entirely met.

2. Second Observation Cycle

   - **Pre-Observation**: Either over email, or in person, discuss your teaching goals with your peer-observation partner, or mentor TA. You will use your experience from the first observation to update your teaching goals.
   - **Observation**: Your mentor either comes to observe you again, or coordinates a peer-observation between you and another TA.
   - **Post-Observation**: Meet with your mentor (and peer, if applicable) to get (and give) feedback on the second round of observation. Your mentor will also collect feedback from you about the program.

You may also arrange to observe your mentor teaching. You are strongly encouraged to make time for this observation, as it will give you an opportunity to see an experienced teacher in the classroom. This can be done at any point in the process.

Your mentor TA is also available by appointment on other occasions. You may use these meetings as an opportunity to discuss problems with your students, grading, classroom management, or anything else pertaining to your teaching duties. In addition to providing guidance on teaching matters, your mentor is also available to offer guidance on other issues related to graduate student life. Even if your mentor does not have the answer to your question, he/she has the resources to direct you to someone who does.

2.5 Grading

Grading makes up a significant portion of the time spent TAing any course. However, each course you TA will make different decisions on how homework and labs will be collected and graded. You may be grading every week, or only a few times a semester. Most grading occurs in the form of either tutorial or homework problems, or lab reports. In either case, the following are some generally important points to keep in mind about grading:

- Grading is vital feedback for our students and is most effective if it is given very soon after they have submitted their work. Try to return homework and labs within one week of collecting it unless otherwise specified by the professor in the course.
• A marking rubric should be worked out with your teaching team to ensure consistency and proper feedback for the students. You should ensure that your students are given the rubric by which they are marked.

• You may be asked to create a solution key for your students. A well-written solution can have a significant impact on your students’ problem-solving skills. Ensure that your worked solutions show proper problem-solving technique (see Chapter 5).

• You will be responsible for keeping the class scores, possibly until the end of term or whenever the professor asks for them. This typically involves regularly uploading grades to an online service like Blackboard WebCT/Vista or simply keeping a spreadsheet on your computer. If you are keeping a spreadsheet on your computer, be sure to back it up so that your students’ grades are not lost.

• Keep track of the common errors, and go over them in class to avoid seeing them again!

2.5.1 Homework and Tutorial Problems

These are some tips specifically to help you with grading tutorial or homework problems:

1. Mark only one question at a time, rather than the entire problem set for each student.

2. Work out the problem yourself in advance.

3. Initially, quickly read over many students’ answers to get a feeling for the range of answers, and most common mistakes.

4. Categorize each paper into piles by the letter grade the student will most likely earn on the problem (A, B, C, D). This is supposed to be a quick procedure! When you look at the solutions in detail you’ll figure out if you misplaced one of them, so don’t worry too much about it.

5. Mark each pile separately and in detail. It is usually easiest to start with the “A” pile. Some of the criteria to use while grading each question are:

   (a) How clearly does the solution communicate reasoning?

   (b) Does the solution use correct concepts, such as major equations, vector analysis, diagrams, etc.?

   (c) Non-physics approaches where the student makes a major conceptual mistake, or is obviously fishing for equations should get no more than 20%.

It might seem like some of these steps are redundant, but a little preparation is guaranteed to save you the time and embarrassment of going back and changing marks after the fact.

2.5.2 Lab Reports

All of the tips for grading problems also hold true for labs, but lab reports may also be graded for written communication because an essential part of being a scientist is communicating results clearly. These are some additional criteria to keep in mind while grading the writing in lab reports:

1. **Content**: Has the student included technical or scientific content accurately and thoroughly? Does the student address accurate information such as definition, formulas, theorems, explanations, or data?
2. **Context**: Has the student communicated the information appropriately for the context in which the document / presentation / visual will be received? Have the requirements of the assignment been met?

3. **Audience**: Has the student addressed the audience with appropriate language and technical content, vocabulary, level of knowledge, and register (informal or formal)?

4. **Purpose**: Has the student identified the purpose of their communication, such as to inform, persuade, instruct, or demonstrate?

5. **Support**: Has the student included appropriate support in the form of documentation, facts, statistics, formulas, illustrations, or evidence?

6. **Design**: Does the student use effective design, both for page design and for the integration of verbal explanations and visual illustrations? Does the student display neatness and cross-references at appropriate points?

7. **Organization**: Has the student organized the communication into logical sections, paragraphs, topic sentences, and headings?

8. **Expression**: Has the student expressed written work clearly, efficiently, and effectively, and has the student used correct grammar and mechanics?

### 2.6 Invigilating

As part of your TA position you will be required to invigilate a final exam, and possibly midterm exams as well. The schedule for invigilating final exams will be sent out by email in advance of the exam date, typically in November for fall exams, and March for spring exams. Invigilation hours are counted in your TA hours for the semester. *Do not make plans for vacations or trips home until you have seen the final exam schedule.*

Your duties will be to:

- Answer questions from students during exams. The types of questions that are appropriate for you to answer should be worked out with the professor in advance.

- Ensure that there is no cheating. If you suspect cheating is occurring, **do not** confront the student yourself. Let the supervising professor know, and give him/her any evidence that you can provide.

### 2.7 Team Meetings

The timing of your team meetings may vary depending on your course, but you should expect to attend a team meeting weekly or bi-weekly. The purpose of the team meetings is to help you prepare for labs and tutorials, and to ensure good communication between the members of the teaching team.

During team meetings you will:

- Discuss what to emphasize in the next tutorial or lab section.

