

# Physics Department, California State Polytechnic University, Pomona



Physics 322  
Spring 2001

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**Course Description:** Physics 322 is the second course of a two-quarter, junior level sequence in classical mechanics.

**Conditions of enrollment:** Physics 309 (the second quarter of Fundamentals of Mathematical Physics) and Physics 321 (the first quarter of Mechanics) are prerequisite for all students enrolled in this course.

**Text:** *Mechanics*, 3<sup>rd</sup> Ed., by Symon.

**How to get help:** My office hours are Mondays 2-4 PM and Wednesdays 2-4 PM. If you can't come during these hours, I will make an appointment with you for another time. For me, one of *the* most enjoyable aspects of teaching is working with students one-on-one and clearing up specific problems. *Please* come see me often.

**Class Attendance and Participation:** Class meetings are MWF 8-9:05. The class will be conducted in a participatory fashion and your attendance and participation will determine a portion of your grade. I have included a detailed schedule of topics with this syllabus. Assigned readings are to be completed before class meetings.

**Homework:** I will assign homework (consisting in general of reading, questions, and one or two problems) to be completed before each class meeting. We will devote the first part of each class to going over the day's assignment in one or two small groups. I will be primarily an observer of those discussions.

Afterward we will reconvene and clear up any remaining questions about the assignment. You should leave the class with either completed solutions or with clear notes that will allow you to complete the solutions later the *same* day. I will not in general supply formal "solutions" to the homework. Keep your completed homework, organized by date, in a special section of a looseleaf notebook that you bring to class each day.

After each exam you will turn in your collected homework organized by date. I will look over that work, make some notes, and assign a score from 0 to 4 with "4" indicating very consistent and often exceptional work, a "3" indicating generally consistent and conscientious work, "2" indicating inconsistent or lower quality work, and a "1" indicating only occasional or generally incomplete, low quality work.

**Examinations:** There will be one midterm exam and a final exam. Your overall "Exam Score" will be given by

$$\text{Exam Score} = \begin{cases} 100\% \text{ Final,} & \text{if Final} \geq \text{Midterm} \\ 60\% \text{ Midterm} + 40\% \text{ Final,} & \text{if Final} < \text{Midterm} \end{cases}$$

**Grading:** Your overall "Course Score" will be calculated using the following relative weights:

Class Attendance and Participation	10%
Homework	30%
Exams	60%

Course *grades* will be assigned using the following maximum breakpoints:

"Course Score" 80%, "A" (meaning "some kind of A"); 65%, "B"; 50%, "C"; 40%, "D"

**Email list:** I have set up an email list called "phy322" (Note: no space between the "phy" and the "322") to support this class. Anyone who subscribes to the list will receive all email sent to the list.

To subscribe to the list, send a message to "[listproc@listproc.csupomona.edu](mailto:listproc@listproc.csupomona.edu)" with no "subject" and a single line that reads

subscribe phy322 name [with your first and last name substituted for "name"]

Save the message that listproc sends back to you because it contains important information.

**Academic Integrity:** Please make sure that you have read and fully understand the statement on academic integrity that appears in the University catalog. My strongest desire is to act as facilitator for your studies in physics. Accordingly, I operate on the assumption that all of our interactions are based on openness, honesty, and good faith. I have no desire to act as policeman, just as *you* should not have to be concerned about being treated fairly and with respect. Because our trust in each other is absolutely *crucial* to the effectiveness of our relationship, I take an uncompromising stance on the necessity for sanctions when it is violated.

**Tentative Course Schedule:**

<i>Date</i>	<i>Read Before Class</i>	<i>Topics/Events/Notes</i>
3/26		
3/28	7.1-2	<i>Physics in accelerated reference frames</i> —Moving and rotating coordinate systems
3/30		<b>(Holiday)</b>
4/2	7.3-4	Laws of motion on a rotating planet, the Foucault pendulum
4/4	7.6	The restricted three body problem, Lagrange points
4/6	8.1-2	<i>Mechanics of continuous media</i> —The vibrating string
4/9	8.3-4	Finite element model of a string
4/11	8.5-6	Kinematics of fluids
4/13	8.7-9	Dynamics of fluids
4/16	8.10-11	Waves in fluids
4/18	8.12-13	Sound waves in pipes, cutoff frequencies, dispersion, group velocity
4/20	(8.14-15? tbd)	Scaling laws in fluids, Mach and Reynolds numbers (if time allows)
4/23	9.1	<i>Lagrangian and Hamiltonian mechanics</i> —Generalized coordinates
4/25	9.2-3	Lagrange's equations
4/27	—	<b>Midterm Exam</b>
4/30	9.4-5	Systems with constraints
5/2	9.6-7	Ignorable coordinates, constants of the motion
5/4	(9.8-9? tbd)	Velocity dependent potentials, Lagrangian of a vibrating string (if time allows)
5/7	9.10-11	Hamilton's equations, Liouville's theorem
5/9	10.1-3	<i>The inertia and stress tensors</i> —Tensor algebra
5/11	10.4	Diagonalizing symmetric tensors, eigenvectors and eigenvalues
5/14	10.5	The inertia tensor
5/16	(10.6? tbd)	The stress tensor (if time allows)
5/18	11.1-3	<i>General rotation of a rigid body</i> —Euler's equations and Poinot's solution
5/21	11.4-5	Euler angles, the symmetrical top
5/23	12.1-3	<i>The theory of small vibrations</i> —Linearized equations of motion, normal modes
5/25	12.4-5	Forced vibrations, perturbation theory
5/28	—	<b>(Holiday)</b>
5/30	12.6	Small vibrations
6/1	12.8	Stability in the restricted three body problem
6/8		<b>Final Exam</b> (Friday, 9:10 - 11:10)