Spring 2-1-2018

PHSX 320.01: Classical Mechanics

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PHSX 320: Classical Mechanics Spring 2018

PROFESSOR:	Dr. Alex Bulmahn
OFFICE:	226 CHCB (inside of room 225)
EMAIL:	alexander.bulmahn@umontana.edu
LECTURE:	TR 9:30-10:50 am, CHCB 230
OFFICE HOURS:	TWR 11-12, and by appointment
COURSE WEBSITE:	Grades and other materials will be posted on the Moodle site for this course
PRE/COREQUISITE:	PHSX 301

Overview

This course will cover many topics in classical mechanics including Newtonian, Lagrangian, and Hamiltonian dynamics, motion in inertial and non-inertial reference frames, motion of rigid bodies, and the central force problem. Emphasis will be placed on advancing your mathematical interpretation and understanding of physics. This is an advanced course so expect to put a lot of time in in order to be successful.

Learning Objectives

Upon completion of this course you should have:

- gained a more fundamental understanding of classical physics.
- improved your ability to set up and approach complicated problems.
- improved your mathematical capabilities.
- gained and understanding of the connection between Newtonian, Lagrangian, and Hamiltonian mechanics and the advantages of each approach.
- improved your ability to work problems using different coordinate systems.

Required Materials

You will need the following text for the course: *Classical Mechanics,* John R. Taylor.

Grading

Your grade for the course will be based on weekly homework assignments, two midterm exams, and a final exam. **Homework is due at the end of the day on the due date. Late homework will be penalized 10% per day (excluding weekends and holidays). Make up exams will only be given in extreme circumstances.** The grading for the course will be broken down as follows:

Homework:	35%
Midterm Exams:	20% each (40% total)
Final Exam:	25%

This course can only be taken with the traditional grading option. The letter grades in this course will be based on a curve, giving you the grade that you earn. The curve will be determined by the performance of the class as a whole, but I do not have a set number of A's, B's, etc. predetermined. *Note: the last day to add or drop the course via Cyberbear is February 9th. The last day to drop the course without the Dean's signature is April 2nd.*

Couse Guidelines and Policies

Student Conduct Code

The Student Conduct Code at the University of Montana embodies and promotes honesty, integrity, accountability, rights, and responsibilities associated with constructive citizenship in our academic community. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students' rights, responsibilities, and the campus processes for adjudicating alleged violations. Full student conduct code.
(http://www.umt.edu/vpsa/policies/student_conduct.php)

Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. https://www.umt.edu/dss/default.php
If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Tentative Schedule

Week	Dates	Topic	Reading
1	1/22—26	Course Introduction, Vector Review, Newton's Laws	Ch. 1
2	1/29—2/2	Application of Newton's Laws	Ch. 2.1—2.5
3	2/5—9	More Applications, Linear Momentum	Ch. 2.5—2.6, Ch. 3.1—3.3
4	2/12—16	Angular Momentum, Energy	Ch. 3.4—3.5, Ch. 4.1—4.5
5	2/19—23	More on Energy **Midterm Exam #1**	Ch. 4.6—4.10
6	2/26—3/2	Calculus of Variations	Ch. 6
7	3/5—9	Lagrange's Equations	Ch. 7.1—7.6
8	3/12—16	More on Lagrange's Equations, Introduction to Hamiltonian Mechanics	Ch. 7.7—7.8, Ch. 7.10, Ch. 13.1—13.2
9	3/19—23	More on Hamilton's Equations, The Central Force Problem	Ch. 13.3—13.5, Ch. 8.1—8.3
10	3/26—30	**SPRING BREAK**	**Relax and Recharge**
11	4/2—6	The Effective Potential and Orbits	Ch. 8.4—8.8
12	4/9—13	Intro to Non-Inertial Reference Frames **Midterm Exam #2**	Ch. 9.1, Ch. 9.3—9.4
13	4/16—20	Newton's Laws in Non-Inertial Frames	Ch. 9.5—9.8
14	4/23—27	Systems of Particles	Ch. 10.1
15	4/30—5/4	Rotation of Rigid Bodies	Ch. 10.2—10.5
16	5/7—11	**Finals Week** **Final Exam 8-10 am, Tuesday 5/8**	