- Trade information on what students understand, and any common problems they encounter. This is where you are the most important member of the team, as you have the most direct contact with the students. Make notes of your observations of the students for this meeting. Experienced TAs and Head TAs can also play an important role by informing you of any common pitfalls or issues that arise, so that you can prepare for these situations in the coming lab or tutorial.
• Learn if the labs or tutorial material is behind or ahead of the lecture material so that you can modify the introduction to your section accordingly.

• Have a space to discuss any issues you are having with the students or the course, as well as to share ideas you have about teaching. Your input is very valuable to lab and course design, and may be used to improve the course, labs or tutorials in the future.

2.8 Maintaining Professionalism

Some aspects of maintaining professionalism were discussed previously in this chapter with a description of your duties, but professionalism extends beyond the workplace and billable hours. The classroom, people’s intelligence, and learning are all very sensitive issues, so it is critical to maintain a certain level of sensitivity even outside the classroom. This means you must be very careful when discussing students. As a rule of thumb: don’t. Always keep in mind that you are representing the department and the university, and behave accordingly.
Chapter 3

Interactive Engagement

This chapter discusses some methods for effective teaching, and how to incorporate these methods into your classroom.

3.1 Learner-centred Teaching

Reflecting on Your Own Learning Experiences:

You were an undergraduate student at one time, and probably took courses and labs that are similar to the ones your students are taking now. This means that reflecting on your own learning experiences can allow you to develop teaching practices and attitudes that you found helpful while first learning physics. Some questions to think about are:

- What qualities did you appreciate in teachers and TAs you had in the past? What characteristics did you not like in past teachers and TAs?

- What was helpful for your learning? What was detrimental to your learning?

- What was a positive (or negative) learning experience you had as a student? What made this experience positive (or negative)?

- How was the information exchanged between the teacher and you, and how did you feel about the information?

While thinking about how to apply your answers to your classroom keep in mind that some of your students have come from different backgrounds, and that their opinions may differ from your own. Reflecting on these questions, however, will give you some ideas about how to create a positive learning environment for your students.

Learner-centred vs. Teacher-centred:

In the Department of Physics and Astronomy, learner-centred teaching techniques are encouraged over teacher-centred methods. These approaches are described in the following table.
<table>
<thead>
<tr>
<th>Learner-centred</th>
<th>Teacher-Centred</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Teaching is providing opportunities to work with content and construct meaning</td>
<td>• Teaching is a flow of information from educator to learner</td>
</tr>
<tr>
<td>• Knowledge is constructed within the learner</td>
<td>• Knowledge is static and can be transferred</td>
</tr>
<tr>
<td>• Instructor provides some guidance, but allows students to learn from their own discoveries</td>
<td>• Information given by the instructor should not be questioned or challenged by the learner</td>
</tr>
</tbody>
</table>

Our department is focusing on learner-centred methods because research in science education has shown that it is effective. Using this approach students retain knowledge better and their understanding is greater. Through interactive activities, students are able to discover concepts on their own and control their own learning. One example of a learner-centred approach is the use of socratic questioning, which is described in sections (3.2-3.3) of this handbook. Other examples include the use of peer instruction through clicker-questions in lectures (Crouch and Mazur, *Am. J. Phys.* 69 (9), 2001), and invention activities (Schwartz and Martin, *Cog. Inst.*, 22 (2), 2004, pp. 129-184). Another excellent example of learner-centred approach was implemented recently in a physics class right here at UBC (Deslauriers, Schelew, Wieman, *Science*, 332 (6031):862-64, 2011). The study even involved one TA from our department!

### 3.2 Socratic Questioning

When a student asks us a question our first impulse is often to simply to answer in the most straightforward way. However, this is usually not the most effective way of building the student’s understanding. Socratic questioning will instead lead students to the right answers by using their own reasoning while systematically unearthing and addressing their misconceptions. It will also help students learn to refine their own questions which has a beneficial impact on their learning skills. This method was introduced in a module during the fall TA training workshop. The following sections will give you some tips to help you develop your own questioning skills, but the best way to learn is by practicing.

As you develop your questioning skills it may help you to keep in mind some techniques that experienced teachers use to help students clarify their thinking. They do this by:

- Posing thought-provoking questions. More detail on these questions will be given in the following sections.
- Rephrasing or asking additional questions.
- Keeping the discussion focused.
- Encouraging students to explain things to each other.
- Ensuring that students consider each view. No views should be cut off, ignored, or unfairly dismissed.
• Breaking big questions or tasks into smaller, more manageable parts.
• Helping students to identify what they need to know.

Some tips for more effective socratic questioning include:
• Phrase the questions clearly and specifically.
• Wait silently for at least 5 to 10 seconds for students to respond.
• Be sure to identify and reinforce the students’ correct thinking.
• Draw attention to aspects of their explanation that are unconvincing.
• Don’t bother with yes/no question because they do little to promote thinking or encourage discussion.
• Avoid questions that are vague, ambiguous, or beyond the level of the students.

3.3 Types of Effective Socratic Questions

Effective Socratic questions often fall into one of four categories. Familiarizing yourself with the definitions of each of these categories as well as the example questions can help you to develop thought provoking questions specific to the course you are teaching.

The categories are:

1. Questions of Clarification
   These questions help you to diagnose the students’ current thinking, a necessary step before you can formulate a plan for teaching them. Examples include:
   • What do you mean by that?
   • Could you elaborate on that?
   • What is your main point?

2. Backward-Thinking Questions
   These questions probe assumptions or reasons that have led to a present impasse or misconception. Examples include:
   • What are you assuming about this question?
   • Can you think of an alternate assumption that might be reasonable?
   • What are your reasons for saying that?
   • Do you have any evidence for that?
   • How did this come about?

