Department of Physics
University of Maryland

Physics 410 Syllabus

Fall 2005

Course Title: Classical Mechanics

Prerequisite: PHYS 374

Lecture/Recitation: Tues. and Thurs., 9:00-10:50,
Physics Bldg., Rm. 1402.

Textbook Required: J. R. Taylor, *Classical Mechanics*,
Tenth Ed., University Science, Inc.

Course Outline:

The course will be taught in terms of four major conceptual units. These will be covered in the following order;

(I.) Newton's Laws of Motion, Projectiles and Charged Particles, Momentum and Angular Momentum, Energy, Two-Body Central-Force Problems, Noninertial Frames, Rigid Body Rotational Motion - the corresponding chapters in Taylor are: 1, 2, 3, 4, 8, 9 & 10.

(II.) Calculus of Variations, Lagrange Equations, Hamiltonian Mechanics - the corresponding chapters in Taylor are: 6, 7 & 13.

(III.) Special Relativity - the corresponding chapter in Taylor is 15.

(IV.) Oscillations, Coupled Oscillators, Normal Modes, Continuum Dynamics - the corresponding chapters in Taylor are: 5, 11 & 16.

Thus, the unit reading assignments are:

Unit (I.) = Chapters: 1, 2, 3, 4, 8, 9 & 10.

Unit (II.) = Chapters: 6, 7 & 8.

Unit (III.) = Chapter: 15.

Unit (IV.) = Chapters: 5, 11 & 16.

Course Wepage: Updates to the course can be found on-line at;

http://www.physics.umd.edu/courses/Phys410/gates/

Supervising Instructor: Sylvester James Gates, Jr., Room 4121 (Toll Physics Bldg.), TEL.: 301-405-6025,
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http://www.physics.umd.edu/ep/gates/gates.html

Instructor: Anke Knauf, Room 4103 (Toll Physics Bldg.),
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Teaching Assistant:

Dong Sheng, Rm 4210 (Toll Physics Bldg.) TEL.: 301-405-6191
E-mail: dsheng@umd.edu

Office Hours:

The course instructor is available for scheduled office hours between 11:00 and 12:00 a.m.every Tuesday and Thursday immediately after class **under ordinary circumstances**. Students are encouraged to contact Prof. Gates tp arrange meetings at other times as desired.

For students with access to electronic mail, inquiries may be sent to the instructor at any time via e-mail.

Office hours for Mr. Dong Sheng are during the hours of 1:00- 3:00 Tues, Thurs, Fri.

Tutorial Assistance:

Any student seeking additional assistance is urged to contact either the course instructor or the T.A. as desired. The Slawsky Physics Clinic is also an additional resource to explore. The Clinic does **NOT** have established specific hours for this course, so check with them ASAP about their availability.

Reading Assignments:

All reading assignments are required. It may occur that examination problems will be drawn from material not covered in lecture, recitation nor homework.

Examinations:

There will be a mid-term examination given during the semester and a final at the end of the term. All examination are open book. The mid-term examination scheduled for **Oct. 20**. The final examination schedule is not presently fixed, but will be some time between **Dec. 15** - **Dec. 21**. Students are advised

to seek definite information from the Testudo websites

http://www.sis.umd.edu/bin/exam?crs=PHYS410&sec=&term=200508
http://www.testudo.umd.edu/soc/examfall.html

for definitive information. No makeup exams will be given. All students are required to take the course examinations.

You may bring one 3" x 5" formula card to the mid-term exam. You may write anything you want to on both sides of the card. You may bring three formula cards to the final exam.

Any emergency that might cause a student to miss an examination must be *rigorously* documented (doctor's note, legal notices, etc.) otherwise a grade of zero will be assigned to the student for the missed examination. If any conflicts with the examination dates are known to the student these must be brought to the instructor's attention immediately. Otherwise, the student risks being assigned a grade of zero for the missed examination. Excuses after the fact are *not* acceptable and will result in an assigned grade of zero.

Homework:

Homework will be given regularly during the semester. It will be collected normally at the end of the lecture on each Thursday, graded and returned to students one week later. However, it is possible that not every problem will be graded. Instead a randomly selected subset of them may be graded. A record will be kept of each student's completed problems. This tally will be used to calculate the homework grade.

Late homework will ONLY be accepted with a physician's or other official written note. However, points will be deducted from the grade on late homework at a rate of 10 points/day.

A Guide to Doing Homework:

If you wish to have the best possible grades on homework returned, you **must**

*1. Staple your papers together.

*2. Box your answers.

*3. Turn in **neat** homework (points may be deducted otherwise).

*4. Write your solutions in **pencil**.

*5. Consider whether your answers make "sense" by checking units etc.

*6. Draw a picture or sketch for every problem where it is appropriate.

*7. Describe in words, why and where equations being used appear in your write-up.

*8. **SHOW YOUR WORK**! Solutions or answers turned in without explanation will **NOT** receive full credit.

It should be noted that many of the above comments also apply to writing your solutions on examinations.

Grading:

The final grade for the course will be determined by the following formula;

$$\text{F.G.} = \frac{25}{100}(\text{H. W.}) + \frac{35}{100}(\text{Midterm XAM }) + \frac{40}{100}(\text{Final XAM}) \quad ,$$

Disability Support Services:

The UMCP campus offers support in these cases. It is the responsibility of the effected students to contact the Counseling Center, Rm. 0126 Shoemaker Building 301-314-7682 or on-line at http://www.inform.umd.edu/dss/ in order to take advantage of this assistance. After this contact the course instructor.

