

# TA Orientation – Schedule and Syllabus

## Fall 2004

**Physics Graduate Student Orientation: Auguts 26 – September 6 (schedule on following pages) 8:45 am to 5 pm with a 1 hour lunch break**

**This TA orientation is part of a course for which you will receive a grade: The goals of this course are to:**

- Introduce you to some of the current research in learning and teaching;
- Show how we apply this research to classroom instruction at UMn;
- Help you develop some of the skills necessary for a successful experience as a teaching assistant in the introductory physics courses.

### Texts and Reading Materials

- Book: Teaching Physics with the Physics Suite
- Selected Readings – Yellow Booklet
- Lab Problems (LP) - Green
- Instructor’s Handbook (IH) – Pink
- Notebook of Activities
- Introductory Physics Text Book
- The Competent Problem Solver

### Instructors

Patricia Heller  
Dept. of Curriculum and Instruction  
✉ 56 Peik Hall ☎ 5-0561  
✉ helle002@umn.edu

Ken Heller  
Dept. of Physics  
✉ 260 Physics ☎ 4-7314  
✉ heller@physics.umn.edu

Alexander Scott  
✉ 253 Physics ☎ 4-7861  
✉ scott@physics.umn.edu

Kimia Ghanbeigi  
✉ 161A Physics ☎ 5-7578  
✉ kimia@physics.umn.edu

### Grading (see page vi for a complete breakdown)

- **Activities.** Since most people learn by doing, throughout the course there will be activities to let you practice what you are learning.
- **Homework.** The homework is intended to give you time to consider the issues raised. Most homework will take about an hour. The homework accounts for about a third of your grade (See page vi for their exact point value.) Late assignments are not accepted.
- **Quizzes.** There will be a short quiz given precisely at 8:45 every morning and collected by 9 am. The quizzes will be on the reading material assigned for the day and on the material discussed the previous day. The purpose of the quizzes is to ensure prompt attendance and adequate preparation for the class activities. These quizzes account for about a third of your grade.

- **Grading scale.**

A 88-100 points,      B 75-87 points,      C/S 64-74 points,      F 0-63 points  
Since the course is graded on an absolute scale, it is possible for everyone to get an A. The Physics Department requires that you at least get a B in this course to continue as a TA.

## 2004 Schedule and Syllabus (continued)

Date	Orientation Topic	Readings & Homework (DUE on the date listed)
Thurs 8/26	<p><b>Morning &amp; Afternoon: Rm 157</b> Introduction to UMn Model; students, being a TA <i>Activities 1-2</i></p> <p>What difficulties do students have learning the concepts and principles of physics? Why? <i>Activities 2-3</i></p>	<p><b>Afternoon:</b> <u>Selected Readings</u> (Alternative Conceptions)</p> <ul style="list-style-type: none"> <li>• Wandersee, Mintzes, &amp; Novak – Research on alternative conceptions in science, 177-183 &amp; 185-191</li> <li>• McDermott – Research on Conceptual Understanding in Mechanics (1.5 pages)</li> </ul>
Fri 8/27	<p><b>Morning:</b> How are discussion sections taught at UMn? Why? <i>Activities 4-5</i></p> <p><b>Afternoon</b> Competent problem solving frameworks for students <i>Activities 6-7</i></p>	<p><b>Readings:</b> <u>Book (Redish)</u></p> <ul style="list-style-type: none"> <li>• Chapter 6</li> </ul> <p><u>Selected Readings</u></p> <ul style="list-style-type: none"> <li>• Larkin – “Processing Information...” (3.5 pages)</li> <li>• Heller – What is Cooperative Problem Solving? (5.5 pages)</li> </ul> <p><u>Instructor’s Handbook</u> (Teaching a Discussion Session)</p> <ul style="list-style-type: none"> <li>• Overview of Teaching a Discussion Section (2 pages)</li> <li>• Outline for Teaching Discussion Sessions (1 page)</li> <li>• Detailed Advice for Teaching Discussion Sessions (4.5 pages)</li> </ul> <p><b>Homework #1:</b> Complete <i>Methods Questions</i> and <i>Predictions</i> for Lab 5 Prob #6; Read Appendix D2 – The Digital Multimeter and Appendix E – Measuring Constant Magnetic Field (the Hall Probe)</p>

