



DEPARTMENT SCIENCE
COURSE OUTLINE – FALL 2021

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

Grande Prairie Regional College respectfully acknowledges that we are located on Treaty 8 territory, the traditional homeland and gathering place for many diverse Indigenous peoples. We are honoured to be on the ancestral lands of the Cree, Dene/Beaver and Métis, whose histories, languages, and cultures continue to influence our vibrant community. We are grateful to have the opportunity to work, learn, and live on this land.

INSTRUCTOR: GLENDA DELOS REYES, PH.D. **PHONE:** 780-539-2826
OFFICE: J220 **E-MAIL:** gdelosreyes@gprc.ab.ca
OFFICE HOURS: Monday 13:00 – 15:00 & Friday 8:30 – 10:00

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 by Walker 5th Edition, Physics 1240 Lab Manual

DELIVERY MODE(S):

Lectures	A2	M	11:30 – 12:50	J203
		F	10:00 - 11:20	J203
Laboratory	L1	W	14:30 – 17:20	J103
	L2	Th	14:30 - 17:20	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:

A list of institutions to which this course transfers (For example: UA, UC, UL, AU, GMU, CU, CUC, KUC. Please note that this is a sample and it must be replaced by your specific course transfer)

***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%	
Midterm #1	15%	October 8th
Midterm #2	15%	November 15th
Labs	15%	(Must get at least 50% in the Lab to pass course)
Final Exam	45%	Cumulative. (Time and Location TBA by Registrar's Office)

NOTE: There will be no makeup or deferral available for any missed Quizzes, Tests or Labs. Lab reports must be submitted a week after the experiment and at the beginning of the class. Late lab reports will not be accepted. Students who missed the lab due to sickness/unavoidable reason will get the average class mark for the missed experiment.

Final Exam: This exam is cumulative. The final exam for lecture will be written during the exam period, between December 10 and December 20 inclusive (including Saturdays and evenings). Writing early is not permitted. Final exam for laboratory will be given during the last meeting in the lab and covers all experiments.

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	Section in Walker
Sept 1 & 2	<i>No Lab (Lab orientation)</i>	
Sept 3	Introduction	1-1,1-2, 1-4
Sept 8 and 9	Lab 1 – <i>Graphical analysis</i>	
Sept 10	Dimensional Analysis	1-3, 1-6, 1-5, 1-8
Sept 13	Position, Velocity, Acceleration	1-7, 2-1, 2-2, 2-3, 2-4
Sept 15 and 16	Lab 2 – <i>Vector addition</i>	
Sept 17	Kinematics Equations, Free Fall	2-5, 2-6, 2-7
Sept 20	Vectors	3-1, 3-2, 3-3, 3-4, 3-5
Sept 22 and 23	Lab 3 – <i>Acceleration due to gravity</i>	
Sept 24	Projectile motion	4-1, 4-2, 4-3, 4-4, 4-5
Sept 27	Newton’s Laws, Weight, Friction	5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
Sept 29 & 30	Lab 4 – <i>Non-Uniform motion</i>	
Oct 1	Applying Newton’s Laws	6-1, 6-2, 6-3, 6-4, 6-5
Oct 4	Work, Kinetic and Potential Energy	7-1, 7-2, 7-3
Oct 6 & 7	Assignment/Problem Set 1	
Oct 8	Midterm #1	
Oct 18	Power, Applying Energy	7-4, 8-1, 8-2, 8-3, 8-4
Oct 20 & 21	Lab 5 – <i>Atwood’s Pulley</i>	
Oct 22	Impulse, Momentum, Collisions	9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7
Oct 25	Rotational Kinematics, Moment of Inertia	10-1, 10-2, 10-3, 10-4, 10-5, 10-6

Oct 27 & 28	Lab 6-Potential Energy & Kinetic Energy	
Oct 29	Torque, Static Equilibrium	11-1, 11-2, 11-3, 11-4, 11-5
Nov 1	Angular Momentum, Rolling Motion	11-6, 11-7, 11-8
Nov 3 & 4	Gravity, Gravitational Potential Energy	12-1, 12-3, 12-4, 12-5
Nov 5	Simple Harmonic Motion, Damped & Driven	13-1, 13-2, 13-3, 13-7, 13-8
Nov 8	Mass on Spring, Pendulum	13-4, 13-5, 13-6
Nov 10 & 11	Lab 7-Collision of ball	
Nov 12	Assignment/Problem Set 2	
Nov 15	Midterm #2	
Nov 17 & 18	Lab 8-Standing Waves on a string	
Nov 19	Waves	14-1, 14-2, 14-3
Nov 22	Sound Waves-Intensity and Standing waves	14-4, 14-5, 14-7, 14-8
Nov 24 & 25	Lab 9- Speed of Sound	
Nov 26	Light Interference	25-3, 28-1, 28-2, 28-3
Nov 29	Diffraction	28-4, 28-5, 28-6,
Dec 1 & 2	Lab 10-Interference of Light	
Dec 3	Black Body radiation, Photoelectric Effect	30-1, 30-2, 30-3, 30-4
Dec 6	de Broglie, Heisenberg, Tunneling	30-5, 30-6, 30-7
Dec 8 & 9	Lab Finals	

STUDENT RESPONSIBILITIES: Assignments must be handed in on time, and tests/exams must be written on the days announced in class. If an emergency prevents a student from writing a test/exam on the scheduled day, the student must contact the instructor immediately to make other arrangements. Otherwise, the student will receive a zero grade for that component of the course.

For more information, 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.

Additional Information (Optional):