

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Fall 2026

PC 1401 (A2): Applied Engineering Mechanics and Thermodynamics I – 3 (3-1-0) 60 Hours over 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
OFFICE: J218
OFFICE HOURS: TBA

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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)/COREQUISITE: None

REQUIRED TEXT/RESOURCE MATERIALS:

The following textbook and resource materials are required for the first year of the PET program, including courses PW 1400, PW 1401, PW 1420, IT 1401, PC 1401, PW 1402, PW 1430, and IT 1402. All books are from PanGlobal.org

- 4th Class Textbook Set – Part A [Ed. 3.5]
- 4th Class Textbook Set – Part B [Ed. 3.5]
- Preparatory Math Topics for Power Engineering [Ed. 2]
- Academic Supplement [Ed. 2.0]
- 2018 ASME Academic Extract (Vol 1)



The first 4 books are available as a bundle

4th Class – Standard Collection

<https://mypower.panglobal.org/pshop/4th-class/225-4th-class-standard-collection.html>

2018 ASME Academic Extract (Vol 1)

<https://mypower.panglobal.org/pshop/code-extracts-supplement/198-2018-asme-academic-extract-vol-1.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): Lecture style presentation of material in person at the NWP Grande Prairie campus and weekly interactive seminar.

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

- Solid understanding of fundamental principles in elementary mechanics, dynamics, elementary chemistry, and thermodynamics.
- Proficiency in performing calculations and solving problems involving forces, moments, equilibrium, mechanical advantage, velocity ratio, and efficiency.
- Ability to work with scalar and vector quantities, and solving linear problems related to speed, velocity, distance, displacement, and acceleration.
- Understanding of the relationships between force, work, pressure, power, and energy.
- Foundational knowledge of the physical properties of materials, stress, deformation, and internal forces resisting deformations.
- Ability to describe power transmission systems and their applications.
- Understanding of basic chemistry principles and types of matter.
- Familiarity with the laws of thermodynamics and modes of heat transfer.
- Knowledge of the theory of operation of heat exchangers.
- Understanding of steam thermodynamics and associated terms.

TRANSFERABILITY: Nontransferable, there are no transfer agreements in place.

Assignments:	10%
Seminars:	20%
Midterms:	30% (2 Midterms)
Final Exam:	40%

GRADING CRITERIA: Grades for this course will be assigned as a percentage. The minimum passing grade is 65%

COURSE SCHEDULE/TENTATIVE TIMELINE:

Week	Topic
1	Scalars & Vectors
2	Force Equilibrium & Moments
3	Reaction Supports & Stress/Strain
4	Friction
5	Rectilinear Kinematics
6	Curvilinear Kinematics
7	Simple Machines
8	Power Transmission
9	Work and Energy
10	Introduction to Thermodynamics
11	Thermodynamic of Steam
12	Heat Transfer and Thermal Expansion

This is a tentative schedule. Updates will be posted on D2L.

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

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.

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.

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.