

DEPARTMENT of Science
COURSE OUTLINE – Fall 2026

PC1300 (A2): Wave Motion, Optics and Sound – 3.8 (3-1-1.5) 82.5 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) 539-2985
OFFICE:	J216	E-MAIL:	gdelosreyes@nwpolytech.ca
OFFICE HOURS:	Tuesday 13:00 – 15:00 & Friday 12:00 – 14:00 or drop-in whenever my office door is open.		

CALENDAR DESCRIPTION: *This course includes geometric optics, optical instruments, oscillations, waves, sound, interference, and diffraction.*

PREREQUISITE(S)/COREQUISITE: *Math 30-1 or equivalent, Math 31, and Physics 30/MA1000*

REQUIRED TEXT/RESOURCE MATERIALS:

Halliday & Resnick, Fundamentals of Physics, 12th Edition. Wiley.

An open source resource from the University of Alberta will be made available to students in pdf form. Any calculus- based physics text including OER may cover the syllabus of this course.

Lab Manual is required and available at the NWP bookstore.



DELIVERY MODE(S):

Lectures: Tuesday & Thursday, 8:30 – 9:50am, J204

Seminar S1: Friday 8:30-9:20 am, J204

Seminar S2: Friday 10:00 – 10:50 am, J204

Seminar S3: Friday 11:00 – 11:50 am, J204

Laboratory: Thursday & Friday 2:30 – 5:20 pm, J103

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

- *Reasonable understanding of the concepts of oscillatory motion, superposition of waves, sound and electromagnetic waves, geometrical and physical optics*
- *Experience with common mathematical and experimental tools, including problem solving for this course.*
- *Skills collecting and analyzing experimental data*

TRANSFERABILITY: *Please consult the Alberta Transfer Guide for more information. You may check the transferability of this course at the Alberta Transfer Guide main page <http://www.transferralberta.alberta.ca>.*

**** For courses with alpha (letter) grading, a 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:

Component	Weight	Comment
Seminars	10%	Weekly, submitted in seminar
Quizzes	5%	Weekly, based on weekend videos and readings.
Laboratory	20%	Minimum 50% to pass the course
Midterm Exam 1	*10	October 15 th , 2026
Midterm Exam 2	*15%	November 17 th , 2026
Final Exam	40%	TBA

Note: **Highest midterm mark will be weighted as 15%, lowest will be weighted as 10%*

Weekly preparation: *Online videos and reading will be assigned on MyClass almost every weekend. After watching the videos you will complete a short, fairly simple online quiz before the start of lectures that week. Weekly video quizzes will be due at 11:59 pm on Sundays. There will be 11 weekly quizzes, and the quiz with the lowest mark will be dropped. Please note that deadlines will never be extended.*

Midterm Exams: There will be two midterm exams. The midterm exams will be given during regular class time and the dates for the midterm exams are in the Course Timeline. **If you missed one or both midterms for any reason, the weight of the missed midterm exam(s) will be automatically added to the final exam weight.** The midterm exam will consist of multiple choice and written response questions (problem solving questions that you need to show your complete solution). The midterm exams are closed book (notes) and you are only allowed to use a calculator approved by UAlberta Engineering faculty (e.g. **TI-36XPro** / **TI-30XI**) and a formula sheet.

Lectures: Tuesday and Thursday lectures will build on and add new material to that in the weekend videos and readings. Since the weekend preparation will cover the basics more time will be spent on challenging concepts and working through example problems.

Seminars: The Friday seminars require completion of a set of seminar questions. The questions are due at the end of seminar and are graded. Students may work together during the last 15 min of the seminar time but must submit their own work. Students may bring their printed notes and textbook but may not use outside resources. Electronic devices such as laptop, tablet, cellphone, smart watch/glasses are prohibited during seminar.

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

Grades for this course will be assigned as a percentage. The minimum passing grade is 60%.

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. This is meant to show the order of the course content, not necessarily the timeline.*

Week		Date	Topic	Details	Quiz Due Dates
1	L01	Sept 3		Introduction.	
	S01	Sep 4		Partial Derivatives/Excel/Word	
2	Weekly Videos		Simple Harmonic Motion I	Period, (angular) frequency, amplitude, phase	Sept 6
				• Equation of motion for horizontal mass-spring system	
	L02	Sept 8		• Characteristics of Simple Harmonic Motion	
	Lab1	Sept 10		• Vertical Mass spring system	
	L03	Sept 10		Graphing and Spreadsheets	
	S02	Sept 11		• Amplitude & Phase from simple initial conditions	
3	Weekly Videos		Simple Harmonic Motion II	• Velocity and acceleration for mass-on-spring	Sept 13
	L04	Sept 15		• Energy of Simple Harmonic Oscillator (SHM)	
	Lab1	Sept 17&18		• The Pendulum	
	L05	Sept 17		• Amplitude and phase from initial conditions	
	S03	Sept 18		Graphing and Spreadsheets	
				• Damping examples: pendulum decay	
4	Weekly Videos		Damped and Driven Oscillators	• resonance	
	L06	Sept 22		• Seminar	
	Lab 2	Sept 24		• Damped Oscillators	Sep 20
	L07	Sept 24		• Types of Damping	
	S04	Sept 25		• Driven oscillators	
				Oscillations of a Spring	
5	Weekly Videos		The Wave Equation	• Transient vs. Steady state solutions	
	L08	Sept 29		• Solutions to the wave equation	
	Lab 2	Oct 1&2		• Phase and medium velocities	
	L09	Oct 1		• Seminar	
	S05	Oct 2		• Period, wavelength, wavenumber, phase velocity	Sept 27
				• Partial derivatives	
	Weekly Videos			• Deriving the wave equation	
				Oscillations of a Spring	
				• Low amplitude transverse waves on a string	
				• Seminar	
	Weekly Videos				Oct 4