3. Forward-Thinking Questions
   These questions probe implications, consequences, or goals. Examples include:
   • What are you implying?
   • What effect would that have?
   • What does this question ask us to evaluate?
   • Will that step move you closer to your goal?
   • Can you think of a strategy we could follow to answer this question?
   • What experiment or measurement could we do in order to answer this question?
4. Problem Solving Questions

These questions encourage the use of the problem solving methodology, which will be described in more detail in Chapter 5. The following are examples broken down by the steps in the problem solving method:

- **General**
  - Which step of the problem-solving method / lab instructions are you working on?
  - Did you successfully complete the earlier steps?

- **Interpret the problem**
  - Can you describe the problem in your own words?
  - Have you tried to draw a picture to visualize the situation?
  - What do you know about this problem?

- **Identify the relevant physics concepts**
  - What physical effects are relevant to this situation?
  - What’s the goal of this problem? Are there particular types of physics that are relevant to that goal?
  - What forces are acting on this object?
  - What additional information do you wish you knew? Why?

- **Define physics assumptions and relationships**
  - Do you think that all of the given information is relevant to solving this problem? Why or why not?
  - What kind of assumptions could you make to simplify this situation? Do you think those would be reasonable to make?
  - Does the physics of this problem imply any relationships between variables?

- **Solve**
  - Could you check this algebra somehow?
  - Are you using consistent units?

- **Check your answer**
  - Does the magnitude of this answer make sense?
  - Can you think of a similar situation that might give you a clue about how big the answer should be?
  - Can you think of a simple way to test this answer?
  - With this test, did your output increase or decrease? Does that make sense considering the given change in the input?

3.4 Techniques for Working with Groups

3.4.1 Groups of Students

If the course assigns students to groups, be sure to explain why this is done. It may take the students a while to get used to group work, as they likely have little (or negative) experience with it so far. Students may resist at first, but persevere! The rewards of learning in groups are well documented.

We tell our students that:
No matter what career you enter, you will have to work cooperatively with many different kinds of people, and not just your friends. This class will give you an opportunity to learn how to work comfortably and successfully in groups.

**Setting up groups:**

If you are responsible for assigning groups, use the following guidelines to ensure good group functionality:

- Choose groups with a small number of students to minimize the tendency of one student to “drop out” and participate minimally. Exact group size will vary from course to course.

- Assign group of mixed ability levels. The resulting discussions will be mutually beneficial for all group members. Groups of uniformly strong students tend to over-complicate things.

- Assign groups of mixed major. That is, avoid putting three arts students in one group and three biology students in another.

**Encouraging group communication and participation:**

- Persuade groups to resolve disagreements by reaching a consensus, rather than simply voting.

- Encourage them to discuss with each other instead of working independently and checking their answers.

- Inquire if groups have reached consensus.

- Remind students of their individual and group accountability (i.e. what they do and learn counts for marks!).

- Convince students that teaching each other is the best way to learn something.

- If students only need to turn in one assignment per group, ask them to put away all but one pencil. Only one person needs to be writing, and the others should be discussing.

**Diffusing group conflict:**

- Encourage group members to agree on standards of behaviour as a preventative measure.

- Ask students explicit questions about how their group is functioning and why they are having problems.

- Encourage students to consider how they might improve their group functionality in the future.
3.4.2 Conducting Class Discussions

Some tips for conducting class discussion include:

- Ask an open-ended question.
- Listen for the answer.
- Paraphrase, or ask the same student or another student to elaborate.
- Periodically summarize (e.g., on blackboard or document projector) what has been discussed.
- Draw as many students as possible into the discussion.

3.4.3 Working the Room in Labs or Tutorials

Some tips for circulating through the room, and interacting with all of your students over the course of the class include:

1. Circulate through the room, listening to students’ conversations
2. Diagnose difficulties with physics concepts
3. Diagnose difficulties with group functioning
4. Is the entire class confused about the same thing? If so, stop the class and discuss.
5. Does a group have the same problem that you’ve already worked through with another group? Get the first group to explain it to the second. Everybody will benefit from interacting with their peers, and it will free up more of your time.
6. Coach the group that needs the most help first.
7. If you spend a long time with one group, circulate around the class to diagnose before you intervene again.

3.5 Body Language

Spoken word is only one of the ways we communicate with each other; body language is also very important. When you are working with students, there are a number of ways you can use body language to reinforce the learner-centred teaching philosophy, and make the learning experience more relaxed and enjoyable.

1. Seeing eye to eye
   If you are taller/shorter than your students while they work at their desks, adjust your height so that your eyes are at approximately the same level. This will create a more egalitarian feeling to your conversations and make the process of guided questioning more natural.
2. Engagement
   Be engaged with your students while having conversation with them; face them while they speak and make regular eye contact.
3. **Openness**
   Remember to always maintain open body posture, avoiding crossed arms etc. This helps to foster a non-judgemental atmosphere.

4. **Personal space**
   Be sensitive to the non-verbal messages you are receiving from your students. You want to sit close enough to hear and display interest, but be aware that each individual will have their own concept of personal space.
Chapter 4

Lesson Plans

As a teaching assistant, you probably will not be designing the lessons for the labs or tutorials, however, it is your job to frame the class so that the students get maximum benefit from the planned activities. The essential elements of a lesson are:

1. Introduction
2. Activities
3. Summary

In addition, at all times in the lab or tutorial it is important to make the learning goals, or what the students should be learning in the lesson, clear. The activities portion is prescribed by the lab manual or the tutorial problem, and your main responsibility will be to coach the students individually and in groups using questioning, as described in sections 3.2 - 3.3. In this chapter we will complete the picture and discuss the learning goals, the introduction and the summary.