## 2004 Schedule and Syllabus (continued)

Date	Orientation Topic	Readings & Homework (DUE on the date listed)
Sat 8/28	<p><b>Morning:</b> How are the labs taught at the UMn? Why? <i>Activity 9</i></p> <p><b>Afternoon:</b> Teaching Problem-solving labs and discussion sessions: Some Details <i>Activity 11</i></p>	<p><b>Reading:</b> <u>Book (Redish)</u></p> <ul style="list-style-type: none"> <li>• Chapter 8</li> </ul> <p><u>Instructor's Handbook</u> (Teaching a Laboratory Section)</p> <p><b>Homework #2:</b></p> <ul style="list-style-type: none"> <li>• Read your <i>assigned</i> Lab problems (that your team will teach) (LP)</li> <li>• Skim the relevant sections of textbook</li> <li>• Answer <i>Methods Questions</i> and <i>Predictions</i> for assigned lab problems</li> </ul> <p><b>Lunch Readings:</b> <u>Selected Readings</u></p> <ul style="list-style-type: none"> <li>• Cummings &amp; Marx – Evaluating Innovation in Studio Physics (6.5 pages)</li> <li>• Heller – Research Review – How Beginning Students Solve Problems (4.5 pages)</li> </ul>
Mon 8/30	<p><b>Morning:</b> Discuss Homework #3</p> <p>Teaching Problem-solving labs and discussion sessions: Some More Details</p> <p><i>Activities 12-13</i></p> <p><b>Afternoon:</b> Preparation for Peer Teaching of Labs and Discussion Sections <i>Activity 10</i></p>	<p><b>Readings:</b> <u>Book (Redish)</u></p> <ul style="list-style-type: none"> <li>• Chapter 2</li> </ul> <p><u>Selected Readings</u></p> <ul style="list-style-type: none"> <li>• Collins, Brown, &amp; Duguid – Situated Cognition and the Culture of Learning, pages 32 &amp; 37-42 (7 pages)</li> <li>• Cooperation in the College Classroom, pages 2-6 (5 pages)</li> <li>• Review Saturday “Lunch Readings” (Cummings &amp; Marx, and Heller)</li> </ul> <p><u>Instructor's Handbook</u></p> <ul style="list-style-type: none"> <li>• Cooperative Problem Solving, pages 7-33 (~23 pages)</li> </ul> <p><b>Homework #3:</b> Solving Problems (due in morning)</p> <p><b>Homework #4:</b> (due in afternoon)</p> <ul style="list-style-type: none"> <li>• Read 1301 Lab 1 Pr#1; 1202 Lab 1 Pr#6, and 1301 Lab 3 Pr #2</li> <li>• Skim the relevant sections of textbook</li> <li>• Answer <i>Methods Questions</i> and <i>Predictions</i> for 3 assigned problems</li> </ul> <p><b>Recommend that you also finish Homework #5</b></p>

