Physics 321 – Mechanics  
Spring 2010

Instructor: Bryan Peterson  
Office: N355 ESC Phone: 422-7417  
Research Area: C341 ESC Phone: 422-5665  
EMail: bryan_peterson@byu.edu  
Office hours: 10:30–11:30 MWF or by appointment

Course Overview: You may have already discovered that most of upper division physics is revisiting the material covered in Physics 121/123/220/222. This is primarily because you didn’t have the necessary mathematical tools for a more complete treatment of the material. In fact, you still don’t have all the tools necessary and if you go on to graduate school in physics you will likely revisit this material one more time. However, you will find that the skills you have now will allow you to solve some pretty impressive problems.

Course Objectives: In this course you will gain the knowledge and tools to be able to:

1. use Newtonian mechanics with forces and torques to solve problems in Cartesian and curvilinear coordinates.
2. solve mechanics problems using work-energy, and conservation of energy, momentum and angular momentum.
3. solve and analyze rigid-body problems.
4. solve mechanics problems in non-inertial frames.
5. use Lagrangian mechanics to obtain the equations of motion for a variety of problems, including the use of generalized coordinates and cyclic coordinates.
6. use perturbation and similar techniques to linearize equations of motion to analyze stability and study coupled systems using normal modes.

Course Materials  
The course textbook is Classical Mechanics, by John R. Taylor. All remaining course materials are available on the course web page (http://www.physics.byu.edu/faculty/petersonb/Phys321/sp2010.html) or by following the “Course Web Pages” link on the department home page.

Reading  
It is expected that you will read through the specified sections of the text before each class period. It will greatly simplify your life and increase your understanding of the material if you complete the reading in advance. To give you more incentive to read the material, there is a form accessible from the web page you can use to log your completion of the reading. It must be done before the start of class for full credit. You will receive a 30% penalty for a late submission.

Homework  
The homework assignments are listed on the course web page. Most of the homework will be turned in using either Maple or Mathematica. You will submit your homework by sending an email with the Maple or Mathematica file attached to the course TA (phys321hw@byu.edu). The homework is due at midnight on the next class date. For instance, homework assigned for a Monday lecture will be due at midnight on Wednesday; that for a Friday lecture will be due at midnight on Monday. Homework will be accepted up to one week late but will be penalized 30%.

Homework is graded on how well you understand (actually, on how well you convey your understanding to the grader), not on getting the correct answer.
It is expected that you will collaborate with other students on the homework. But remember that what you turn in must be your work, not that of your group.

**Take-home Tests**
A take-home test will be due every Thursday at midnight. This test will consist of Maple- or Mathematica-based questions very similar to the homework problems. They are open book, open notes, open homework, open class web page, but CLOSED friends and classmates. You may not discuss the test with anyone but the instructor or TA. The tests will also be submitted by sending an email with the Maple or Mathematica file attached to phys321test@byu.edu.

If you submit a take-home test late it will be penalized 10% per late day.

**Midterm Tests**
The course is divided into three units. There will be a midterm test for each of the first two units. These tests will be open book/open notes and will be administered in the Testing Center. They will consist primarily of essay questions that will require you to explain concepts, problem-solving strategies, etc. There will be relatively few problems on these tests.

**Final Exam**
The final exam will consist of selected questions from the two midterm tests and sample tests, along with questions covering the materials from Unit 3 at a level comparable to the midterms. The final exam will be held in the classroom at the time specified in the University Finals Schedule. The final will also be open book/open notes. University policy requires that exams are to be given at the scheduled time. If you have an important reason to take the final at a different time you need to discuss it with the instructor as soon as possible.

**Course Grading**
This list shows the approximate weighting for grades. It may be adjusted as the semester develops:

<table>
<thead>
<tr>
<th>Graded activity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>5</td>
</tr>
<tr>
<td>Homework</td>
<td>10</td>
</tr>
<tr>
<td>Take-home Tests</td>
<td>40</td>
</tr>
<tr>
<td>Midterm Tests</td>
<td>25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
</tbody>
</table>

The grades will be assigned roughly on the traditional scale (93% = A, 90-93% = A-, 87-90% = B+, etc.). The scale will be adjusted if necessary depending on the severity of the tests and homework.

**Academic Honesty**
The first injunction of the BYU Honor Code is the call to be honest. Students come to the university not only to improve their minds, gain knowledge, and develop skills that will assist them in their life’s work, but also to build character. President David O. McKay taught that “character is the highest aim of education” (The Aims of a BYU Education, p. 6). It is the purpose of the BYU Academic Honesty Policy to assist in fulfilling that aim. BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct.

**Honor Code Standards**
In keeping with the principles of the BYU Honor Code, students are expected to be honest in their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university.

Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university’s expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have any questions about those standards.
Preventing Sexual Harassment:
Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, and student-to-student sexual harassment. BYU’s policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter sexual harassment or gender-based discrimination, please talk to your professor; contact the Equal Opportunity Office at 422-5895 or 367-5689 (24-hours), D285 ASB; or contact the Honor Code Office at 422-2847, 4440 WSC.

Students With Disabilities
BYU is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability that may impair your ability to complete this course successfully, please contact the Services for Students with Disabilities Office (2170 WSC, 422-2767). Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. Services are coordinated with the student and instructor by the SSD Office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D285 ASB.

Children in the Classroom
The serious study of the physical and mathematical sciences requires uninterrupted concentration and focus in the classroom. Having small children in class is often a distraction that degrades the educational experience for the entire class. Please make other arrangements for child care rather than bringing children to class with you. If there are extenuating circumstances, please talk with your instructor in advance.