

Course Syllabus

**PHY 5246 Theoretical Mechanics**

Fall 2014

Lectures: Mon-Wed 9:05am – 10:20am; Fri 9:05am-9:55am (HCB 219)  
starting Monday, Aug 25

Instructor: *Oskar Vafek*

e-mail: vafek'at'magnet.fsu.edu

Office hours: Mon 10:50-11:50pm (Keen 309) and by appointment

**Topics and objective:**

This is a one semester graduate level course. In the first part of this course, we will start from the Lagrangian formulation of classical mechanics and study the solution of the equations of motion of several systems, from simple one-body systems, to more complex systems acted upon by central forces and rigid bodies, up to scattering problems and oscillations. We will also extend our discussion to include the theory of special relativity. The second part of this course will introduce the hamiltonian formulation of classical mechanics and study its formal and physical consequences. More advanced topics, such as non-linear dynamics and continuous systems, will be discussed in the third part of this course, depending on time availability.

Upon successful completion of this course the student is expected to understand and actively use in problem solving:

- Holonomic vs. non-holonomic systems
- d'Alembert and Hamilton's principles and their range of applicability
- Use of Lagrange multipliers in non-holonomic systems
- Techniques for central force and Kepler problems, including scattering
- Techniques for rigid body motion
- Techniques for oscillatory motion
- Poisson's brackets and canonical transformations

**Main text:**

- H. Goldstein, C. Poole, and J. Safko, *Classical Mechanics*, Addison Wesley (3<sup>rd</sup> Edition).

**Suggested** reference book: L. D. Landau and E. M. Lifshitz, *Mechanics*, Butterworth-Heinemann Publisher (Third Edition).

**Evaluation of Performance:**

The homework will be assigned on a weekly basis, on Wednesday, due the next Wednesday at class time. It may consist of graded and non-graded problems. Only the graded problems will have to be returned by the due date. Solutions will be posted (for all problems, both graded and non-graded) on the course web page. I will not accept late homework except for special circumstances (to be discussed with me ahead of time). There will be no make-up for late or missed homework.

A student's grade will be based 30% on the homework, 40% on two Midterm Exams (20%

each) and 30% on the Final Exam. Letter grades will be determined from numerical grades as follows:

100-85% : A  
84-70% : B  
69-55% : C  
54-40% : D  
below 40% : F

Attendance and participation may also be factors in determining a student's final grade at the discretion of the instructor.

### **ADA Statement:**

Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center (SDRC), and (2) bring a letter to the instructor from SDRC indicating your need for academic accommodation and what type. Please do this during the first week of class. For more information about services available to FSU students with disabilities, contact:

Student Disability Resource Center  
874 Traditions Way  
108 Student Services Building  
Florida State University  
Tallahassee, FL 32306-4167  
(850) 644-9566 (voice)  
(850) 644-8504 (TDD)  
E-mail: [sdrc@admin.fsu.edu](mailto:sdrc@admin.fsu.edu)  
<http://www.disabilitycenter.fsu.edu/>

### **Academic Honor Policy:**

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "... be honest and truthful and ... [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>.) Students are expected to uphold this Academic Honor Policy.

### **University Attendance Policy:**

Excused absences include documented illness, deaths in the immediate family and other documented crisis, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize stu-

dents who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

**Syllabus Change Policy:**

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.