## 2004 Schedule and Syllabus (continued)

Date	Orientation Topic	Readings & Homework (DUE on the date listed)
Tues 8/31	<p><b>Morning:</b> Discuss Homework #8</p> <p>Evaluating lab reports: Physics &amp; Writing <i>Activities 14-15</i></p> <p><b>Afternoon:</b> Practice teaching Labs &amp; Discussion</p>	<p><b>Readings:</b> <u>Instructor's Handbook</u></p> <ul style="list-style-type: none"> <li>• Grading the Labs (3 pages)</li> <li>• Teaching a Discussion Session, pages 43-59 (11 pages)</li> </ul> <p><b>Homework #5:</b> (due in afternoon)</p> <ul style="list-style-type: none"> <li>• Read 1302 Lab 1 Pr#2; 1101 Lab 1 Pr#3, and 1301 Lab 6 Pr #2</li> <li>• Skim the relevant sections of textbook</li> <li>• Answer <i>Methods Questions</i> and <i>Predictions</i> for problems</li> </ul> <p>OR finish preparations for Peer Teaching</p> <p><b>Homework #6:</b> Initial Evaluation of Example Student Laboratory Reports (due in morning)</p> <p><b>Homework #8:</b> Judging Problems (due in morning)</p>
Weds 9/1	<p><b>Morning:</b> Practice teaching of Labs &amp; Discussion.</p> <p><b>Afternoon:</b> Practice teaching of Labs &amp; Discussion.</p>	<p><b>Homework #7:</b> (due in morning)</p> <ul style="list-style-type: none"> <li>• Read 1301 Lab 2 Pr#1 and 1201 Lab 3 Pr#3</li> <li>• Skim the relevant sections of textbook</li> <li>• Answer <i>Methods Questions</i> and <i>Predictions</i> for problems</li> </ul> <p>OR finish preparations for Peer Teaching</p>
Thurs 9/2	<p><b>Morning:</b> How can you teach for Diversity and personal interactions? What to do about cheating. <i>Activity 16</i></p> <p><b>Afternoon:</b> Practice teaching of Labs &amp; Discussion.</p>	<p><b>Readings:</b> <u>Selected Readings</u> (Sexual Harassment and Ethics)</p> <ul style="list-style-type: none"> <li>• Equal Opportunity Brochure, sections 1-10 (15 pages)</li> <li>• Standards of Student Conduct – sections IV and V (3 pages)</li> <li>• Shymansky &amp; Penick: Do TAs exhibit sex bias? (2 pages)</li> <li>• Seymour – Gender differences in attrition rates (9 pages)</li> <li>• Article from Minnesota Daily (1 page)</li> </ul> <p><u>Notebook of Activities</u></p> <ul style="list-style-type: none"> <li>• Read Case Studies from Activity 16</li> </ul> <p><b>Homework #9:</b> (due in morning)</p> <ul style="list-style-type: none"> <li>• Read 1202 Lab 1 Pr#2; 1301 Lab 3 Pr#4, and 1302 Lab 4 Pr #2</li> <li>• Skim the relevant sections of textbook</li> <li>• Answer <i>Methods Questions</i> and <i>Predictions</i> for lab problems</li> </ul> <p>OR finish preparations for peer teaching</p>

## 2004 Schedule and Syllabus (continued)

Date	Orientation Topic	Readings & Homework (DUE on the date listed)
Fri 9/3	<p><b>Morning:</b> How to teach the <i>first</i> lab and discussion session</p> <p><b>Afternoon:</b> Team Meeting with Faculty</p>	<p><b>Reading:</b></p> <p><u>Instructor's Handbook</u> (Other Teaching Resources)</p> <ul style="list-style-type: none"><li>• Team Meeting Guidelines</li><li>• Downloading Class Lists</li><li>• Checking Pre-lab Quiz Scores</li></ul>

## 2004 Schedule and Syllabus (continued)

### Grading

#### Activities (by day completed): (42 total points)

Date	Act. #	Description	Max.	Earned
8/26	2a	Alternative Conceptions – Light Patterns on Screens	3	
8/26	3a	Analyzing the Force Concept Inventory Questions	2	
8/27	5	Demonstration of Discussion Session	2	
8/27	6	Expert-Novice Problem Solving	2	
8/27	7	Solving problems with Methods Questions	2	
8/28	8b	Using Methods Questions for Grading	2	
8/28	9	Demonstration of Laboratory Instruction	2	
8/30	11b	Lab Methods questions and Problem Solving	2	
8/31	13	What Questions Should You Ask?	2	
9/1	15b	Grading Two Example Lab Reports	3	
9/2	16a	Scholastic Dishonesty is...	2	
9/2	16b	Case Studies: Diversity and Gender Issues	3	
8/30		“Student” in Peer Teaching (2 days)	11	
9/2		Practice Lab Teaching (1 day)	4	

#### Homework (by day due): (61 total points)

Date	Hwk. #	Description	Max.	Earned
8/27	1	Methods Questions for Lab 5 Prob 6	3	
8/30	2	Methods Questions for Assigned Lab, and Discussion	9	
9/2		Prob.		
8/30	3	Solving Problems	12	
9/1	6	Initial Evaluation of Example Lab Reports	6	
9/2	8	Judging Problems	4	
8/30	4,5,7,9	Methods Questions for being a student in Peer Teaching	27	
9/2				

#### Quizzes (by day given): (48 total points)

Date	Quiz	Description	Max.	Earned
8/26	1	TA Responsibilities, Alternative Conceptions	8	
8/27	2	Problem Solving, Discussion Section Plans	8	
8/28	3	Lab Rationale and Plans	8	
8/30	4	Cooperative Problem Solving	8	
8/31	6	Cooperative Problem Solving	8	
9/2	7	Sexual Harassment Policy, Cheating Policy, Gender Diff.	8	
9/3	8	First Team Meeting	8	

Total of 151 points will be renormalized to 100 points.