PH 141 **Fall 2022**

Foundations of Mechanics

Syllabus

Week	Class	Date	Subject (Reading assignments from Halliday, Resnick and Walker)
(1)	1	Sept. 7	Introduction to PH141 and the science of physics Read: Sections 1-1 through 1-3
	2	Sept. 9	Motion and its description Read: Sections 2-1 and 2-2 Ungraded PH141 questionnaire due
(2)	3	Sept. 12	Acceleration and "the kinematic equations" Read: Sections 2-3 and 2-4 Problem Set #1 due
	4	Sept. 14	Freely falling objects Read: Section 2-5
	5	Sept. 16	Vectors and motion in more than one dimension Read: Sections 3-1, 3-2, and 4-1 Problem Set #2 due
(3)	6	Sept. 19	Vectors for velocity and acceleration; projectile motion Read: Sections 4-2 through 4-4
	7	Sept. 21	Classic problems in projectile motion Read: Section 4-4
	8	Sept. 23	Circular motion and relative motion Read: Sections 4-5 and 4-6 Problem Set #3 due
(4)	9	Sept. 26	Newton's laws of motion: inertia, mass, and force Read: Sections 5-1 and 5-2
	10	Sept. 28	Newton's second law and some applications Read: Sections 5-2 and 5-3
	11	Sept. 30	Newton's third law and more applications Read: Section 5-3 Problem Set #4 due

Week	Class	Date	Subject
(5)		Oct. 2	**(Sunday)** Optional Midterm #1 Review Session 6:30-8:00 PM in Keyes 105
	12	Oct. 3	**Midterm #1**
	13	Oct. 5	Frictional forces and dynamics Read: Sections 6-1 and 6-2
	14	Oct. 7	Circular motion and forces: Ferris wheels, roller coasters, and swinging buckets Read: Section 6-3 Problem Set #5 due
(6)		Oct. 10	Fall Break
	15	Oct. 12	Work and energy: a new way of understanding interactions Read: Sections 7-1 through 7-3, and 3-3
	16	Oct. 14	The work-energy theorem Read: Sections 7-4 through 7-6 Problem Set #6 due
(7)	17	Oct. 17	Potential energy and the "conservation" of energy Read: Sections 8-1 and 8-2
	18	Oct. 19	Potential energy curves and the extended law of conservation of energy Read: Sections 8-3 through 8-5
	19	Oct. 21	Motion of a system of objects: center of mass and its motion Read: Sections 9-1 through 9-3 Problem Set #7 due
(8)	20	Oct. 24	Momentum, impulse, and the conservation of linear momentum: golf swings, karate strikes, air bags, and rockets Read: Sections 9-4, 9-5, and 9-9
	21	Oct. 26	Collisions Read: Sections 9-6 through 9-8
	22	Oct. 28	Rigid objects and rotational kinematics Read: Sections 10-1 through 10-3 Problem Set #8 due

Week	Class	Date	Subject
(9)	23	Oct. 31	Moment of inertia and torque Read: Sections 10-4 through 10-6
		Nov. 1	**(Tuesday)** Optional Midterm #2 Review Session Keyes 105 6:30-8:00 PM
	24	Nov. 2	**Midterm #2**
	25	Nov. 4	Rolling motion and rotational kinetic energy Read: Sections 11-1 and 11-2 Problem Set #9 due
(10)	26	Nov. 7	Angular momentum Read: Section 11-5 through 11-9 and 13-6 (again!)
	27	Nov. 9	Planets, Kepler's laws and Newton's universal law of gravitation Read: Section 13-6 and 13-1 through 13-4
	28	Nov. 11	Understanding of Kepler's laws in terms of conservation laws Read: Section 13-5 Problem Set #10 due
(11)	29	Nov. 14	Oscillators and simple harmonics motion: differential equations Read: Sections 15-1 and 15-2
	30	Nov. 16	Angular oscillators and the pendulum Read: Sections 15-3 and 15-4
	31	Nov. 18	Fluids, pressure, and Pascal's principle Read: Sections 14-1 through 14-4
(12)	32	Nov. 21	Archimedes' principle and Bernoulli's equation: fluid flow Read: Sections 14-5 throug 14-7 Problem Set #11 due
		Nov. 23	Thanksgiving Break
		Nov. 25	Thanksgiving Break

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(13)	33	Nov. 28	Waves and wave equations Read: Sections 16-1 through 16-4 and 17-2
	34	Nov. 30	Superposition and standing waves Read: Sections 16-5 and 16-7
	35	Dec. 2	Sound waves Read: Sections 17-1, 17-2, 17-4, and 17-5 Problem Set #12 due
(14)		Dec. 4	**(Sunday)** Optional Midterm #3 Review Session Keyes 105 6:30-8:00 PM
	36	Dec. 5	**Midterm #3**
	37	Dec. 7	Interference and beats Read: Sections 17-3 and 17-6
	38	Dec. 9	The Doppler effect Read: Sections 17-6 and 17-7 Problem Set #13 due
(15)		TBA	Final Exam Review Session Time determined based on student feedback
		TBA	**Final Exam** Exam period scheduled by the registrar