Phys 311 – Classical Mechanics

Instructor:
Dr. Christine Nattrass
Office: SERF 609
Phone: 974-6211
Email: christine.nattrass@utk.edu
Office hours: 1-2 Mondays and 3-4 Wednesdays

Teaching assistant:
TBA

Class time & Location: Mondays, Wednesdays, and Fridays 9:05-9:55 in Nielsen 306

Course Description:
Physics 311-312 will discuss the fundamental aspects of Classical Mechanics: single particle motion, systems of particles, oscillations, motion in a central force field, two-body motion and planetary motion, two particle scattering, motion in non-inertial reference frames, dynamics of rigid bodies and oscillating systems, Lagrangian mechanics, and aspects of non-linear dynamics, chaos, and the special theory of relativity.

Textbook: Analytical Mechanics, 7th Edition, by Cassidy and Fowles. ISBN 978-0-534-49492-6. You may also use the 6th edition or the international edition.

Campus Syllabus:
The campus syllabus applies to this class. You are encouraged to review the campus syllabus.

Course Structure:
This is course is taught in a traditional lecture format. There will be in-class activities and students are required to attend lecture.

Learning objectives:
Students who successfully complete this course will be able to:

1. Understand and apply fundamental concepts of Classical Mechanics like displacement, velocity, acceleration, force, work, kinetic energy, potential energy, mechanical energy, momentum, and angular momentum as well as the relationships between these concepts.
2. Understand and apply the conservation laws of mechanical energy, momentum, and angular momentum.
3. Analyze and solve problems in 1-, 2, and 3-dimensional systems by applying force and/or conservation concepts. In particular, the students will be able to identify the equation of motions by using Newton's Second Law and solve these equations.

Prerequisites:
The course prerequisites are: Physics 136 or 138 or 231 and Computer Science 102. In general it will be assumed that you are familiar with calculus and calculus concepts (vectors, differential and integral calculus), aspects of linear algebra like matrices and determinants, and aspects of differential equations. Since the use of numerical methods is an integral aspect of the course, you will need to be familiar with computer programming. If you have not taken CS 102, you will need to demonstrate a strong familiarity with a high-level computer language.

MATLAB:
An important aspect of Physics 311-312 is to teach you to use both analytical and numerical methods in solving physics problems. In order to introduce numerical and computer programing methods we will be using the MATLAB packages throughout the course. You will be introduced to the fundamentals of MATLAB during the early lectures and you will then be assumed to gradually become proficient in the use of MATLAB as you get more and more advanced assignments. A good way to teach yourself about MATLAB is to use the book "Getting Started with MATLAB" by Rudra Pratap.

Lectures:
It is assumed that you have studied the material contained in each chapter before the lectures, so during the lectures we can focus on a few particularly important issues.

Grade:
The grade is:

- 40% exams
- 30% work and quizzes in class
- 30% homework

The grading scale will be:

- 93.00% and above A
- 90.00% - 92.99% A-
- 87.00% - 89.99% B+
- 83.00% - 86.99% B
- 80.00% - 82.99% B-
- 77.00% - 79.99% C+
- 73.00% - 76.99% C
- 70.00% - 72.99% C-
- 67.00% - 69.99% D+
- 63.00% - 66.99% D
- 60.00% - 62.99% D-
- 59.99% and below F

Exams:
There will be four exams:

- Midterm I: 10%
- Midterm II: 10%
- Midterm III: 10%
- Final: 10%

Excused absences will be considered on a case-by-case basis. In most cases for excused absences, a make-up exam will be administered.

Work and quizzes in class:
Some quizzes in class will be individual and some will be group quizzes. There will also be some group work in class turned in for credit. These will not be announced in advance.

Homework:
Homework assignments are approximately weekly due at the beginning of class.

Course Schedule:
A course schedule is posted on Canvas. This schedule is subject to change except for exam dates and times.

Attendance Policy:
Students are expected to attend lecture. Quizzes and in-class work may be unannounced.

If an absence is predictable in advance, the student should contact the instructor in advance by email and request that the absence be excused. If the absence could not be predicted in advance, the student should contact the instructor as soon as possible afterwards to request that the absence be excused. The instructor will reply to let the student know if the absence is excused. At the professor's discretion, doctor's notes, accident reports, police reports, and other relevant documentation may be required.

If class is canceled, it will be announced on Canvas.

Communication:
Emails to the instructor should have "Phys 311" in the subject. Students are expected to use their UTK email address for communication regarding the class and are expected to check their email regularly. You are very strongly encouraged not to disable emails from Canvas. Questions of general interest should be directed to the discussion forum, not made via private emails to the instructor. Only questions particular to an individual student should be made via private emails to the instructor. Questions of general interest made via a private email to the instructor may not be answered.

Discussion forum:
All questions of general interest will only be answered on the discussion forum. This includes both questions about the material and questions about course logistics.

Academic honesty and expectations of clarity:
Students are expected to be familiar with Hill Topics and the academic integrity policies. Cases of academic dishonesty will be handled individually and the full range of sanctions allowed by university policy will be considered. Students are expected to report any suspected academic dishonesty to the instructor and *failure to do so is considered a violation of the student code of conduct.* Student are encouraged to work together and therefore expectations for this class are clarified in supplemental information available on Blackboard. *When in doubt about how much group work is allowed, students are encouraged to ask for clarification in advance.* Students are responsible for making sure that their work meets expectations.