Academic Dishonesty:

The University of Maryland has an established policy on academic dishonesty (see the webpage at

http://www.inform.umd.edu/CampusInfo/Departments/PRES/policies/iii100a.html).

Students are advised to become familiar with the policy which in part states,

"The University can function properly only if its members adhere to clearly established goals and values. Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. Accordingly, The Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University share this responsibility. The Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with the students."

Students who infringe upon this UMCP policy will be subject to **severe** sanction.

PHYS 410 Homework Assignment Schedule - Fall 2005

Assignment	Due Date	Problems
# 1	Sept. 8	1.4, 1.7, 1.19, 1.25, 1.27
		1.36, 1.38, 1.41, 1.47, 1.48
# 2	Sept. 15	2.1, 2.8, 2.13, 2.21, 2.27
		2.28, 2.33, 2.49, 2.53, 2.55
# 3	Sept. 22	3.3, 3.8, 3.13, 3.16, 3.21
		3.22, 3.25, 3.32, 3.34, 3.37
# 4	Sept. 29	4.2, 4.8, 4.10, 4.11, 4.20
		4.28, 4.30, 4.36, 4.43, 4.48
# 5	Oct. 6	8.6, 8.11, 8.12
		8.15, 8.19, 8.24, 8.30, 8.35
# 6	Oct. 13	9.1, 9.3, 9.8, 9.10, 9.14
		9.18, 9.20, 9.22, 9.25, 9.34
# 7	Oct. 20	10.3, 10.8, 10.14, 10.19, 10.21
		10.33, 10.35, 10.40, 10.50, 10.51
# 8	Nov. 3	6.1, 6.3 ,6.5, 6.7, 6.18
		6.22, 7.3, 7.14, 7.18, 7.23
# 9	Nov. 10	7.31, 7.41, 13.3, 13.5, 13.7
		13.10, 13.12, 13.14, 13.18, 13.20
# 10	Nov. 17	15.3, 15.6, 15.11, 15.17, 15.21
		15.49, 15.67, 15.79, 15.86, 15.107
# 11	Dec. 1	5.2, 5.11, 5.21, 5.33, 5.40
		5.49, 11.9, 11.12, 11.14, 11.24
# 12	Dec. 8	11.28, 11.32, 16.4, 16.9, 16.13
		16.15, 16.16, 16.20, 16.31, 16.36

Note: Problem 5.49 is NOT to be done using a computer.

Tentative Physics 410 Schedule - Fall 2005

AUGUST-SEPTEMBER

Date	Class#	Comment	Topic	Reading Assignment
Week 1				
Sept. 1	1		Newton′s Laws	*Unit I.*
Week 2				
Sept. 6	2		Newton′s Laws	*Unit I.*
Sept. 8	3	H.W. due	Proj. mot. &charge part.	*Unit I.*
Week 3				
Sept. 13	4		Proj. mot. &charge part.	*Unit I.*
Sept. 15	5	H.W. due	Lin. & Ang. Momenta	*Unit I.*
Week 4				
Sept. 20	6		Lin. & Ang. Momenta	*Unit I.*
Sept. 22	7	H.W. due	Energy	*Unit I.*
Week 5				
Sept. 27	8		Energy	*Unit I.*
Sept. 29	9	H.W. due	2 body, cent. forces	*Unit I.*

Tentative 410 Lecture Schedule - Fall 2005

OCTOBER

Date	Class#	Comment	Topic	Reading Assign.
Week 6				Unit Readings in
Oct. 4	10		2 body, cent. forces	*Unit I.*
Oct. 6	11	H.W. due	Non – inertial frames	*Unit I.*
Week 7				
Oct. 11	12		Non – inertial frames	*Unit I.*
Oct. 13	13	H.W. due	Rigid Rot. Dyn.	*Unit I.*
Week 8				
Oct. 18	14		Rigid Rot. Dyn.	*Unit I.*
Oct. 20	15	H.W. due	Calc. of Var. & Lagrange	*Unit II.*
Week 9				
Oct. 25	16		Mid. Term Exam	*Unit I.*
Oct. 27	17		Calc. of Var. & Lagrange	*Unit II.*

Tentative 410 Lecture Schedule - Fall 2005

NOVEMBER

Date	Class#	Comment	Topic	Reading Assign.
Week 10				Unit Readings in Taylor
Nov. 1	18		Lagrange & Hamilton	*Unit II.*
Nov. 3	19	H.W. due	Lagrange & Hamilton	*Unit II.*
Week 11				
Nov. 8	20		Special Relativity	*Unit III.*
Nov. 10	21	H.W. due	Special Relativity	*Unit III.*
Week 12				
Nov. 15	22		Special Relativity	*Unit III.*
Nov. 17	23	H.W. due	Oscillators, Norm. Modes	*Unit IV.*
Week 13				
Nov. 22	24		Oscillators, Norm. Modes	*Unit IV.*
Nov. 24	25		Thanksgiving Break	
Week 14				
Nov. 29	26			

Tentative 410 Lecture Schedule - Fall 2005

DECEMBER

Date	Class#	Comment	Topic	Reading Assign.
Week 14				Unit Readings in Taylor
Dec. 1	27	H.W. due	Norm. Modes & Cont. Dyn.	*Unit IV.*
Week 15				
Dec. 6	28		Norm. Modes & Cont. Dyn.	*Unit IV.*
Dec. 8	29	H.W. due		
Week 16				
Dec. 13	30		Review	