4.1 Learning Goals

A critical element of an effective lesson is the formulation of clear, well-defined learning goals. It is essential that both you, the instructor, and your students have a clear idea of what they are supposed to be learning. Novices do not have the organizational structure to differentiate between what is important to know in a lesson and what is just an interesting aside. You can provide that structure for them by communicating the learning goals to your students.

Learning goals are beneficial for a number of reasons:

- Students have a clear idea of what is expected of them in order to obtain a good mark.
- Learning goals provide a study guide so students can focus their learning and studying on relevant material.
- Learning goals also make marking much easier for you as a TA, as they provide a marking guide.

In general, the learning goals will be decided by the faculty in charge of your course and will be communicated to you in the team meetings. They should be formulated as a statement of what the student should be able to accomplish at the end of the lesson.

Some examples of learning goals are:
• At the end of this lab, you will be able to use an oscilloscope to measure the period of a wave.

• At the end of the tutorial, you will be able to mathematically describe the properties of simple harmonic motion.

4.2 Introduction

The introduction to a lab or tutorial has many purposes:

1. Motivate the lesson
   This part of the introduction should answer the questions:
   • Why should the students care about this lesson?
   • How does it relate to the real world?
   • How does it relate to what they have already learned?

   Keep your audience in mind. An effective motivation may be different for life-sciences students and for engineers.

2. Focus the lesson
   This part of the introduction should:
   • Introduce the learning goals.
   • Let students know what they will be doing during the class. An outline is often helpful.

3. Give introductory information
   This part of the introduction should answer:
   • How does this piece of equipment work?
   • What are the fundamental equations and concepts to focus on?

4. Find out what they know or don’t know
   It is unwise to assume that the students know something just because they have seen it in the lecture! Asking the students about what they know in advance can save them much confusion during your introduction and lesson.

Prepare your introduction in advance of your class and practice until you are comfortable giving it.

4.3 Conclusion

The closure of the lesson is as important as the beginning. Instructors who pay relatively little attention to closure of a lesson have endings such as the following:

• Uh-oh, it looks like we’re out of time. See you tomorrow.

• That’s it for today!

• Gee, there goes the bell!
Statements like these do end the session but they do little else. Just as your introduction must gain the learners' attention and focus it to prepare them for learning, it is important for your conclusion to summarize, review or highlight the learning goals in order to draw the lesson together. In a sense, the opening helps the students prepare themselves for the learning that will take place, while the closure helps them organize the material so they can retain it.

**Important aspects of a conclusion:**

1. **Review Learning Goals**
   The students have experienced many things during the previous activities, and now is the time to refocus their attention on the learning goals.

2. **Organize Students’ Knowledge**
   Make reference to how this lesson fits with what they already know. If possible, also link it with future tasks they will be expected to perform.

3. **Formative Evaluation**
   The end of the lesson is a good time for you to assess how well the students have actually learned what you intended. Formative evaluation (see Chapter 6) will let you know if your lesson has succeeded.

Although often overlooked as students rush to finish on time, a conclusion is very important to help the students construct knowledge out of the lab or tutorial in which they have just participated. Make sure your students leave the lab with a clear idea of what they learned, or they may soon forget.
Chapter 5

Solving Physics Problems

Learning to solve problems is a major goal of introductory physics classes, even though it will typically not be on the syllabus. It is generally assumed that problem solving is a skill that students pick up on their own through practice problems that we give them. However, if the students are practicing bad problem solving technique, they continue to be bad problem solvers. Our students predominantly solve problems through a process of pattern-matching the question type, and equation hunting in the end of chapter summaries. Most of you became adept problem-solvers on your own, however, it is a good idea to remember that physicists are the exception rather than the rule!

5.1 Problem Solving Strategies

What does it mean to be a good problem solver? Researchers have developed several general problem solving strategies for physics. At UBC, we will follow one such strategy.

An expert problem solver will:

1. **Interpret the Problem**
   This involves:
   - Visualizing the events described.
   - Sketching a picture.
   - Identifying the goal of the problem.

2. **Model the Problem**
   This involves:
   - Identifying the physical principles that are relevant to this situation.
   - Stating any simplifying assumptions.
   - Drawing one or more physics models, such as:
     - Special diagrams (free-body diagram, energy bar-chart, motion diagram etc.).
     - Graphs of physics quantities.
     - A statement of limitations or constraints.
     - A list of given information, including definitions of relevant symbols.

3. **Plan a Solution**
   This involves:
• Translating the physics model into equations which represent the problem mathematically.
• Assessing how to solve these equations, and whether there is enough information present to give a solution.

4. Solve
This involves:
• Inserting the relevant quantities and solve for the answer.

5. Check Your Answer
This involves:
• Checking that the formula gives the correct units
• Comparing the answer to existing experience.
• Checking for reasonableness and completeness.

Now that this problem solving method is defined, what are some methods for teaching this technique to our students? One way is to demonstrate the full technique when we work out problems for them in lecture or in homework solutions. If the students know the problem solving technique, they are more likely to use it. We can also help them practice good problem solving technique through the use of guided questions when they come to us for help. Some questions we can ask are detailed in Section 3.3.

5.2 Characteristics of a Good Problem

Another way we can help our students to learn problem solving is to give them good problems to practice with. We distinguish between problems and exercises. If you know the outline of your solution soon after reading the problem, then it is an exercise. If applying the single right formula is sufficient to solve the problem, then it is an exercise. Problems force you to try to reach the goal step by step, not in one step, and to make subjective decisions about the appropriateness of your approach along the way. For example, long division is an exercise once one is taught how to do it. Similarly, after students are taught the equation $F = ma$, asking them to calculate one of $F, m,$ or $a$ given the other two is an exercise. When students tell you they don’t know how to get started, the question they are solving is a problem for them. Many perfectly good problems for undergraduate students are exercises to you, and differentiating between the two takes experience and observation of your students.

