PHY 5210 – Classical Mechanics II – Syllabus

Semester: Winter 2018

Lecturer:

Prof. **Alexey A. Petrov**, Room 358 Physics Building,
Phone: 313-577-2739, or 313-577-2720 (for messages)
e-mail: apetrov@wayne.edu, Web: http://www.physics.wayne.edu/~apetrov/

Lecture: **Monday, Wednesday, Friday 2:30 pm – 3:20 pm,** 177 Physics Building

Text: John R. Taylor, _Classical Mechanics_ (University Science Books, (2005); ISBN 1-891389-22-X); also consider L. Landau, E. Lifshitz, Mechanics; ISBN: 0750628960

Office Hours: Monday 11:30 – 12:30 pm or by appointment.

Grading: Your course grade will be determined by your performance in homework assignments, project work, two Midterm Exams and a Final Exam on the basis of the following distribution.

Homework Asignments (typically every 7-10 days)	30%
First Midterm Exam	20%
Second Midterm Exam	20%
Final Exam	30%

Homework assignments: The completed homework assignments are due _at the beginning of the class_ on the due date. **Late submissions will not be accepted.** Homework must include _explanatory text_ and be _neatly written_ or it will be given zero credit. _A sequence of equations without explanation is not appropriate._ Two lowest homework scores will be dropped. It is important to work problems constantly through the course, providing solutions with an explanation of how it is obtained. It is important to take and keep lecture notes and read the textbook. We will discuss some of the homework problems in class if appropriate. You are welcome to form group studies, but must submit your own work.

Exams: The final exam will cover all the material of this course; however, there will be slight emphasis on material not covered by the first and the second midterm exams.

Course description and objectives: This course provides an introduction to fundamental ideas of Lagrange nad Hamilton mechanics: dynamics of particles and systems including central force motion, coupled oscillations and waves in elastic media.

Website: http://www.physics.wayne.edu/~apetrov/PHY5210/

Topics to be covered (approximate):

1. **Mechanics in Noninertial Frames.** The mechanics of objects in linearly accelerating and rotating frames, the centrifugal force, the Coriolis force, tides, and the Foucault pendulum.
2. **Calculus of Variations and Lagrange's Equations.** Equations of motion. Symmetries and energy and momentum.
3. **Rotational Motion of Rigid Bodies.** Center of mass and relative coordinates, angular momentum, kinetic energy, and potential energy; rotation about a fixed axis, moment of inertia; rotation about any axis and the moment of inertia tensor; principal axes, eigenvalue equations, matrices; precession; Euler's equations; nutation
4. **Coupled Oscillators and Normal Modes.**
5. **Nonlinear Mechanics and Chaos.**
6. **Collision Theory.**
7. **Hamilton Mechanics.** Hamilton and Hamilton-Jacobi equations. Quantum Mechanics.
8. **Mechanics of Continuous Media and other topics.** (time permitting)

PHY 5200 and 5200 or equivalents are a prerequisite for this course.

Final Grade: The overall course grade will be determined on the basis of the following grading curve (any score below 40 is considered as F):

Grade	Cumulated Score	Grade	Cumulated Score
A	90-100	C+	65-69
A-	85-89	C	60-64
B+	80-84	C-	55-59
B	75-79	D+	50-54
B-	70-74	D	40-49

Learning outcomes: Understanding of the principles and concepts of Lagrange and Hamilton formulations of Classical Mechanics. Ability to solve problems and apply corresponding techniques for the material outlined above. Ability to critically read and understand scientific texts related to Classical Mechanics.

Students with disabilities If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.