PHYSICS 20

Mr. M Cherney

COURSE OUTLINE 2024-2025

Ch 0 Mathematics of Physics	10(11 1st)-9 Classes	10(11) School Days	Sept 3 – Sept 17
Ch 1 Kinematics I One Dimension	9(11 FR)-9 Classes	9(11) School Days	Sept 18 – Oct 4
Ch 2 Kinematics II Two Dimensions	8-7 Classes	8 School Days	Oct 7 – Oct 17
Ch 3 Dynamics Laws of Motion	9-8 Classes	9 School Days	Oct 18 – Oct 31
Ch 4 and 5 Gravitation Circular Motion	11-10 Classes	11 School Days	Nov 1 – Nov 18
Ch 6 Mechanical Energy	7-7 Classes	7 School Days	Nov 19 – Nov 27
Ch 7 Harmonic Motion	7-7 Classes	7 School Days	Nov 28 – Dec 9
Ch 8 Mechanical Waves	8(9 TAL)-7 Classes	8(9) School Days	Dec 10 – Dec 20
Course Review	7-13 Classes	7 School Days	Jan 6 – Jan 14
In Class Final Written Response	3 Classes	3 School Days	Jan 15 – Jan 17
	79(80) Classes	79(83) School Days	

Final

Final Exam	Jan 20 – 27

COURSE MARKING 2024-2025

Heading	Date	Weight	Points Earned (%)	Percent (%)
Course Work		75		
Tests		90		
Ch 0 Math of Physics		5		
Ch 1 Kinematics I		15		
Ch 2 Kinematics II		10		
Ch 3 Dynamics		15		
Ch 4 and 5 Gravitation Circular Motion		15		
Ch 6 Mechanical Energy		15		
Ch 7 Harmonic Motion		10		
Ch 8 Mechanical Waves		15		
Homework, Labs		10		
Final Exam		25		
Final Grade				

Daily Homework for each assignment is due the day after it is assigned. It will be marked for completeness, 1 mark for each completed question out of the total assigned questions. Each question number of your work is to be highlighted once (**not** abc parts) with a marker. Each assignment is to have your Name, Date, and Assignment Label and to be clearly marked as correct or incorrect (and corrected).

Review Quizzes are given twice per chapter or when necessary as review. Each quiz will have about 5-10 questions.

Review Summary Sheets are given for each chapter and can be used as 'I Can' statements to self assess learning or as review sheets for content covered in the chapter.

Labs are due on the assigned dates. They are a set of questions and related problems designed to challenge and stimulate investigation and problem solving. Full complete written answers with graphs, diagrams, charts, explanations, and organized written work are expected.

Tests may be rewritten on any chapter up to two times at any time during the semester before the beginning of the Course Review at the end of the semester. Your best score up to 79% will be taken on rewrites. Before any test is rewritten all previous tests from other chapters must be complete and at least some homework from the rewritten chapter must be handed in.

Extra Help or a quiet place to work is available during any lunch hour in my room through out the year on a come and go as you need help basis.

Web Sites that may be of help

Exam bank: http://alberta.exambank.com/

Username: pal.hca

Password: gulp

PHYSICS 20 FORMULA SHEET

Graphing Calculator Window Format $x[x_{\min}, x_{\max}, x_{scl}]$ $y[y_{\min}, y_{\max}, y_{scl}]$

Trigonometry

Right Triangles

$$\sin\theta = \frac{opp}{hyp} \quad \cos\theta = \frac{adj}{hyp} \quad \tan\theta = \frac{opp}{adj}$$