Good problems should encourage students to:

1. **Consider physics concepts in terms of real objects in the real world**
   • This helps students practice connecting “physics knowledge” with the real world.
   • Avoiding physics cues such as “inclined plane” and “frictionless surface” also prevents students from using a memorized solution pattern to solve the problem.
   • Taking out some relevant numbers and making the students estimate the quantity from their own experience will reinforce their real-world intuition.

2. **View problem solving as a series of decisions**
   • This can be accomplished by making the students decide which information is relevant and which is not by, for example, including excess information that isn’t needed in the problem or replacing terms like frictionless and massless by slippery and light.
3. Use their conceptual understanding of the problem to analyze the situation before the mathematical manipulation of formulas

- Making the problem difficult to understand without drawing a diagram, and making the situation as real as possible helps students in the visualization process.
- Students are forced to practice visualization if no picture is given to them! Removing all diagrams in the problem will reinforce this.
- The problem should require at least two equations to solve. This can be done by changing the target quantity (i.e. velocity to time or acceleration to force), or the initial conditions for example.

As a TA, you may not have much control over the questions asked in assignments and tutorials, but it is very simple to change a textbook exercise into a good problem and your professor will often appreciate suggestions. Also, when helping your students one on one, you can rephrase questions in terms of real-life problems to make them more interesting and easier to connect with their experience.

5.3 Other Teaching Tools

In a tutorial, we can encourage proper problem solving rather than equation hunting by giving the students the equations we want them to use. For example, you can provide for your students the fundamental equations and principles for mechanics problems and separate them from (or simply omit) the equations that apply only under certain conditions. This list can grow as the students learn more concepts.
Chapter 6

Formative Evaluation

Formative evaluation is a form of classroom assessment that provides both you and your students with useful feedback on the teaching-learning process. The more you know about what and how students are learning, the better you can plan learning activities to structure your teaching. Formative assessment differs from summative assessment in that it is aimed at course improvement, rather than at assigning grades. The primary goal is to better understand your students’ learning so to improve your teaching. To maximize the benefit of formative evaluation, it is important to let the students know that you have reviewed their feedback and that you will incorporate it into future lessons.

This is a small list of formative feedback techniques that are easy to use in the physics and astronomy classroom, laboratory or tutorial section. Descriptions of the formative feedback techniques below were taken from [4] and the following online resources, which have many more techniques you might like to try when you are teaching:

http://www.flaguide.org/cat/cat.php
http://www.siue.edu/~deder/assess/catmain.html

Minute Paper:
During the last few minutes of the class period, ask students to answer on a half-sheet of paper a question such as: “What is the most important point you learned today?”; or, “What point remains least clear to you?”. The purpose is to elicit data about students’ comprehension of a particular class session. Afterward, review responses and note any useful comments. During the next class periods emphasize the issues illuminated by your students’ comments.

Stop-Start-Continue:
Like the minute paper, this is a very quick and simple form of formative evaluation. It is based on the traffic light and consists of you asking the students to answer the following three questions on a small piece of paper:

- What would you like me/us to STOP doing in class because it is not helping your learning?
- What would you like me/us to START doing because you believe it would be beneficial to your learning?
- What would you like me/us to CONTINUE doing because it is working?

Self-Confidence Survey:
This technique is used to help the students identify and communicate their academic anxieties by rating their confidence in understanding specific concepts, performing specific tasks
or using specific laboratory equipment. For example:

How confident do you feel that you can achieve the following? (Circle one response for each statement.)

- Use an oscilloscope to measure the switching frequency of an AC voltage supply:
  Very, Somewhat, Not Very, Not At All

- Explain Newton’s laws to a friend that has never studied physics:
  Very, Somewhat, Not Very, Not At All

**Directed Paraphrase:**
Ask the students to summarize a concept or idea and direct this summary toward a specific audience. Asking them to paraphrase requires them to generate a new way to express the concept. Asking them to direct it toward a specific audience reveals whether the student understands the concept within the specified framework. An example is to ask them to explain Newton’s third law to a friend that has never studied physics.
Chapter 7

Problems and Resolution

This section discusses procedures for several emergencies as well as strategies to consider should interpersonal problems arise.

7.1 Emergencies

The following procedures are summarized from [www.emergency.ubc.ca/procedures](http://www.emergency.ubc.ca/procedures) where more detailed and extensive information can be found.

Important contacts:

<table>
<thead>
<tr>
<th>Fire, Ambulance, Police, Hazardous Materials Response</th>
<th>911</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Security</td>
<td>604-822-2222</td>
</tr>
<tr>
<td>Campus First-Aid</td>
<td>604-822-4444</td>
</tr>
<tr>
<td>Poison Control Center</td>
<td>604-682-5050</td>
</tr>
</tbody>
</table>

7.1.1 Fire

If you see a fire:

- Activate the fire alarm, alert others, and move everyone away from the area of the fire, closing doors behind you.
- Call 911 and report location of fire.
- Use a fire extinguisher on small fires only if it is safe to do so. Aim the extinguisher at the base of the flames.

When a fire alarm is activated:

- It *must* be treated as a real emergency.
- Evacuate the building and proceed to your emergency meeting location.
  - Before you teach your first class, please familiarize yourself with the fire map and emergency meeting location for the building where your class is held. For Hennings, fire maps can be found throughout the building and the emergency rally location is on East Mall between Hennings and the IKB Learning Center (1st and 3rd floors) and in the south-west corner between Hennings and the Chemistry building (2nd floor). For Hebb, a fire map can be found near the north stairwell
on each floor and the emergency meeting location is in front of the Hebb theatre on East Mall.

