

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Fall 2026

PC2301 (A2): Applied Engineering Mechanics and Thermodynamics II – 3 (3-1-0) 60 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:	Dr. Braden Kelly	PHONE:	780-539-2963
OFFICE:	J218	E-MAIL:	bkelly@nwpolytech.ca
OFFICE HOURS:	Unlimited/by-appointment		

CALENDAR DESCRIPTION:

This course provides an overview of elementary mechanics and dynamics, as well as elementary chemistry and thermodynamics, covering topics such as forces, moments, equilibrium, velocity, power, and energy, as well as properties of materials, stress and deformation, power transmission systems, and thermodynamics principles.

PREREQUISITE(S):

- PC1401

REQUIRED MATERIALS:

The following textbook and resource materials are required for the second year of the PET program, including courses PW 2301, PW 2320, TT 2301, PC 2301, PW 2302, PW 2330, and TT 2302. All books are from PanGlobal.org

- 3rd Class Part A Textbook Set [Ed. 3.0]
- 3rd Class Part B Textbook Set [Ed. 3.0]
- Academic Supplement [Ed. 2.0] – Students may have this from year one.



- 2018 ASME Academic Extract (Vol 1) – Students may have this from year one.
- 2018 ASME Academic Extract (Vol 2)

The 3rd Class books and the 2018 ASME Academic Extract (Vol 2) are available as a bundle:

<https://mypower.panglobal.org/pshop/3rd-class/229-3rd-class-standard-collection.html>

NOTE: Older editions of Power Engineering textbooks are not acceptable. The changes between editions are enough to impact the likelihood of passing the ABSA exams.

DELIVERY MODE(S):

Lectures: Monday/Wednesday 1:00–2:20 PM, Room A209

Seminar: Tuesday 1:00 – 1:50 PM, Room A209

LEARNING OUTCOMES: By the end of this course, students will have:

Applied Mechanics:

- Explain the applications of forces and create vector diagrams.
- Analyze friction on level and angled surfaces.
- Understand linear and angular velocity, acceleration, and related calculations.
- Understand linear and angular momentum
- Calculate work, power, and energy in mechanical systems.
- Examine moments of force and concepts related to simple machines, including mechanical advantage, velocity ratio, and efficiency.
- Define stress and strain, consider safe working stress, yield point, ultimate strength, and factor of safety.
- Analyze the bending of beams, equilibrium, shearing forces, and bending moments.
- Understand density, specific gravity, fluid pressure, and fluid flow principles.

Thermodynamics:

- Explain temperature measurement units and scales.
- Comprehend various thermodynamic concepts, including expansion of solids and liquids, quantities of heat, changes of state, heat content in mixtures, steam tables, heat transfer methods, laws of thermodynamics, and gas behavior including expansion and compression.
- Understand Thermodynamics cycles and perform calculations

TRANSFERABILITY:

Nontransferable, there are no transfer agreements in place.

EVALUATIONS:

Assignments:	10%
Seminars:	20%
Midterms:	30%
Final Exam:	40%

GRADING CRITERIA:

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 65%.

COURSE SCHEDULE/TENTATIVE TIMELINE:

Week	Topic
1	Heat expansion & Heat transfer
2	Heat, State Change & Calorimetry
3	Thermodynamics of Steam
4	Thermodynamics of Gases
5	Thermodynamic Cycles
6	Pressure/Density/Flow
7	Vectors/Forces/Equilibrium

8	Forces & Friction, Simple Machines
9	Strength of Materials
10	Work, Power, Energy
12	Linear and Angular Motion

STUDENT RESPONSIBILITIES:

Students must attend a minimum of 80% of all classes to successfully complete the course.

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.

CALCULATOR POLICY:

Only non-programmable or programmable calculators approved by ABSA are allowed in tests and exams <https://www.absa.ca/media/1134/approved-calculator-list.pdf>. Using an improper calculator or other devices/software in an exam/test is considered cheating. The TI-36X-Pro is recommended.

Additional Information:

Assignments and seminars will be handed in on stapled graph or engineering paper with a cover page. The cover page will include student name, ID, course name, assignment number and date. The header for each page will also include this information as well as page number. All drawings must make use of a straight edge for generating lines. Illegible or indiscernible work will be given a grade of zero. Late work will also be given a grade of zero. There will be no make-up assignments of assessments for poorly performed work, or late work. During Midterms and Final exams students must remain seated. There are no washroom breaks.