6	L10	Oct 6	Acoustic Waves and Superposition	• Bulk modulus, pressure and density • Acoustic wave equation • Principles of superposition	
	Lab 3	Oct 8		Polarization	
	L11	Oct 8		• Wave intensity • Decibel scale	
				• Interference pattern from two point sources • Beats	
	S06	Oct 9		• Doppler effect • Shockwaves, sonic boom	
7		Oct 13	Review for Exam		
	Lab 3	Oct 15&16		Polarization	
		Oct 15	MIDTERM #1 EXAM		
	S07	Oct 16		•Seminar	
8	Weekly Videos		Physics of Music	• Reflection at a boundary • Standing waves on strings • Standing waves on pipes	Oct 18
	L12	Oct 20		Speed of Sound	
	Lab4	Oct 22		• Harmonics and physics of music	
	L13	Oct 22			
	S08	Oct 23		• Seminar	
9	Weekly Videos		Geometric Optics	• Reflection of light waves and images • Refraction and Snell's law	Oct 25
	L14	Oct 27		• Curved mirrors and image formation	
	Lab4	Oct 29&30		Speed of Sound	
	L15	Oct 29		• Thin Lenses	
	S09	Oct 30		• Seminar	
10	Weekly Videos		Optical Instruments	• Lensmaker equation • Spherical and chromatic aberrations • Magnifying glass • Microscope	Nov 1
	L16	Nov 3		No Lab	
		Nov 5			
	L17	Nov 5		• Refracting and reflecting telescopes	
	S10	Nov 6		• Seminar	
11		Nov 10	Reading Week		
		Nov 11			
		Nov 12			
12	Weekly Videos		Huygens' Principle, Polarization, Dispersion	• Polarization • Brewster's Angle • Dispersion	Nov 15
		Nov 17		MIDTERM #2 EXAM	
	Lab5	Nov 19		Difraction	
	L18	Nov 19		• Huygen's principle and refraction • Dispersion examples • Rainbows	
	S11	Nov 20		• Seminar	

13	Weekly Videos		Interference of light	• Interference in thin films • Newton's rings	Nov 22
	L19	Nov 24		• Thin wedge interference • Anti-reflective coating and optical filters	
	Lab5	Nov 26&27		Diffraction	
	L20	Nov 26		• Interferometers • Detecting gravitational waves	
	S12	Nov 27		• Seminar	
14	Weekly Videos		Diffraction	• Diffraction - intro with water waves • Single slit diffraction • Double slit diffraction • Diffraction - double wide slits	Nov 29
	L21	Dec 1		• Circular aperture • Resolving power of telescopes	
	L22	Dec 3		• Seminar	
	S13	Dec 4			
15	Weekly Videos		Diffraction Cont'd	• Diffraction gratings • Resolving power for diffraction grating	Dec 7
	L23	Dec 8			

STUDENT RESPONSIBILITIES: YOU MUST PASS THE LABORATORY SECTION (minimum 50 % average) TO PASS THE COURSE. All students are expected to come to the laboratory well prepared for the experiment that is to be performed and on time. Students are expected to attend all laboratory periods. Absences due to illness must be substantiated by presenting suitable evidence to the Instructor within three business days of missing the lab. An opportunity to make up a lab will be given only for **excused absences**.

The laboratory experiments are designed to allow a well-prepared student to finish all the work within the allotted time. Formal lab reports should be type-written using the format provided to you by the instructor.

CALCULATOR POLICY: Any calculator without communications features that is approved by UAlberta Engineering faculty (e.g. **TI-36XPro** / **TI-30XI**) may be used during PC1300 examinations. Smartphones, Blackberries, Tablets/Laptop computers etc. are prohibited. Cellular phones must be shut off during exams. All calculators with removable covers must have the covers removed and stored elsewhere during the exam.

Final Exam Period: The final exam period for Engineering will follow a modified schedule this year. Students in Engineering will have an exam period that is one (1) day longer than the official final exam period for NWP students.

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 <https://www.nwpolytech.ca/about/polytechnic-leadership/policies-directory>.

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

Additional Information: *Submitting late work is not allowed. Late work will be given a grade of zero and will not be marked.*