

Physics 430—Classical Mechanics – Fall 2009 – Sec 001

Prof. Dale E. Gary -- <http://web.njit.edu/~gary>

Lecture: Tuesday, 8:30-9:55 am and Thursday, 2:30-3:55 pm, Room 314 FMH

Text: Classical Mechanics—John R. Taylor

ISBN-10: 189138922X; ISBN-13: 978-1891389221

Announcements:

Office Hours for Dale E. Gary: Wed, Thurs 10:00-11:30 AM, in 101 Tiernan

We will be using the Phun physics engine quite regularly in class and for exercises. Please download the current version of Phun (Phun beta 5) at:

<http://www.phunland.com/wiki/Download>.

We will also be using Matlab rather extensively. Download and install the latest version of Matlab (2009a) at:

<http://ist.njit.edu/software/display.php?id=327>. (Windows)

<http://ist.njit.edu/software/display.php?id=329> (Linux)

<http://ist.njit.edu/software/display.php?id=332> (MacOS)

Grading

Your final grade in Physics 430 will be determined by your performance on the following:

Exams: Two exams will be given during the normal class period. The schedule is:

- Exam 1 : Tuesday, October 6, 8:30 – 9:55 am
- Exam 2 : Tuesday, November 10, 8:30 – 9:55 am

Final Exam: A comprehensive examination of the entire semester's work will be given at the end of the semester, sometime during the period (TBA) December 11 - 17. 2.5 hours long.

Homework: Homework assignments are due each week, at the start of the Tuesday class.

Attendance: As Woody Allen said, "90% of life is just showing up." Attendance at lectures is expected, and there is an "easy" 10% of your grade allotted to simply showing up and participating in class. If class attendance becomes a problem, quizzes during class will be instituted!

The final grades will be based on a composite score that includes each common exam score, the final exam, short quizzes, and the term's homework score. Here are the approximate weights to be used for calculating the final grade and the final grade scale:

Relative weights of grade components	Total Score	Final Grade
30% for all three common exams (15% each)	80% and more	A
30% for the final exam	65% - 79%	B
30% for the total homework + quiz grade	55% - 64%	C
10% for attendance and class participation	50% - 54%	D
	49% and less	F

Getting Help:

This course is expected to be challenging, but you do not have to learn alone! You can seek help during Prof. Gary's office hours, W, Th, 10-11:30 am. There will also be help sessions prior to the two mid-term exams.

Honor Code Violations or Disruptive Behavior:

NJIT policy is zero-tolerance for cheating of any kind and for student behavior that disrupts learning by others. Incidents will be immediately reported to the Dean of Students. The penalties for violations range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on a students' permanent record. Avoid situations where your own honorable behavior could be misinterpreted. Students will be required to adhere to the [NJIT Honor Code](#).

Assignments:

















- The weekly text and homework assignments are listed in the schedule below. It is not possible to succeed in this course without working a lot of problems, and this is reflected in the weighting of the homework problems--30% of the total grade.
- The weekly **text readings and homework problems** are from *Classical Mechanics*, by John R. Taylor, as indicated in the table below. Read each assigned section before the Lecture covering the material in it. We suggest that you download the lectures, which will be posted ahead of the class time and bring them to class.
- **You may work together in completing the homework**, however, **each student must turn in his/her own weekly assignment**. You are accountable for knowing what is on your homework papers. Handing in a paper containing someone else's work is a violation of the honor code.
- The homeworks are due by the start of class each Tuesday. Note that homework is due even on the two exam days. Late work will be accepted up to one week late, at 50% penalty. After 1 week, no credit will be given.











Courtesy:

Please do not eat, drink, or create noise that interferes with the work of students or instructors. **Cellular phones, wireless devices, notebook computers, and messaging devices of all kinds should be turned off during class meetings and exams.**

Syllabus:

Any changes to the syllabus will be consulted with students.

