DEPARTMENT SCIENCE

COURSE OUTLINE – FALL 2017

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

INSTRUCTOR:	Dr. Greg Ballentine	**PHONE:**	780-539-2008
OFFICE:	C414	**E-MAIL:**	gballentine@gprc.ab.ca

OFFICE HOURS: 10:30 – 11:30 AM Monday to Friday (or whenever else can be arranged – come check my 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 5th Edition, 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 W 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.transferalberta.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%
Labs	20% (Must pass Lab to pass course)
Midterm #1	15% (or 0%*) October 11th
Midterm #2	15% (or 0%*) November 6th
Final Exam	55% (or 40%*) Cumulative. Time and Location TBA by Registrar's Office

* The lowest midterm will be dropped and its weight will be added to the final exam if it improves your mark

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

Date	Topic	Sections in Walker
Aug 30th	Introduction	1-1,1-2,1-5
Sept 6th	Dimensional Analysis, Significant Figures	1-3,1-4,1-6,1-8
Sept 6th/7th	Lab – Graphical Analysis	
Sept 11th	Position, Velocity, Acceleration	1-7,2-1,2-2,2-3,2-4
Sept 13th	Kinematics Equations, Freefall	2-5,2-6,2-7
Sept 13th/14th	Lab – Vector Addition	
Sept 18th	Vectors	3-1,3-2,3-3,3-4,3-5
Sept 20th	Projectile Motion	4-1,4-2,4-3,4-4,4.5
Sept 20th/21st	Lab – Acceleration of Gravity	
Sept 25th	Newton's Laws, Weight, Friction	5-1,5-2,5-3,5-4,5-5,5-6,5-7
Sept 27th	Applying Newton's Laws	6-1,6-2,6-3,6-4,6-5
Sept 27th/28th	Lab – Non-Uniform Motion	
Oct 2nd	Work, Kinetic and Potential Energy	7-1,7-2,7-3
Oct 4th	Power, Applying Energy	7-4,8-1,8-2,8-3,8-4
Oct 4th/5th	Problem Lab #1	
Oct 11th	Midterm #1	
Oct 11th/12th	Lab – Atwood's Pulley	
Oct 16th	Impulse, Momentum, Collisions	9-1,9-2,9-3,9-4,9-5,9-6,9-7
Oct 18th	Rotational Kinematics, Moment of Inertia	10-1,10-2,10-3,10-4,10-5,10-6
Oct 18th/19th	Lab – Potential Energy and Kinetic Energy	
Oct 23rd	Torque, Static Equilibrium	11-1,11-2,11-3,11-4,11-5
Oct 25th	Angular Momentum, Rolling Motion	11-6,11-7,11-8
Oct 25th/26th	Lab-Collision of Ball	
Oct 30th	Gravity, Gravitational Potential Energy	12-1,12-3,12-4,12-5
Nov 1st	Simple Harmonic Motion, Damped + Driven	13-1,13-2,13-3,13-7,13-8
Nov 1st/2nd	Lab – Problem Lab #2	
Nov 6th	Midterm #2	
Nov 8th	Mass on Spring, Pendulum	13-4,13-5,13-6
Nov 8th/9th	Lab – Standing Waves on a String	
Nov 15th	Waves	14-1,14-2,14-3
Nov 15th/16th	Lab – Speed of Sound	

Nov 20th	Sound Waves- Intensity and Standing Waves	14-4,14-5,14-7,14-8
Nov 22nd	Light Interference	25-3,28-1,28-2,28-3
Nov 22nd/23rd	Lab – Interference of Light	
Nov 27th	Diffraction	28-4,28-5,28-6
Nov 29th	Blackbody Radiation, Photoelectric Effect	30-1,30-2,30-3,30-4
Nov 29th/30th	Problem Lab #3	
Dec 4th	deBroglie, Heisenberg, Tunnelling	30-5,30-6,30-7
Dec 6th	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.