PHYS 419 – Fall 2008

Classical Mechanics I

Lecture course outline

Lecture hours:	Mon., Wed., & Fri.: 10:10 AM – 11:00 AM
Lecture room:	109 SHL
Web page:	http://www.physics.udel.edu/∼szalewic/teach/419/
Instructor:	Krzysztof Szalewicz, 121 SHL, phone: 831 6579, szalewic@udel.edu
Office hours:	one hour after class or by appointment
Teaching assistant:	Jun Wan, 227 SHL, wanjun@UDel.Edu
Office hours:	Thur. 5-8 PM
Text:	*Classical Mechanics* by John R. Taylor, University Science Books, 2005 (Ch. 1-8 and 13 with some small omissions, fragments of Ch. 10 & 11)
Supplementary texts:	*Classical Dynamics* by Stephen T. Thornton and Jerry B Marion, Thomson-Brooks/Cole, 5th edition, 2004 *Mechanics* by Keith R. Symon, Addison-Wesley, 3rd edition, 1971
Background texts:	G.B. Thomas and R.L. Finney *Calculus and Analytic Geometry*, Addison-Wesley 1998 or later D. Halliday, R. Resnick, and J. Walker (or K.S. Krane) *Fundamentals of Physics*, Wiley 1993 or later
Advanced text:	H. Goldstein, C. Poole, J. Safko *Classical Mechanics*, Addison-Wesely, 3rd edition, 2002
Prerequisites:	PHYS 207, PHYS 208, MATH 243
Corequisite:	MATH 302 or MATH 341

Exams and quizes:		
	Quizes (10-15 minutes)	every Friday, except for 9/5 and exam weeks
	Exam 0 (50 minutes)	Sep. 12
	Exam 1 (50 minutes)	Oct. 03
	Exam 2 (50 minutes)	Nov. 07
	Exam 3 (50 minutes)	Dec. 05
	Final exam (2 hours)	after Dec. 12

Homework: About 10 problems each week. Normally assigned on Friday, due the next Friday, returned by the following Friday.

Grading:		
	Homework:	15%
	Quizes:	15%
	Exam 0:	5%
	Exam 1:	15%
	Exam 2:	15%
	Exam 3:	15%
	Final exam:	20%

Grades will be assigned as follows:
A – 0.75 and above, F – below 0.40, each 0.035 is one grade increment.

PHYS 419 – Outline, continued

All problems will be graded on the scale 0 to 10.

Homework 0 and Exam 0 are intended to advise you about the background required to do well in this course. These will consist of questions from classical mechanics at the level of PHYS207, Fundamentals of Physics I. [Chapters 1-14 and 17 from Resnick, Halliday, and Krane, "Physics", 5th Edition, Vol. 1]. Exam 0 will be returned to you before the drop/add date.

The other exams will be from the material covered in this course. Three types of problems can be expected. (a) Problems or questions related directly to the material covered in class (note that derivations and proofs are an essential part of this course and will be required on exams). (b) Problems very similar to actual homework problems (therefore it is critical that you spend time to understand solutions deposited in the library if you have not solved the homework problems perfectly by yourself). (c) Problems related to the material covered, but not necessarily similar to any homework problem.

Exams 1–3 will deal with the course material covered in the weeks preceding a given exam (e.g., exam 2 will not repeat subjects contained in exam 1). The final exam will embrace the whole course with emphasis on subjects not covered by exams 1–3. All exams and quizes will be closed book. Each exam will contribute to your final grade as the ratio of the number of points earned to the maximum number of points, weighted as listed above. The homework and quizes will contribute as an analogous ratio multiplied by the weight given above.

Homework will be graded only pass or fail. The pass grade will be given even for wrong solutions showing a substantial effort, thus, a pass grade does not mean that your solution is correct. There will be a quiz on each day a homework is due with one problem very similar to the problems of the just submitted homework. There will be no quizes on exam weeks and on the first week of classes.

Detailed solutions to homework and exam problems will be put on reserve in the physics library. Everybody is strongly advised to compare these solutions with their work.

I will communicate with you by email. Let me know if you are not getting my emails.

Lecture Contents

- Newton's Law
- Simple harmonic motion in polar coordinates
- Projectile motion with retarding forces
- Motion in magnetic field
- Conservation of linear and angular momentum
- Energy
  - Work-energy theorem
  - Conservative and nonconservative forces
  - Potential energy surfaces
- Equations of motion in curvilinear coordinates
- Multiparticle systems and central forces
- Driven and damped oscillators
- Calculus of variations and Euler-Lagrange equations
- Lagrange's equations
- Hamilton's equations
- Two-body problem
- Rotations of rigid body
- Coupled vibrations