- Never open a closed door without checking it first for heat. If the door is hot, do not open it. If not hot, open it slowly, standing behind it to one side, and be prepared to shut it quickly if fire is present.
- Use the stairway, proceeding down to the ground floor, never up. *Never use elevators* if fire is suspected.
- Once outside, proceed to the predetermined area so that a head count can be taken.

**If clothing catches on fire:**
- Someone else’s: Smother the flames with a coat.

### 7.1.2 First Aid

If someone requires first aid use the following procedures.

**Assess:**
- Before starting any first aid, always ensure that there is no further danger to the victim or to yourself.
- Determine the severity of the injury/accident and whether it requires 911 emergency response. Always err on the side of caution.

**Get Help:**
- Whenever possible, get your faculty representative or a health care professional to administer aid. e.g. Jon Nakane, Hennings 203C, local phone 2-2110, cell 604-562-6524 (for a full list of first aid contacts, see [http://www.phas.ubc.ca/first-aid-contacts](http://www.phas.ubc.ca/first-aid-contacts)).
- Ensure that other students will not impede the movement of any emergency response crew.
- Attempt to ensure that other students give the injured party sufficient privacy until the situation is resolved. In the case of an emergency, it is reasonable to expect class will be disrupted.

**Give First Aid:**
- In the event of an emergency, always call 911. Follow the instructions of the operator.
- For non-emergency situations, ensure that the lab supervisor is notified immediately, even if the situation is simple enough that you can resolve it yourself.
- Universal precautions (e.g. wearing latex or other waterproof gloves) should be followed whenever contact with blood or bodily fluids is likely to occur. Latex gloves can be found in the local first aid kit. In Hebb, kits are located in marked cupboards of the 3rd floor lab rooms.
7.1.3 Earthquake

If you are in class and there is an earthquake use the following procedures.

**During the Shaking:**

- Stay inside. Stay away from windows, shelves and heavy objects which may fall.
- DROP under heavy furniture such as a table, desk or any solid furniture.
- COVER your head and torso to prevent being hit by falling objects.
- HOLD ON to the object that you are under so that you remain covered and face away from the windows. Be prepared to move with the object until the shaking has finished.
- If you can’t get under something strong, or if you are in a hallway, crouch against an interior wall and protect your head and neck with your arms.
- In a loud, clear, calm voice, instruct students to follow the above procedures.

**After the shaking stops:**

- Count to 60 to allow debris to finish falling after the shaking stops.
- Assess your immediate surroundings for danger.
- Proceed with evacuating the building.
- Upon exiting the building, proceed directly to the designated assembly area. Do not use the elevator.
- Proceed to the designated Area of Refuge if you have difficulty negotiating the stairs or if you need assistance in evacuating.
- If an aftershock occurs during evacuation and you are still inside the building, repeat DROP, COVER, AND HOLD ON procedure before resuming evacuation.

**After an earthquake:**

- Give first aid to injured persons. Do not move victims unless absolutely necessary.
- Report hazards to emergency personnel.
- Monitor battery powered or car radio for directions.
- Do not use telephones except to report medical emergencies, fires, chemical spills, gas leaks or other hazards. Ensure that your students are not using telephones.
- Do not use elevators.
- Do not leave area or return home until authorities say it is safe to do so. This could be up to 72 hours.
7.1.4 Personal Security

If there is a stranger in your classroom:

- Be friendly but assertive.
- Ask if you can direct the person.
- If the person is hostile, retreat and call Campus Security or 911 in an emergency.
- Do not attempt to evict the person yourself.

If you feel threatened:

- Trust your feelings.
- Put distance between yourself and the other person. If necessary, instruct students to put distance between themselves and the person.
- Use assertive verbal language and strong body language.
- Alert the appropriate authorities. Always err on the side of caution.

In the event of a lockdown alert:

- Close and lock the door. If the door does not lock, barricade it.
- Close curtains or blinds where possible.
- Stay away from windows and doors.
- Stay low and quiet.
- Cell phones should be put on quiet or vibrate mode. No phone calls should be made unless
  - You have immediate concern for your safety or the safety of others.
  - You feel you have critical information that will assist emergency personnel in their response.
- Do not open the door once it has been secured until you are officially advised “all clear” or are certain it is emergency response personnel at the door.
- Do not use or hide in washrooms.
- Follow instructions from emergency personnel only. Be 100% compliant with those instructions.
- During a lockdown, if the fire alarm is activated, remain where you are and await further instructions over a PA or portable loudspeaker.
- If possible, monitor the UBC website homepage for updates. Media reports may be unreliable.
- The police may require individuals to remain available for questioning following a lockdown.
7.1.5 Other Emergencies

Procedures for other emergencies are available at [emergency.ubc.ca/procedures](http://emergency.ubc.ca/procedures).

7.2 Plagiarism

Plagiarism is a form of academic misconduct in which an individual submits the oral or written work of another as his/her own. Determining what constitutes plagiarism, however, is not always straightforward in practice. Working on homework assignments in groups is encouraged in physics, and may sometimes result in work that appears very similar. The rule of thumb for group work is “work together, write separately”. On the other hand, copying work from another is always plagiarism.

Some examples of plagiarism you may encounter are:

- Students copying assignments from one another. This usually occurs right at the beginning of a class where the assignment is handed in. Be vigilant!

- In the lab, it happens sometimes that a student uses someone else’s data for their analysis. In this eventuality, it is the student’s responsibility to reference their partner’s work.

