PHYS3101 Analytical Mechanics (Fall 2023)

Class Schedule as of November 11, 2023

Reading and homework assignments from *Classical Mechanics* (University Science Books 2005) by John R. Taylor
Additional reading from *A Short Introduction to Mathematical Concepts in Physics* (handout)

Day	Date	Topics	Taylor	Concepts	Due
Tue	29 Aug	Review: Forces, Momentum, Angular momentum, and Energy	Chap's 1–5	Chap 3	—
Thu	31 Aug	Review: Hamilton's Principle and Lagrange's Equations of Motion	Chap 6; 7.1	Chap 7	Quiz #1
Tue	5 Sep	Lagrange's Equations for Constrained Systems; Degrees of Freedom	7.2,3,4	—	HW #1
Thu	7 Sep	Examples of Mechanical Problems Solved with Lagrange's Equations	7.5	—	Quiz #2
Tue	12 Sep	Ignorable Coordinates and Conservation Laws; Magnetic Forces	7.6,7,8,9	—	HW #2
Thu	14 Sep	Lagrange Multipliers and Constraint Forces	7.10	7.4	Quiz #3
Tue	19 Sep	The Two-Body Central Force Problem; The Center-of-Momentum Frame	8.1,2,3,4	—	HW #3
Thu	21 Sep	Keplerian Orbits; The DART Mission (Possible homework assignment)	8.5,6,7,8	—	Quiz #4
Tue	26 Sep	Kinematics and Dynamics in Accelerating and Rotating Reference Frames	9.1,3,4,5	Chap 4	HW #4
Thu	28 Sep	Motion at the Earth's Surface; Perturbative Solutions to Differential Equations	9.6,7,8,9	Chap 4	Quiz #5
Tue	3 Oct	Rigid Body Rotation and the Inertia Tensor; Principal Axes	10.1,2,3,4,5	6.4	HW #5
Thu	5 Oct	Precession under a Weak Torque; Euler's Equations	10.6,7,8	—	Quiz #6
Tue	10 Oct	Euler Angles; The Lagrangian for a Symmetric Spinning Top	10.9,10	—	HW #6
Thu	12 Oct	Precession and Nutation of a Symmetric Spinning Top	10.10	—	Quiz #7
Tue	17 Oct	Review: Two Coupled Oscillators; The Double Pendulum	11.1,2,3,4	3.7	HW #7
Thu	19 Oct	General Coupled Oscillations; Normal Coordinates	11.5,6,7	6.4.3	Quiz #8
Tue	24 Oct	The Hamiltonian Formulation of Mechanics	13.1,2,3	—	HW #8
Thu	26 Oct	Ignorable Coordinates; Phase Space Orbits	13.4,5,6	4.3.2	Quiz #9
Tue	31 Oct	Liouville's Theorem	13.7	—	HW #9
Thu	2 Nov	Introduction to Relativistic Kinematics	Notes	—	Quiz #10
Tue	7 Nov	Collisions and Cross Sections	14.1,2,3,4	—	HW #10
Thu	9 Nov	Calculating Cross Sections	14.5,6,7,8	—	Quiz #11
Tue	14 Nov	Classical Fields: Strings, Springs, and Electromagnetism	16.1,2,3,4	4.5; 5.1,2,3	HW #11
Thu	16 Nov	Inviscid Fluids and Sound Waves	16.12,13	—	Quiz #12
22-26 Nov		**Thanksgiving Break (No Classes)**			
Tue	28 Nov	Nonlinear dynamics and Chaos: The Damped Driven Pendulum	Chap 12	Chap 3	HW #12
Thu	30 Nov	*See the course website for the* MATHEMATICA *notebook*		—	—
Tue	5 Dec	Stresses and Strains in Solids	16.5,6,7,8,9	—	HW #13
Thu	7 Dec	Wave Propagation in Elastic Media	16.10,11	—	Quiz #13