NORTHWESTERN POLYTECHNIC

DEPARTMENT Science

COURSE OUTLINE – Fall 2024

PC1240(A2):Particles and Waves–3(3-0-3) UT 90 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR: GLENDA DELOS REYES, Ph.D **PHONE:** 780-539-2826
OFFICE: J204 **E-MAIL:** GDelosReyes@nwpolytech.ca
OFFICE HOURS: TR 13:00 – 14:30

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

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DELIVERY MODE(S):

Lectures	A2	T&R	11:30 – 12:50	J202
Laboratory	L1	M	14:30 – 17:20	J103
	L2	W	14:30 – 17:20	J103

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:

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page http://www.transferalberta.alberta.ca.

** 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%	
*Midterm 2	20%	
Labs	15%	(Must get at least 50% in the Lab to pass the course)
Final Exam	40%	Cumulative (Time and Location TBA by Registrar's Office)

*The higher midterm mark will have 20% weight.

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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 12 and December 18 inclusive (including Saturdays and evenings). Writing early is not permitted. Final exam for laboratory will be given during the last lecture meeting and covers experiments 1-9.

GRADING CRITERIA:

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	95–100	C+	2.3	67–69
A	4.0	85–94	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: The course schedule is on myClass 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.

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Date	Topic	Section in Walker
Sept 3	Introduction	1-1,1-2, 1-4
Sept 4 & 9	**Lab orientation**	
Sept 5	Dimensional Analysis	1-3, 1-6, 1-5, 1-8
Sept 10	Position, Velocity, Acceleration	1-7, 2-1, 2-2, 2-3, 2-4
Sept 11 & 16	**Lab 1– Graphical analysis**	
Sept 12	Kinematics Equations, Free Fall	2-5, 2-6, 2-7
Sept 17	Vectors	3-1, 3-2, 3-3, 3-4, 3-5
Sept 18 & 23	**Lab 2– Acceleration due to gravity**	
Sept 19	Projectile motion	4-1, 4-2, 4-3, 4-4, 4-5
Sept 24	Newton's Laws	5-1, 5-2, 5-3, 5-4, 5-5
Sept 26	Weight, Friction	5-6, 5-7
Oct 1	Applying Newton's Laws	6-1, 6-2, 6-3, 6-4, 6-5
Oct 2 & 7	**Lab 3- Vector Addition**	
Oct 3	Work, Kinetic and Potential Energy	7-1, 7-2, 7-3
Oct 8	Power, Applying Energy	7-4, 8-1, 8-2, 8-3, 8-4
Oct 10	**Midterm #1**	
Oct 15	Impulse, Momentum	9-1, 9-2, 9-3, 9-4
Oct 16 & 21	**Lab 4- Non-Uniform motion**	
Oct 17	Collisions	9-5, 9-6, 9-7
Oct 22	Rotational Kinematics, Moment of Inertia	10-1, 10-2, 10-3, 10-4, 10-5, 10-6
Oct 23 & 28	**Lab 5-Atwood's Pulley**	
Oct 24	Torque, Static Equilibrium	11-1, 11-2, 11-3, 11-4, 11-5
Oct 29	Angular Momentum, Rolling Motion	11-6, 11-7, 11-8
Oct 30 & Nov 4	**Lab 6-Potential Energy & Kinetic Energy**	
Oct 31	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 6 & 18	**Lab 7-Collision of ball**	
Nov 7	Mass on Spring, Pendulum	13-4, 13-5, 13-6
Nov 19	**Midterm #2**	
Nov 20 & 25	**Lab 8-Standing Waves on a string**	
Nov 21	Waves	14-1, 14-2, 14-3
Nov 26	Sound Waves-Intensity and Standing waves	14-4, 14-5, 14-7, 14-8
Nov 27 & Dec 2	**Lab 9- Speed of Sound**	
Nov 28	Light Interference,	25-3, 28-1, 28-2, 28-3
Dec 3	Diffraction	28-4, 28-5, 28-6
Dec 4 & 9	**Lab 10-Interference of Light**	
Dec 5	Black Body radiation, Photoelectric Effect, de Broglie, Heisenberg, Tunneling	30-1, 30-2, 30-3, 30-4, 30-5, 30-6, 30-7
Dec 10	**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.nwpolytech.ca/about/administration/policies/fetch.php?ID=69

STATEMENT ON ACADEMIC MISCONDUCT:

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at https://www.nwpolytech.ca/about/administration/policies/index.html.

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