

## DEPARTMENT Science

### COURSE OUTLINE –WINTER 2023

#### PC1260 (A3): FLUIDS, FIELDS and RADIATION – 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.

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**OFFICE:** J220

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**OFFICE HOURS:** Wednesday 10:00 – 12:00 &  
Thursday 2:30 – 4:00 pm

**CALENDAR DESCRIPTION:** This course is a continuation of PC1240 for students in the life and medical sciences. It includes fluid statics and dynamics, gases, kinetic interpretation; electrostatics, current and circuits; magnetic fields; electromagnetic induction; nuclear radiation, its interaction with matter and applications.

**PREREQUISITE(S)/COREQUISITE:** PC 1240

**REQUIRED TEXT/RESOURCE MATERIALS:** PHYSICS Walker 5<sup>th</sup> Edition, Physics 1260 Lab Manual

**DELIVERY MODE(S):** 3 hours of lecture (TTh 1:00 – 2:20 pm, J201)  
3 hours of lab (W 14:30-17:20 J103)

**COURSE OBJECTIVES:** This course will provide a simple algebraic understanding of basic fluid statics and dynamics. The students will be shown how to draw and evaluate the basic constituents associated with simple electrical circuits. Applications will be presented for charges at rest and charges in motion. The relationship between electricity and magnetism will be presented and laboratory experiments will be conducted to verify the principles presented in class. Nuclear radiation and its behavior will be discussed with applications for the modern world.

**LEARNING OUTCOMES:** Students will have the knowledge to be able to analyze (with algebra) the general behavior of fluids. Students will know and be able to explain the underlying principles associated with charge at rest plus the moving charges of basic electricity and magnetism and why simple circuits, electrical motors and generators behave as they do. The basics of radioactivity and the general products of fission and fusion will be understood.

**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.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:**

Assignment	10%	
*Midterm #1	15%	February 9 <sup>th</sup>
*Midterm #2	20%	March 16 <sup>th</sup>
Laboratory	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.*

**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.

**Midterm Exams:** Students are allowed a formula sheet (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 the 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 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.

Date	Topic	Section in Walker
Jan 4	<b><i>Introduction &amp; Lab Orientation</i></b>	
Jan 5	Fluid Statics	15-1, 15-2, 15-3, 15-4
Jan 10	Fluid Dynamics	15-5, 15-6, 15-7, 15-8, 15-9
Jan 11	<b><i>Lab 1– Fluid Properties</i></b>	
Jan 12	Coulomb’s Law, Insulators, Conductors	19-1, 19-2, 19-3
Jan 17	Electric Fields	19-4, 19-5, 19-6, 19-7
Jan 18	<b><i>Lab 2– Terminal velocity</i></b>	
Jan 19	Voltage , Potential difference	20-1, 20-2, 20-3
Jan 24	Capacitance, Capacitor circuits, Dielectrics	20-4, 20-5, 20-6
Jan 25	<b><i>Lab 3-Coulomb’s Law</i></b>	
Jan 26	Electric Current, Ohm’s Law, Power	21-1, 21-2, 21-3
Jan 31	Resistors in Series and Parallel, Complex Circuits	21-4, 21-8
Feb 1	<b><i>Lab 4- Inverse square Law RC Circuits</i></b>	
Feb 2	Kirchhoff’s Laws	21-5
Feb 7	RC Circuits	21-6, 21-7
Feb 8	<b><i>Lab 5- Mapping of Electric Fields</i></b>	
Feb 9	<b>Midterm #1 Exam</b>	
Feb 14	Magnets, Magnetic field forces	22-1, 22-2, 22-3, 22-8
Feb 15	<b><i>Lab 6- Capacitance</i></b>	
Feb 16	Ampere’s Law, Magnetic Field in Wires	22-4, 22-5, 22-6, 22-7
Feb 28	Induced EMF, Magnetic Flux	23-1, 23-2
Mar 1	<b><i>Lab 7- Resistance</i></b>	
Mar 2	Lenz and Faraday’s Laws	23-3, 23-4

Mar 7	Generators and Transformers, Inductors	23-6, 23-10, 23-7
Mar 8	<b>Lab 8-</b> <i>e/m for Electrons</i>	
Mar 9	RL Circuits, Energy Stored in Magnetic Field	23-5, 23-8, 23-9
Mar 14	AC Circuits	24-1, 24-2
Mar 15	<b>Lab 9-</b> <i>Magnetic Fields</i>	
Mar 16	<b>Midterm #2 Exam</b>	
Mar 21	RC and RL Circuits	24-3, 24-4,
Mar 22	<b>Lab 10-</b> <i>Balmer Series</i>	
Mar 23	RLC, Resonance, Phasors	24-5, 24-6
Mar 28	Nuclei, Radioactivity, Half- Life,	32-1, 32-2,
Mar 30	Radioactive Dating, Nuclear Binding Energy	32-3, 32-4
Apr 4	Nuclear Fission and Fusion	32-5, 32-6, 32-7
Apr 6	Fundamental Particles+ Forces	32-8, 32-9
Apr 11	Conclusion	

**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 Northwestern Polytechnic Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the Student Rights and Responsibilities policy which can be found at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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

### **Additional Information (Optional):**

Instructors may add whatever they want here.