

# PHYS 311 – Advanced Classical Mechanics

**Semester:** Fall 2009  
**Lecture Hours:** Tu, Th B4 – 14:00 – 15:15  
**Room:** SCI Z06

<b>Instructor:</b> Alper Kiraz	<b>TA:</b> M. Yavuz Yüce
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<b>Off. Hr:</b> Tu, B5 15:30 – 16:45 or by appointment	<b>Prob. Sess.:</b> To be announced

**Course Description:** Nonlinear oscillations; numerical methods and visualizations for chaotic systems; linear stability analysis; calculus of variations; Lagrangian and Hamiltonian dynamics; canonical transformations and Hamilton-Jacobi theory; Poisson brackets; dynamics of systems of particles; dynamics of rigid bodies; coupled oscillations; dynamics of continuous systems; the special theory of relativity.

**Textbooks:** *Classical Mechanics* by Tom W. B. Kibble and Frank H. Berkshire, Fifth Edition, 2004 Imperial College Press, ISBN: 9-781860-944352  
*Classical Dynamics of Particles and Systems* by S. T. Thornton and J. B. Marion, Fifth Edition, 2004 Brooks/Cole, ISBN: 0-534-40896-6

**Grading:** 1<sup>st</sup> Midterm 20 %, (16 Nov. 2009)  
 2<sup>nd</sup> Midterm 20 %, (21 Dec. 2009)  
 Homework 10 %  
 12 Quizzes 18% (1.5% per quiz)  
 Final 25% (to be announced)

**Attendance Policy:** If a student attends 90%-100% of the classes s/he obtains 7%, if a student attends 70%-90% of the classes s/he obtains 5%, if a student attends 50%-70% of the classes s/he obtains 3%.

**Homework Policy:** You may discuss the problems, consult your teachers and use the library and internet. However, the final submitted work should be totally yours. You must not submit work done in groups, transfer files or copy from a book.

## Lecture Schedule:

Week	Subject	Week	Subject		
1	Feb. 15	Calculus of Variations (TM Ch. 6, KB Ch. 3)	9	Apr. 12	Small Oscillations and Normal Modes (KB Ch. 11)
2	Feb. 22	Calculus of Variations (TM Ch. 6, KB Ch. 3)	10	Apr. 19	Small Oscillations and Normal Modes (KB Ch. 11)
3	Mar. 1	Lagrangian Mechanics (KB Ch. 10, TM Ch. 7)	11	Apr. 26	Hamiltonian Mechanics (KB Ch. 12, TM Ch. 7)
4	Mar. 8	Lagrangian Mechanics (KB Ch. 10, TM Ch. 7)	12	May 3	Hamiltonian Mechanics (KB Ch. 12), TM Ch. 7
5	Mar. 15	Lagrangian Mechanics (KB Ch. 10, TM Ch. 7)	13	May 10	Nonlinear Oscillations and Chaos (TM Ch. 4)
6	Mar. 22	Lagrangian Mechanics (KB Ch. 10, TM Ch. 7)	14	May 17	Nonlinear Oscillations and Chaos (TM Ch. 4)
7	Mar. 29	Small Oscillations and Normal Modes (KB Ch. 11)	15	May 24	Nonlinear Oscillations and Chaos (TM Ch. 4)
8	Apr. 5	<b>Spring Break</b>			<b>Final Exam (App. A, Ch.s 1-7)</b>