$$c^2 = a^2 + b^2 \qquad \angle A + \angle B + \angle C = 180°$$

Kinematics

Uniform Motion

$$v = \frac{d}{t} \qquad v_{ave} = \frac{v_f + v_i}{2}$$

Uniform Accelerated Motion

$$a = \frac{v_f - v_i}{t} \qquad d = v_i t + \tfrac{1}{2} a t^2$$

$$d = \left(\frac{v_f + v_i}{2}\right) t \qquad d = v_f t - \tfrac{1}{2} a t^2$$

$$v_f^2 = v_i^2 + 2ad$$

Dynamics

$$F = ma \qquad F_g = mg \qquad Weight = mg$$

$$F_f = \mu F_N \qquad F_{net} = T + F_g + F_f$$

Energy

Energy Work Power

$$E_p = mgh \qquad W = mgh \qquad E_k = \tfrac{1}{2} m v^2$$

$$W = Fd \qquad P = \frac{W}{t} \qquad P = F v_{ave}$$

$$\Delta E_k = \tfrac{1}{2} m(v_f{}^2 - v_i{}^2) \qquad W = \Delta E_k$$

$$Fd = \tfrac{1}{2} m(v_f{}^2 - v_i{}^2), \; F \text{ is } F_{net}$$

$$W = F(\cos\theta)d$$

Conservation of Energy

$$\Delta E_p = mg\Delta h \qquad \Delta E_p = mg(h_f - h_i)$$

$$\Delta E_p = \Delta E_k \qquad E_m = E_k + E_p$$

$$W = \Delta E_k + \Delta E_p$$

Circular Motion and Gravitation

$$v = \frac{2\pi R}{T} \qquad a_c = \frac{v^2}{R} \qquad a_c = \frac{4\pi^2 R}{T^2}$$

$$F_c = \frac{mv^2}{R} \qquad F_c = \frac{4\pi^2 Rm}{T^2}$$

$$v = \sqrt{Rg} \qquad \frac{T_1^2}{R_1^3} = \frac{T_2^2}{R_2^3} = k$$

$$F_g = \frac{Gm_1 m_2}{R^2} \qquad g = \frac{Gm_c}{R^2} \qquad g = \frac{F_g}{m}$$

$$v = \sqrt{\frac{Gm_c}{R}} \qquad T = \frac{2\pi R^{\frac{3}{2}}}{\sqrt{Gm_c}} \qquad F_c = T + F_g$$

$$F_{net} = F_N + F_g \qquad F_c = F_g \qquad F_c = F_f$$

SHM and Mechanical Waves

Springs, Pendulums and Waves

$$F_R = -kx \qquad W = E_p = \tfrac{1}{2} kx^2$$

$$W = \tfrac{1}{2} Fx \qquad a = \tfrac{-kx}{m} \qquad E_T = E_p + E_k$$

$$E_p = \tfrac{1}{2} kx^2 \qquad E_T = \tfrac{1}{2} kA^2 \qquad v_{\max} = A\sqrt{\frac{k}{m}}$$

$$E_k = \tfrac{1}{2} mv^2 \qquad E_T = \tfrac{1}{2} k v_{\max}^2$$

$$T = 2\pi\sqrt{\frac{m}{k}} \qquad T = \frac{1}{f} \qquad f = \frac{1}{T}$$

$$T = 2\pi\sqrt{\frac{L}{g}} \qquad F_R = F_g \sin\theta$$

$$v = \lambda f \qquad v = \frac{\lambda}{T} \qquad \angle i = \angle r$$

Sound

$$f_a = f_s\left(\frac{v}{v \pm v_s}\right) \qquad beats = |f_1 - f_2|$$

f_a = observer frequency (apparent)

f_s = source frequency

v_s = source velocity (− to obs, + from obs)

v = sound velocity $\qquad v = (331 + 0.6T)$ m/s (in air)

PHYSICS DATA SHEET

CONSTANTS

Acceleration Due to Gravity …..……	$g = 9.81\text{m/s}^2$
Gravitational Field Strength near Earth……..…	$g = 9.81\text{N/kg}$
Gravitational Constant…….……	$G = 6.67 \times 10^{-11}\,\text{N} \cdot \text{m}^2/\text{kg}^2$
Mass of Earth……..	$M_e = 5.98 \times 10^{24}\,\text{kg}$
Radius of Earth……...	$R_e = 6.37 \times 10^6\,\text{m}$
Mass of Moon……..	$M_m = 7.35 \times 10^{22}\,\text{kg}$
Radius of Moon……...	$R_m = 1.74 \times 10^6\,\text{m}$
Mass of Sun……...……..	$M_S = 1.96 \times 10^{30}\,\text{kg}$
Radius of Sun……...……...	$R_s = 6.95 \times 10^8\,\text{m}$
Kepler's Constant (Earth at centre)……	$k = 9.84 \times 10^{-14}\text{s}^2/\text{m}^3$
Kepler's Constant (Sun at centre) ……..	$k = 3.01 \times 10^{-19}\text{s}^2/\text{m}^3$

METRIC SYSTEM

Prefix	Symbol	Power of 10
giga	G	$\times 10^9$
mega	M	$\times 10^6$
kilo	k	$\times 10^3$
hecto	h	$\times 10^2$
deka	da	$\times 10^1$
base	metre, litre, gram	$\times 10^0$
deci	d	$\times 10^{-1}$
centi	c	$\times 10^{-2}$
milli	m	$\times 10^{-3}$
micro	μ	$\times 10^{-6}$
nano	n	$\times 10^{-9}$
pico	p	$\times 10^{-12}$