Fall 2016 Physics 342 CRN 25234

Professor
Dr. Jared Workman

Class Location
WS 366

Class Hours

Tue & Thu 11:00-12:15

Text Book
Classical Dynamics of Particles and Systems Marion and Thornton

Course Website
http://org.coloradomesa.edu/~jworkman/teaching/fall19/342/index342.php

Welcome to Physics 342, Advanced Dynamics

Classical Mechanics is the study of the motion of macroscopic objects and can be neatly divided into two disciplines, namely, statics and dynamics. In this course we will be primarily concerned with a study of the latter.

Dynamics is the study of the physical laws that determine the motion of a material particle or a system of particles. In addition to developing a more sophisticated treatment of mechanics via Newton's laws of motion, we will also examine the equations of Lagrange and Hamilton to describe these same physical laws.

What We Will Cover will be drawn from

- Newton's Laws of Motion
- Projectiles and Charged Particles
- Linear and Angular Momentum
- Energy
- Calculus of Variations, Lagrange's Equations, and Hamiltonian Dynamics
- Gravitation
- Two Body Central Force Problems
- Dynamics in non-inertial Frames
- Dynamics of Systems of Particles
- Solid body Dynamics
- Non-Linear Dynamics
- Additional Topics applying mechanics to astrophysical systems

Here is CMU's course catalog description:
From the catalog…
"In-depth survey of classical mechanics. Includes Newtonian dynamics, conservation laws, oscillating systems, gravitation, the Lagrangian and Hamiltonian formulation of mechanics, orbital and central force motion, systems of particles, non-inertial reference frames, rigid bodies, coupled oscillations, and waves on a string.

Prerequisites: PHYS 230 and MATH 260 or Math 236"

What to look for in this syllabus

- ☐ How to contact me
- ☐ Evaluation (grades)
- ☐ Late or missed work/exams
- ☐ Homework
- ☐ Exams
- ☐ Attendance
- ☐ Schedule
- ☐ Resources for student assistance
- ☐ Student Conduct
- ☐ Important Dates
- ☐ Work Load Expectations
- ☐ Course Learning Objectives
- ☐ Program Level Student Learning Objectives

How to Contact Your Instructor

Visit my office: WS 230C
Office Hours: Mon/Wed/Fri 11:00-12:00, Thu 1:30-3:30

Leave me a message at: (970)-248-1327
Email me at: jworkman@coloradomesa.edu (better than the phone)

Evaluation

Homework 20%
Exams 50%
Final Exam 30%
Attendance – see below

Grading

Grades will be assigned as follows:

Excellent	A	> 90%
Good	B	80%-90%
Average	C	70%-80%
Deficient	D	60%-70%
Failing	F	< 60%

A curve may be used at the end of the semester. I can be contacted at any time to give you an update of your current grade.

Homework

- There will be roughly one assignment per 1-2 weeks consisting of approximately 4-10 homework problems per assignment. Assignments are to be turned in during class on the date due. An assignment not done by the beginning of class is considered late for the day and will be penalized 25% for that day. Each following day the assignment is not handed in by 11:00 AM it will accrue a further 25% late penalty.
- You will be graded out of 75% of the total possible points on homework.

- You are encouraged to discuss homework problems with your classmates. Working problems with your peers is an excellent learning method, however, anything turned in **must** be your own work. If you have worked with other students at the blackboard and I see identical solutions the credit will be split amongst the participants. Ex – 100 percent correct with 2 identical solutions = 50% per student, with 3 participants = 33% per student.
- Homework is worth 20% of your grade.
- There is a great deal of freely available solutions to everything in almost any book on the internet. Speaking from experience, you won't pass the tests if you copy solutions. The homework IS the place you'll really learn quantum mechanics. If you hand in obviously copied solutions the penalty for the first offense will be a zero grade and a report to the office of academic affairs, the penalty for the second offense will be failing the course. If the copying is egregious on the first offense a grade of zero may be assigned for the entire class at my discretion. If you use solutions as a guide you should come to me beforehand and have me look over the homework before handing it in.
    - Note – a very easy way for me to tell who is copying is if you skip steps that you obviously can not.
- Do not use online integrators or canned table solutions to integrals, work them out entirely, this is to help not punish you.
- Write only on one side of each sheet of paper, keep your work neat and understandable
- I will not grade all problems assigned however I will hand out solutions, the problems I grade will be random so skipping problems is a bad choice

Exams
- There will be two to three exams and a final exam. Exams will be worth 50% of your grade, the final is worth 30%
- Each exam will cover approximately 2-3 chapters
- The Final Period is Tuesday, December 10th at 10:00

Attendance

This is up to you but you are more likely to pass if you show up.