- Copying from solutions found on the web. This is a serious problem these days. Especially for questions asked out of the textbook, it is often possible to find the solution on the web. If you notice that the solution is readily available, you may want to bring this to the attention of the professor of the course to have that question discontinued.

Plagiarism is a serious offense and the university has procedures in place to deal with it. You are never to confront a student about suspected plagiarism on your own, your job is simply to present the class professor with the evidence for plagiarism.

7.3 Truancy and Lateness

Your students are adults, and may choose to not come to class. Most courses have procedures for missed labs, etc., and you should familiarize yourself with them at the beginning of the year. Outside of these existing frameworks, you are not responsible for students’ missed work. If your student has documentation (e.g. doctor’s note) that they believe entitles them treatment outside the regular procedures, you may refer them to your lab supervisor or the course instructor.

Lateness is a more complex issue. First and foremost, you should set a positive example by always arriving with adequate setup time before your section begins, and always starting (and ending) classes in a timely manner. If a student is regularly arriving late and you feel it is disruptive to the class, speak with them privately about arriving more punctually.

7.4 Student-Student Conflict

If your students are having a conflict that is disruptive to the rest of the class, inform them that they may either stop or continue their discussion outside the classroom. Once you have the opportunity to speak to them privately, let them know that their behaviour has been unprofessional and will not be tolerated in the classroom. If the situation feels unsafe, follow the directions in section 7.1, “Personal Security”.

If interpersonal problems are ongoing, inform your Head TA or lab supervisor.
7.5 Boundaries

As a TA, you are in a position of authority over your students. This means that you must be careful not to enter any compromising situations. You may also find that this authority leads students to expect more from you than is reasonable.

1. Conflict of Interest
A conflict of interest arises when a TA’s personal relationship with a student interferes with their ability to effectively function as an educator, either for the student in question or for other students in that TA’s class. It is natural to form relationships with the people you work with, but to avoid compromising situations, your relationships with your students should remain strictly professional.

If your significant other winds up in your class, inform your lab supervisor immediately so that accommodations can be made.

2. Overbearing Students
As a TA you are a great source of information and knowledge for your students, and being able to access you for course-related conversation is useful. You should expect to spend lots of time answering questions during the class, and you should also not be surprised to answer a number of questions via e-mail over the term. Different students will need/want a different amount of guidance from you regarding course material, but it possible for a problem to arise when one student or group of students begins to make unfair use of your time. Warning signs that this is happening are:

- You feel that the help a particular student(s) is getting gives them an unfair advantage over other students in the course.
- Replying to a student(s)’s questions is noticeably increasing your working hours.

If this happens, politely inform the student that you need to be helping other students (in class) or that you will not be able to answer so many questions (electronically).

If you give your students your e-mail address at the beginning of the term, you may find it useful to establish guidelines up-front about how it may be used. Further, there are many great resources online you can direct your students to where they can get help on problems. For example, Physics 101 and 102 have TAs whose specific job is to reply to student questions on the courses’ website message boards.

7.5.1 Social Media
It is strongly recommended that TAs refrain from connecting with students via social media (e.g. adding as a “friend” on Facebook,) who are currently enrolled in courses they are TAing. While it is not intrinsically wrong to use this medium to communicate with students, it can significantly complicate a situation if there is concern of a conflict of interest. Thus, to remain above reproach, standard operating procedure is to completely refrain from social media contact with current students.

7.6 TA-TA Conflict

Many TA positions are assigned in pairs, with two TAs per classroom. It is possible that you may have a disagreement with your TA partner, or a concern over how they are behaving. Find a time to speak to them privately. Bring up your concern in the least judgmental way possible and try to discover why they are doing things the way they are. Attempt to find a solution to the conflicting views that is amenable to both of you. If this approach fails to resolve the problem, contact your Head TA for assistance and mediation. If you are a first
year TA you may also discuss any problems that arise confidentially with your mentor TA. In the same spirit of not discussing students, treat your experiences with your TA partner with discretion.

7.7 Classroom Diversity and Language

The students in your class come from a wide variety of backgrounds and will thus invariably have differing learning and teaching philosophies. Each of your students will have a different identity that is defined on many levels - from core elements such as gender, sexual orientation and religion, to vast, broadly encompassing features such as their past experiences and the cultures to which they belong. The identity of any one of your students will affect how he/she learns and how receptive he/she is to your teaching. On top of that, your own identity will have a significant impact on the way you teach and on what you expect from your students. This makes for some complicated classroom dynamics!

As an educator it is your duty to be constantly aware of how your identity and that of your students will affect the classroom learning environment. You should aim to maintain an inclusive classroom in which everyone can comfortably learn and teach in. It is obviously very challenging to tailor a classroom to the identity of every single one of your students, but there are a couple simple ways by which you and your students can approach this ideal.

• The first step, and often the hardest, is simply to be aware of the diversity present in the classroom. This can be difficult at first if you are not conscious and/or accepting of how profound an impact diversity can have on the learning experience of your students. Sometimes there are traits common to many students in your classroom that will have huge impacts on the classroom. A most common example of this is that most first year physics classes (e.g. Physics 100, 101, 102, 153) that you will be teaching are 90% composed of students that will not be pursuing a physics major.

• Once you are aware of the diversity of the classroom - which stems from both you and your students - you should strive to maintain a learning environment that embraces it rather than stifles it. To do so it is imperative for you and your students to keep an open-minded attitude; always put yourself in the other person’s shoes. As a general rule, suspend judgement. Seeking to understand where the other person is coming from rather than immediately judging them is the most effective way of avoiding frustrating teacher / learner conflicts.

