

Physics 911 — Classical Mechanics

Fall 2015

Synopsis

This course will cover the foundations of classical mechanics: variational principles; symmetries and conservation laws; canonical formalism; action-angle variables and integrability; and perturbation theory.

Meeting Time

Official time: 09:00 – 10:30 AM MWF, Jorgensen Hall, Room 151

We will meet Monday and Wednesday only.

Instructor

Brad Shadwick, 310N Jorgensen Hall, 472-3578, shadwick@mailaps.org

Office Hours: Drop by or by appointment.

Text

There is no formal textbook for this course. Recommended but not required text: Fasano and Marmi, *Analytical Mechanics: An Introduction*, Oxford University Press, 2006.

Additional references

Advanced:

- José and Saletan, *Classical Dynamics: A contemporary Approach*
- Johns, *Analytical Mechanics for Relativity and Quantum Mechanics*
- Goldstein, Poole and Safko, *Classical Mechanics*, 3rd ed.
- Goldstein, *Classical Mechanics*, 2nd ed.

Intermediate:

- Brizard, *An Introduction to Lagrangian Mechanics*
- Hand and Finch *Analytical mechanics*
- Landau & Lifshitz, *Mechanics*

Mathematical:

- Arnold, *Mathematical Methods of Classical Mechanics*

Supplementary:

- Gelfand and Fomin, *Calculus of Variations*
- Zwillinger, *Handbook of Differential Equations*
- Gradshteyn and Ryzhik, *Table of Integrals, Series, and Products*

Many of these references are on reserve in the Engineering library (search by course number or instructor).

Quizzes

We will have approximately 3 twenty minute quizzes throughout the semester. Tentative schedule: 16 September, 21 October, and 23 November.

Exams

There will be one mid-term exam, tentatively scheduled for Thursday, October 8 from 7:00 to 9:00 PM. A comprehensive two hour final exam is officially scheduled for 07:30 AM on Wednesday, December 16, 2015.

Homework

Mastering the concepts covered in this course requires solving problems. The importance of doing and fully understanding the homework problems cannot be over emphasized. Homework will be assigned roughly weekly and will be due approximately one week later. While discussing homework problems with other students is encouraged, the work you turn must be yours alone. In your solutions, you **must state** all sources (people, web sites, books, *etc.*) from which you obtained part or all of a solution. Symbolic algebra programs such as Maple and Mathematica **are not to be used** to do homework calculations. Homework is due at the end of the day listed on the assignment.

Grading (approximate)

- 30% Final exam
- 30% Mid-term exam
- 25% Quizzes
- 15% Homework

Web Pages

Course materials will be available through the Blackboard system.

Makeup Lecture Time

The instructor will likely need to miss a class from time to time. Makeup lectures will be held on Fridays at 9:00 in the regular location. Dates of makeup lectures will be announced during the semester.

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.