Resources for Students

Your instructor: I am here to help you learn; please let me know if you are having trouble with anything! My contact information is at the top of the syllabus, or you can talk to me after class or during my office hours.

The Course Website: Contains all class information and several helpful (and some just fun) links.

Tutorial Learning Center: HH113 http://www.coloradomesa.edu/tutoring/index.html

Students With Disabilities: Students with disabilities have certain privileges extended to them including but not limited to extended exam time. It is your responsibility to contact the EAS (Educational Access Services)

At Houston Hall, Room 108, 1-970.248.1856 http://www.coloradomesa.edu/eas/links.html and bring me the necessary forms for any special dispensations received.

Class Policies

All students expected to follow the Student Code of Conduct. Violations of the Student Code of Conduct may result in disciplinary action. The code of conduct is here here http://www.coloradomesa.edu/academics/policies/academic_integrity.html. Some specific items that are important in this class are:

1. Create and sustain a respectful learning environment. Allow your fellow students to learn and the instructor to teach. Disrespectful, disruptive or abusive behavior toward an individual or group is unacceptable.
2. Due to the rapid pace of this course, late work is generally not accepted. In the event of illness, family emergency or other special circumstances, you must contact me BEFORE the deadline to make arrangements for late work or early tests. At the instructor's discretion, you may then turn in the work within 1 week of the deadline.
3. I encourage participation, ask questions, email me, ask for reading material for your own edification after the course is over, provide me with feedback. I am not directly grading you on participation but it will play a factor in the end of the semester grade. This is an interesting topic and I want you to be involved in learning it.
4. Turn off your cell phone.
5. No smart phones, ipads, earphones, etc during class time, no texting or web browsing. You all get one freebie phone ring then I may ask you to leave.
6. Laptops are fine for note taking but please do not web surf during class. If I find you surfing the web you forfeit your laptop privileges. Students using laptops are required to sit at the front of the class.
7. I will turn any students I find cheating, copying each other's work, or plagiarizing material over to the department chair, no exceptions. If you are unsure if something is prohibited, ask me. You are encouraged to work together but please do not hand in identical assignments, they will not be accepted.
8. Please arrive to class on time and wait until class is over to leave. I reserve the right to tell students to leave who are tardy. I will also penalize students who leave class early UNLESS I am forewarned.
9. No conversations with classmates in class.
10. I do not track attendance however I am aware who is and is not coming to class. If you choose not to come to class please do not come to me asking why your grade is suffering.
11. Finally – YOU are responsible for knowing what is due when. I will not make students who miss material aware of what was missed. This information is available in a plethora of places. If you aren't sure of what or when something is due the onus is on you to find out.

Important dates:
http://www.coloradomesa.edu/registrar/dates.html

Work Load Expectations:
An undergraduate student should expect to spend on this course a **minimum** of two hours outside the classroom for every hour in the classroom. The outside hours may vary depending on the number of credit hours or type of course. More details are available from the faculty member or department office and in CMU's Curriculum Policies and Procedures Manual.

Course Learning Objectives:

A student who has taken this course will demonstrate the ability to:

1. Translate between verbal and mathematical descriptions of physical situations. Apply mathematical reasoning, using vectors, vector calculus, and the calculus of variations, to analyze these situations.

2. Construct free-body diagrams and apply Newton's Second Law to analyze the dynamics of physical situations involving a single particle.
3. Apply the conservation theorems, namely, conservation of linear momentum, angular momentum, and energy of a particle in a conservative force field, to analyze the dynamics of physical situations involving linear and/or rotational motion.
4. Apply Newton's Law of Gravitation to a system of particles and extended objects.
5. Construct Lagrange's equations of motion for various physical phenomena.
6. Use the Hamiltonian method to find the equations of motion for various physical phenomena.

Program-Level Student Learning Objectives:

This course satisfies the following Physics-degree student learning objectives:

1. Articulate the knowledge base and show fluency with the ideas and techniques of the major fields of physics (classical mechanics).
2. Translate physical problems into mathematical problems, solved these using appropriate mathematics and extract physically meaningful statements from the solutions.

Disclaimer: The instructor reserves the right to modify this syllabus and schedule.