Maintaining an inclusive classroom can be at times daunting, but it is always rewarding by the stimulating learning/teaching environment it creates. To help you in this task, there is the “Creating Inclusive Classrooms” module in the fall workshop that is designed to get you thinking about others’ identities, cultures, perspectives and motivations (focusing in particular on TA - student dynamics). Your Head TAs and mentors have received inclusivity / diversity training from UBC’s Centre for Intercultural Communication, so if any problems or questions arise, be sure to ask them for advice.

7.8 Students in Crisis

Your students will usually have less life experience than you, and at times you will function not just as a TA, but also as a mentor. Because of this, at some point a student may come to you with a personal problem. It is not your responsibility to, nor should you, act as a therapist, but it is beneficial to be prepared to direct students to places where they can get help/advice. UBC’s contact sheet follows.

The Early Alert system is another way for you to help if you believe your student is facing a crisis that is jeopardizing them academically. This system makes it possible for faculty, staff
and TAs who might become aware of problems students are facing through their classroom contact to connect students to resources they need and minimize the effect on their academic career. As a TA, if you are concerned about a student you can file a confidential report on a student on the Early Alert website. This report will be reviewed by an Early Alert staff member and this staff member will identify the resources that might be most useful to the student in need, and contact an academic advisor who will reach out to the student directly. More information on how to use this system, and situations in which you might want to use it can be found on the Early Alert website: blog.students.ubc.ca/earlyalert/
Students in Crisis

As you work with students, you may be confronted with critical incidents. It is important that you contact the resources below for assistance.

<table>
<thead>
<tr>
<th>INCIDENT</th>
<th>WEEKDAYS</th>
<th>AFTER HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>Police 911 and Campus Security 604-822-2222</td>
<td>VP Students Office 604-822-3955 (after hours via Campus Security)</td>
</tr>
<tr>
<td>Suicide • Imminent threat or attempt</td>
<td>Emergency Services 911 and Campus Security 604-822-222</td>
<td></td>
</tr>
<tr>
<td>Suicide • Suicidal thoughts</td>
<td>Crisis Counselling and Suicide Prevention 24-hour crisis lines</td>
<td></td>
</tr>
<tr>
<td>Medical Emergency</td>
<td>Student Health Service 604-822-7011</td>
<td></td>
</tr>
<tr>
<td>Illness, injury</td>
<td>UBC Urgent Care (UBC Hospital) 604-822-7662 (until 10 pm)</td>
<td>Emergency, Vancouver General Hospital 604-875-4995 (24 hours)</td>
</tr>
<tr>
<td>Sexual Assault</td>
<td>Counseling Services 604-822-3811</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Services should only be called if requested by victim or if a life threatening situation exists.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sexual Assault Service at VGH Emergency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If sexual assault has occurred within the past seven days, sexual assault services can be requested at: Vancouver General Hospital Emergency, 920 West 10th Avenue, Vancouver (Female patients can arrange for a Women Against Violence Against Women (WAVAW) rape crisis counsellor to meet them at the hospital.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women Against Violence Against Women 604-255-6228</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24-hour crisis line: 604-255-6344</td>
<td></td>
</tr>
<tr>
<td>Students in need of emergency funding</td>
<td>Student Financial Assistance and Awards 604-822-5111</td>
<td></td>
</tr>
<tr>
<td>Missing Student</td>
<td>Campus Security 604-822-2222</td>
<td></td>
</tr>
<tr>
<td>Extremely disruptive student endangering the safety of themselves and/or others</td>
<td>Police 911 and Campus Security 604-822-2222 and VP Students Office 604-822-3955 (after hours via Campus Security)</td>
<td></td>
</tr>
</tbody>
</table>

The VP Students office coordinates the University's response to critical incidents involving students, works with faculties and departments to gather information, supports the affected students and surrounding student community, and coordinates communication.

The VP Students office is a resource for instructors and administrators who need help with a student who is in very difficult circumstances and past efforts to resolve their problems have not been successful.

Student Health Service, Counselling Services, Campus Security, the RCMP and other resource groups work with the VP Students office to ensure students receive the support they require.

Please contact the VP Students office at 604-822-3955 if you have any questions regarding a student in crisis.
Chapter 8

First Day Checklist

1. Meet with the course coordinator and/or Head-TA
   • Go over the material covered in the course.
   • Get materials such as assignments, lab manuals, textbook, and syllabus.
   • Find out about their grading expectations: when the homework will be returned, if there is a set grading rubric for the course, the policy on accepting late work, and procedures for grades appeals.
   • If there is no pre-made grading rubric, you may want to discuss the focus of the grading and present the professor with a grading rubric of your own.
   • Discuss their expectations for team meetings.
   • Find out what you should do if you need to miss a session.

2. Meet with professors or TAs who have taught the course before
   • Find out who your students are, their majors (if decided), what they like or dislike about the course.
   • What content was most challenging.

3. Check out the classroom
   • You do not want to be late for your first class! Visit the class ahead of time, make sure your keys work.
   • Do you have an overhead projector available to you for presentations?

4. Plan your first session
   • You need to let the students know who you are and what are the expectations for the class, such as
     – Be on time.
     – Submit work on time.
     – Be prepared for the session, do pre-labs and readings.
     – Participate in class discussions.
     – Respect the opinions of others.
   • Consider making a handout with your contact information, office hours, expectations and policies on late work, and what they can be expected to take from this course.

5. First day of class
• Your attitude on the first day sets the tone for the course – be enthusiastic!
• Introduce yourself, and maybe something about your interests in physics.
• If the class is not too large, you can get them to introduce themselves. If it is very large, you should visit each of them personally and spend a few minutes getting to know them. This lets them know that you care about them and are open to their questions and feedback.
• Express your expectations for the class, and let them know how they will be evaluated.
Bibliography