

# Physics 419

Fall, 2004

209 Holt, MWF, 12:00-12:50

Gary Weisel, 101H Elm Building

Phone: 949-5175

Email: gwx20@psu.edu

Office Hours: Monday, Thursday, and Friday, 10:00-11:00; and by appointment

Text: Thornton and Marion, Classical Dynamics of Particles and Systems, Fifth edition, (Thomson Brooks/Cole, 2004).

## Objective:

This course investigates, in greater depth, the principles of classical mechanics familiar to you from introductory courses. Some of the most important material involves the calculus of variations, a formalism developed by applied mathematicians, such as Lagrange and Hamilton, during the eighteenth and early-nineteenth centuries in order to generalize Newton's dynamics. You should leave the class with an understanding of Lagrange's equations, Hamilton's principle, and an ability to analyze a broad class of mechanics problems, including oscillations, orbital motion, rigid-body motion, collisions, scattering, and non-inertial reference frames.

## Grading:

Mid-term Exams (two total)	30%
Final Exam (cumulative)	20%
Classroom participation	50%

Mid term Exams: These consist of about four long-answer questions, which require you to show your work in order to get full credit or partial credit. The final exam will be cumulative and will include about seven questions. All three of the exams will include in-class and take-home portions.

It is possible to make up the exams if you inform me before the exam that you will be absent. To take the exam before or after the appointed day, you must have an "acceptable excuse" (e.g., a doctor's excuse, a death in the family, etc.).

Classroom participation: This is mainly based on homework submission and attendance and. I will take attendance on random days. Homework assignments will be collected and graded for each chapter.

## Academic Integrity:

At this point in your education, infractions of academic integrity should be obvious. Don't cheat during quizzes and exams by taking or accepting answers from other students or by sneaking in notes. If I find that you have cheated, then I will fail you for the assignment or for the entire course. Ultimately, academic integrity is about not lying to yourself-- about how much effort you are putting forward and about how much you really are accomplishing.

**Schedule: Note that we will not cover Chapter 1 (a review of relevant mathematics) in class. We will cover this material as needed.**

T	August 31	Chapter 2 Newtonian Mechanics – Single Particle
W	September 1	
F	September 3	
M	September 6 (holiday)	
W	September 8	
F	September 10	
M	September 13	Chapter 3 Oscillations
W	September 15	
F	September 17	
M	September 20	Chapter 5 Gravitation
W	September 22	
F	September 24	
M	September 27	Chapter 6 Calculus of Variations
W	September 29	
F	October 1	
M	October 4	<b>EXAM I (Chapters 2, 3, 5, and 6)</b>
W	October 6	
F	October 8	
M	October 11	Chapter 7 Hamilton's Principle
W	October 13	
F	October 15 (holiday)	
M	October 18	
W	October 20	
F	October 22	
M	October 25	
W	October 27	
F	October 29	
M	November 1	Chapter 8 Central Force Motion
W	November 3	
F	November 5	
M	November 8	
W	November 10	
F	November 12	

M	November 15	<b>EXAM II (Chapters 7 and 8)</b> Chapter 9 Dynamics of a System of Particle
W	November 17	
F	November 19	
M	November 22	
W	November 24 (holiday)	
F	November 26 (holiday)	
M	November 29	
W	December 1	
F	December 3	
M	December 6	Chapter 10 Non-Inertial Reference Frames
W	December 8	
F	December 10	
<b>Final Exam (Cumulative)</b>		To be arranged