



**DEPARTMENT SCIENCE  
COURSE OUTLINE – FALL 2018**

**PC1240 (A2/B2): PARTICLES AND WAVES – 3 (3-0-3) UT 90 Hours for 15 Weeks**

**INSTRUCTOR:** Sunil Kunjachan Ph.D.      **PHONE:** 780-539-2952  
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**OFFICE HOURS:** Monday and Wednesday 1 - 3pm.  
Friday 9 - 11a.m.  
(by appointment also – feel free to come check by office at any time)

**CALENDAR DESCRIPTION:** Algebra-based course primarily for students in life, environmental, and medical sciences. It guides the students through two distinct types of motions: motion of matter (particles) and wave motion. Vectors, forces, bodies in equilibrium, review of kinematics and basic dynamics; conservation of momentum and energy; circular motion; vibrations; elastic waves in matter; sound; wave optics; black body radiation, photons, de Broglie waves. Examples relevant in environmental, life, and medical sciences will be emphasized.

**PREREQUISITE(S)/COREQUISITE:** Physics 20 or equivalent, Mathematics 30-1 or equivalent. Physics 30 is strongly recommended.

**REQUIRED TEXT/RESOURCE MATERIALS:**

- PHYSICS Walker 5<sup>th</sup> Edition (2018)
- Physics 1240 Lab Manual

**DELIVERY MODE(S):**

3 hours of lecture (MW 8:30-9:50 J201) and  
3 hours of lab (A2 R 14:30- 17:20 B2 F 14:30-17:20 in J103)

**COURSE OBJECTIVES:**

This course is designed to be a survey course as an introduction to university level physics. In this course, students will learn about classical physics including Newton's Laws, vectors, energy, momentum and rotational motion. Gravity and oscillatory motion will also be discussed. Sound and light waves will also be studied. The course concludes with a brief look at modern physics.

**LEARNING OUTCOMES:** Upon successful completion, a student is expected to have:

- Reasonable understanding of concepts of kinematics, vectors, Newton's Laws, energy, rotational motion, oscillatory motion, superposition of waves, sound and electromagnetic waves
- Experience with common mathematical and experimental tools, including problem solving for this course.

## TRANSFERABILITY:

UA, UC, UL, AU, Augustana UA, CUC, GMU, KUC

**\*Warning:** Although we strive to make the transferability information in this document up-to-date and accurate, **the student has the final responsibility for ensuring the transferability of this course to Alberta Colleges and Universities.** Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at Alberta Transfer Guide main page <http://www.transferralberta.ca> or, if you do not want to navigate through few links, at <http://alis.alberta.ca/ps/tsp/ta/tbi/onlineSearch.html?SearchMode=S&step=2>

**\*\* Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

## EVALUATIONS:

Assignments	10%
Presentation	5%
Midterm #1	15% October 10 <sup>th</sup>
Midterm #2	15% November 7 <sup>th</sup>
Labs	20% (Must pass Lab to pass course)
Final Exam	35% Cumulative. (Time and Location TBA by Registrar's Office)

**Midterm Exams:** Students are allowed a formula sheet (handwritten 8.5 x 11 inch both sides), a calculator (any calculator WITHOUT communication features) and pens or pencils and eraser.

**Final Exam:** This exam is cumulative. Students are allowed the same items as for a midterm exam.

## GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

**COURSE SCHEDULE/TENTATIVE TIMELINE:**

NOTE: The course schedule is on Moodle and may be updated there if necessary. This schedule is preliminary but gives a good idea of which sections in the textbooks you should read to be caught up with the class lectures.

<b>Date</b>	<b>Topic</b>	<b>Section in Walker</b>
Sept 5	Introduction	1-1,1-2, 1-4
Sept 6/7	<i>No Lab</i>	
Sept 10	Dimensional Analysis	1-3, 1-6, 1-5, 1-8
Sept 12	Position, Velocity, Acceleration	1-7, 2-1, 2-2, 2-3, 2-4
Sept 13/14	<i>Lab 1- Graphical analysis</i>	
Sept 17	Kinematics Equations, Free Fall	2-5, 2-6, 2-7
Sept 19	Vectors	3-1, 3-2, 3-3, 3-4, 3-5
Sept 20/21	<i>Lab 2- Vector addition</i>	
Sept 24	Projectile motion	4-1, 4-2, 4-3, 4-4, 4-5
Sept 26	Newton's Laws, Weight, Friction	5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
Sept 27/28	<i>Lab 3-Acceleration due to gravity</i>	
Oct 1	Applying Newton's Laws	6-1, 6-2, 6-3, 6-4, 6-5
Oct 3	Work, Kinetic and Potential Energy	7-1, 7-2, 7-3
Oct 4/5	<i>Lab 4- Non-Uniform motion</i>	
Oct 10	<b>Midterm #1</b>	
Oct 11/12	<i>Lab 5-Atwood's Pulley</i>	
Oct 15	Power, Applying Energy	7-4, 8-1, 8-2, 8-3, 8-4
Oct 17	Impulse, Momentum, Collisions	9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7
Oct 18/19	<i>Lab 6-Potential Energy &amp; Kinetic Energy</i>	
Oct 22	Rotational Kinematics, Moment of Inertia	10-1, 10-2, 10-3, 10-4, 10-5, 10-6
Oct 24	Torque, Static Equilibrium	11-1, 11-2, 11-3, 11-4, 11-5
Oct 25/26	<i>Lab 7-Collision ball</i>	
Oct 29	Angular Momentum, Rolling Motion	11-6, 11-7, 11-8
Oct 31	Gravity, Gravitational Potential Energy	12-1, 12-3, 12-4, 12-5
Nov 1/2	Simple Harmonic Motion, Damped & Driven	13-1, 13-2, 13-3, 13-7, 13-8
Nov 5	Mass on Spring, Pendulum	13-4, 13-5, 13-6
Nov 7	<b>Midterm #2</b>	
Nov 8/9	<i>Lab 8-Standing Waves on a string</i>	
Nov 14	Waves	14-1, 14-2, 14-3
Nov 15/16	<i>Lab 9- Speed of Sound</i>	
Nov 19	Sound Waves-Intensity and Standing waves	14-4, 14-5, 14-7, 14-8
Nov 21	Light Interference	25-3, 28-1, 28-2, 28-3
Nov 22/23	<i>Lab 10-Interference of Light</i>	
Nov 26	Diffraction	28-4, 28-5, 28-6,
Nov 28	Black Body radiation, Photoelectric Effect	30-1, 30-2, 30-3, 30-4
Nov 29/30	de Broglie, Heisenberg, Tunneling	30-5, 30-6, 30-7
Dec 3	Conclusion	

**STUDENT RESPONSIBILITIES:**

Refer to the College Policy on Student Rights and Responsibilities at <https://www.gprc.ab.ca/about/administration/policies/fetch.php?ID=69>

**STATEMENT ON PLAGIARISM AND CHEATING:**

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Calendar at <http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at <https://www.gprc.ab.ca/about/administration/policies>

\*\*Note: all Academic and Administrative policies are available on the same page.