PHYSICS 419 Syllabus (Spring 2008)

Instructor: Dr. Darin Zimmerman
Office: 106 Science Building
Office Hours: MWF, 11 – 11:50 am or by appointment
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Meeting Time / Place: MWF, 10:00 - 10:50 am / 103 Science

Textbook: *Classical Dynamics of Particles and Systems* by S. Thornton & J. Marion (5th Ed.)

Course Description: This is the advanced undergraduate course in theoretical mechanics. We will review Newtonian mechanics and then introduce Calculus of Variations leading to Lagrangian and Hamiltonian techniques. Applications will include: vibrational, rotational, orbital, and projectile motion, and collisions.

Grade Weighting: Homework (45%) + Midterm (25%) + Final (30%)

Letter Grades: A (94-100), **A-** (90-94), **B+** (87-90), **B** (83-87), **B-** (80-83), **C+** (75-80), **C** (70-75), **D** (60-70), **F** (<60)

Homework: Homework will be assigned and graded.

Exams: Exam problems will be similar to the homework problems. Each exam will probably consist of 4 to 6 problems. The Final Exam will be cumulative.

Academic Integrity: Cases of academic dishonesty (cheating, plagiarism, fraud, etc.) will be dealt with harshly. Consequences for such behavior may include receiving a failing grade on the exam or in the course and in more serious cases, permanent expulsion from the University. For the details, see *The Student Guide to University Policies and Rules*.

Class Cancellation: In the event that snow or other inclement weather forces a delay or a closing of the campus, class may be cancelled. If this happens you may call my voicemail number above and I will inform you as to whether or not class is indeed cancelled.

Comments: Often, an upper division course in physics is focused heavily on the mathematics. While the use of mathematics is quite necessary in the discussion of the concepts and problems, much attention will be paid to understanding the concepts, making connections with applications, and in a word, not losing sight of the physics.

My mission is to facilitate your learning and provide you with the tools to complete the work. I will try to provide you with an underlying motivation for the topics we are studying that will make the course more interesting and enjoyable for you. I make myself available for help so you should not hesitate to come to my office when you are struggling (come by even if you're not struggling!). You should feel free to approach me with questions and problems - no matter how "stupid" or "simple" you think they might seem.

Physics 419 Spring 2008 Class Schedule (Subject to change…)

Week	Date	Day	Chapter: topics / [HW]
1	**January**		
	14	M	**Ch. 2:**Introduction, Newton's Laws, Retarding forces / [4, 5, 11, 15, 25, 27, 32, 34, 37, 39, 52, 54]
	16	W	Conservation of linear and angular momentum
	18	F	Conservation of energy, potential functions
2	21	M	*Dr. Martin Luther King, Jr. Day, no classes*
	23	W	**Ch. 9.11**: Rocket motion, applications / [54, 60, 63]
	25	F	
3	28	M	**Ch. 3:** 1-d oscillator, 2-d oscillator / [2, 4, 6, 7, 12, 18, 28, 34, 39, 45]
	30	W	Damped oscillator, driven oscillator
	February		
	1	F	Applications, Fourier series
4	**4**	M	**Ch. 5:** Gravitation / [2, 7, 13, 15, 16, 17, 18]
	6	W	Tidal forces
	8	F	
5	11	M	**Ch. 6:** Calculus of variations, Euler's equation [2, 4, 6, 10]
	13	W	
	15	F	
6	18	M	**Ch. 7:** Hamilton's Principle, Lagrange's Equations / [3, 7, 9, 10, 11, 12, 13, 15, 20, 22, 24, 34, 40]
	20	W	Generalized coordinates
	22	F	Method of undetermined multipliers
7	25	M	Equivalence of Lagrange & Newton
	27	W	Conservation theorems
	29	F	Hamilton's Equations
8	**March**		
	3	M	
	5	W	
	7	F	Midterm Exam
9	10	M	*Spring Break*
	12	W	*Spring Break*
	14	F	*Spring Break*
10	17	M	**Ch. 8:** Reduced mass, conservation theorems / [4, 8 - 10, 14, 18, 24, 25, 27, 30, 37, 40, 41 - 43, 47]
	19	W	Equations of motion, examples
	21	F	
11	24	M	Orbits, effective potential
	26	W	Kepler's Problem
	28	F	Orbital Dynamics
12	31	M	**Ch. 9:** Center of mass / [2, 9, 12, 20, 23, 24, 30, 40, 42, 43, 46, 50]
	April		
	2	W	Linear momentum
	4	F	Angular momentum
13	7	M	Energy
	9	W	Elastic collisions
	11	F	Inelastic collisions / *Late Drop Deadline*
14	14	M	
	16	W	Review, applications
	18	F	**Ch. 10:** Rotating coordinate systems / [6, 9, 11, 12, 17, 18, 21]
15	21	M	Motion relative to the earth
	23	W	Applications
	25	F	
16	28	M	Applications of Lagrangian Dynamics
	30	W	Applications of Lagrangian Dynamics
	May		
	2	F	Review for Final
17	5	M	
	7	W	Final Exam (8:00 – 9:50am) / 103 SCIENCE
	9	F	