Lecture and Topics Covered	Reading Assignments	Homework Assignments (all due at start of class on due date)
September 1, Lecture 1 Mass, Force, Newton's Laws 	Chapter 1: 1.1-1.5	HW Probs: 1.2, 1.12, 1.17, 1.25 (HW 1a due, Sept. 8)
September 3, Lecture 2 Newton's 2nd Law in Cartesian and Polar Coordinates 	Chapter 1: 1.6-1.7	HW Probs: 1.35, 1.45, 1.49 (HW 1b due, Sept. 8)
September 8, Lecture 3 Linear Air Resistance 	Chapter 2: 2.1-2.3	HW Probs: 2.2, 2.8, 2.13, 2.20 (HW 2a due, Sept. 15)
September 10, Lecture 4 Quadratic Air Resistance 	Chapter 2: 2.4-2.5	HW Probs: 2.23, 2.34, 2.37 (HW 2b due, Sept. 15)
September 15, Lecture 5 Complex Exponentials, Rockets 	Chapter 2: 2.6-2.7 Chapter 3: 3.1-3.2	HW Probs: 2.49, 2.53, 3.4, 3.7, 3.14 (HW 3a due, Sept. 22)
September 17, Lecture 6 Center of Mass, Angular Momentum 	Chapter 3: 3.3-3.5	HW Probs: 3.22, 3.32, 3.35 (HW 3b due, Sept. 22)
September 22, Lecture 7 Kinetic and Potential Energy 	Chapter 4: 4.1-4.2	HW Probs: (HW 4a due, Sept. 29)
September 24, Lecture 8 Force and Potential Energy 	Chapter 4: 4.3-4.6	HW Probs: (HW 4b due, Sept. 29)
September 29, Lecture 9 Curvilinear Systems, Central Forces 	Chapter 4: 4.7-4.8	HW Probs: (HW 5a due, Oct. 6)
October 1, Lecture 10 Energy of Interaction 	Chapter 4: 4.9-4.10	HW Probs: (HW 5b due, Oct. 6)
Exam 1: October 6 Tuesday, 8:30-9:55		Covers Lectures 1-10 Chapters 1-4
October 8, Lecture 11 Oscillations 	Chapter 5: 5.1-5.2	HW Probs:(HW 6 due, Oct. 13)
October 13: Lecture 12 Two Dimensional Oscillators 	Chapter 5: 5.3-5.4	HW Probs:(HW 7a due, Oct. 20)
October 15: Lecture 13 Driven Oscillations and Resonance 	Chapter 5: 5.5-5.6	HW Probs:(HW 7b due, Oct. 20)
October 20: Lecture 14 Calculus of Variations 	Chapter 6: 6.1-6.4	HW Probs:(HW 8a due, Oct. 27)
October 22: Lecture 15 Lagrange's Equations 	Chapter 7: 7.1-7.2	HW Probs:(HW 8b due, Oct. 27)
October 27: Lecture 16 Lagrange's Equations with Constraints 	Chapter 7: 7.3-7.4	HW Probs:(HW 9a due, Nov. 3)
October 29: Lecture 17	Chapter 7: 7.5-7.7	HW Probs:(HW 9b due, Nov. 3)

Examples of Lagrange's Equations 		
November 03: Lecture 18 Two-Body, Central Force Problems 	Chapter 8: 8.1-8.5	HW Probs: (HW 10a due, Nov. 10)
November 05: Lecture 19 Kepler Orbits 	Chapter 8: 8.6-8.8	HW Probs: (HW 10b due, Nov. 10)
Exam 2: November 10 Tuesday, 8:30-9:55 am		Covers Lectures 11-19 Chapters 5-8
November 12: Lecture 20 Non-Inertial Frames 	Chapter 9: 9.1-9.4	HW Probs: (HW 11 due, Nov. 17)
November 17: Lecture 21 Rotating Frames 	Chapter 9: 9.5-9.9	HW Probs: (HW 12a due, Nov. 24)
November 19: Lecture 22 Rotation About a Fixed Axis 	Chapter 10: 10.1-10.2	HW Probs: (HW 12b due, Nov. 24)
November 24 (Thursday Schedule): Lecture 23 Inertia Tensor and Principle Axes 	Chapter 10: 10.3-10.6	HW Probs: (HW 13 due, Dec. 1)
Thanksgiving November 26	Recess	No class on Thursday
December 01: Lecture 24 Euler's Equations 	Chapter 10: 10.7-10.8	HW Probs: (HW 14a due, Dec. 8)
December 03: Lecture 25 Coupled Oscillators 	Chapter 10: 11.1-11.3	HW Probs: (HW 14b due, Dec. 8)
December 08: Lecture 26 Lagrangian Approach 	Chapter 11: 11.4-11.6	HW Probs: (HW 15 due, Dec 15)
Reading Day: December 10	No classes	
Final Exam Period	December 11 - 17	Comprehensive final exam