

Analytical Mechanics II (PHY 312)

Spring 2017

Dr. Scott N. Walck

Contact Information

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Course Description

Second semester of a rigorous study of classical mechanics, including the motion of a single particle and the motion of a system of particles. The Lagrange generalization of Newtonian mechanics, special relativity, and general relativity are among the topics treated. Prerequisites: PHY 111/L and MAS 266. 3 credits.

Learning Objectives

It is expected that students will

1. describe physical situations using the languages of Lagrangians and four-vectors
2. interpret the results of experiments in terms of relativity theory
3. apply the ideas of Lagrangian mechanics and relativity to specific physical situations
4. calculate physical quantities of interest
5. calculate the future state of a system from its initial state and its equations of motion
6. solve problems in classical mechanics using Lagrangians
7. solve problems in relativity theory

IDEA Objectives

1. Learning fundamental principles and theories, in particular the Lagrangian formulation of classical mechanics, special relativity, and general relativity
2. Gaining factual knowledge and terminology, especially the terminology of four-vectors in which relativity is expressed
3. Learning to apply course material to solve problems in classical mechanics

Textbook

The textbook for the course is *Introduction to Classical Mechanics* by David Morin, Cambridge University Press, ISBN 978-0-521-87622-3.

Plan

The plan for this course is to read chapters 1, 6, 11, 12, 13, and 14 of Morin. Each week you will present one Problem and one Exercise from the chapter on the syllabus for that week. The Problem can be any problem of interest to you; the Exercise must have at least two stars.

Grading

Your grade will be determined by the completeness of the Problems and Exercises that you present.

Class Schedule

Week of	Topic
01/16	Chapter 1
01/23	Chapter 6
01/30	Chapter 6
02/06	Chapter 6
02/13	Chapter 11
02/20	Chapter 11
02/27	Chapter 12
03/06	Spring Break
03/13	Chapter 12
03/20	Chapter 12
03/27	Chapter 13
04/03	Chapter 13
04/10	Chapter 13
04/17	Chapter 14
04/24	Chapter 14
05/01	Chapter 14