



Course Outline

**4th Class Power Engineering Online
2019-2020**

PELM 4400 Prime Movers and Auxiliaries

4 credits

Topics include types of prime movers and heat engines, plant auxiliary systems, basic concepts of compression and absorption refrigeration, HVAC fundamental for facility operators, building environmental systems and controls, and typical industrial plant configurations as identified in the Alberta Boilers Safety Association Reference Syllabus for 4th Class Part B Power Engineering.

Recommended Prerequisites: It is strongly recommended that students have Math 20/23 or Math 20 Applied, Physics 20 or Science 20 and English 20 (Grade 11).

Instructors

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Contact Information

Keyano College Power Engineering Department
780-791-4955
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Tutoring Hours

Tuesday & Thursday 6:30on – 9:30pm at Keyano College Bob Lamb Building Room 150. Please contact the Power Engineering office at 780791-4955 for an appointment.

Required Resources: (Available at Keyano College Bookstore)

Power Engineering Fourth Class (Textbook), Part B PanGlobal, Edition 3.0, ISBN 978-1-77251-072-0

Academic Supplement, PanGlobal, Edition 2.0, ISBN 978-1-77251-073-7

2018 ASME Boiler & Pressure Vessel Code Volume 1, Academic Abstract 2018 Edition, ISBN 978-177251108-6 Recommended Resources:

Power Engineering Fourth Class (Workbook), Part B PanGlobal, Edition 3.0, ISBN 978-1-77251-076-8

Course Outcomes

Upon successful completion of this course, students will be able to:

- Identify and describe types of prime movers and heat engines including steam turbines, gas turbines, and internal combustion engines, and discuss their use in the Power Engineering field.
- Describe typical industrial building lighting, water, and drainage systems.

- Explain basic compression and absorption refrigeration systems and describe refrigeration control and operation.
- Discuss commonly used HVAC equipment including air conditioning, humidification, fans, air filters, coils and distribution.
- Describe building environmental systems and control in relation to Power Engineering.
- Discuss building heating systems, gains and losses, heat recovery methods, and control strategies.
- Identify the types of plants that employ Power Engineers and discuss their typical configurations.

Evaluation

Students will be graded using percentage scales.

Category	Weight
Section "S" Test	10%
Section "S" Test	10%
"E" Exams	70%
Moodle Chapter & Unit Quizzes	10%
Total Grade	100%

The minimum standard for passing the overall course is a grade of 65%.

Performance Requirements

The Power Engineering online program provides access to a comprehensive computer question bank designed to highlight subjects in the Alberta Boiler's Branch syllabi. Assessments are generated and marked by the

- All quizzes and exams on iLearn will open in a SECURE window. Any attempts to breach security measures (i.e. copy, print, screen capture, right clicking, navigation away from quiz/exam window, etc.) will automatically eject you out of the quiz. Occurrences of this nature will be documented and kept on student record, be considered academic misconduct and just cause for disqualification of course completion.

Student Academic Support Services

It is the College's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on a disability, please let your instructor know immediately so options can be discussed. You are also welcome to contact Student Academic Support Services to establish reasonable accommodations. Please call 780-791-8934 or drop in at CC167.

It is your responsibility to contact the Office of the Registrar to **update your contact information** and complete forms related to changes of registration.

Keyano College

Office of the Registrar

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Keyano College Main Switchboard Toll Free: 1-800-251-1408

Email: registrar@keyano.ca www.keyano.ca

Please be advised, the Office of the Registrar will only use Keyano student email to communicate with students. Check your student email regularly for important information.

Learning Outcomes

1. Discuss the historical conversions of heat energy into mechanical energy.
2. Describe the construction and operation of steam turbines.
3. Explain the operation and maintenance requirements of condensers and cooling towers.
4. Describe the application, startup, operation, and maintenance required for gas turbines.
5. Understand the application, construction, and operation of internal combustion engines.
6. Explain the various lighting systems and some of the basic design considerations for lighting a space.
7. Explain the various water supply systems used in buildings.
8. Describe the design and components of various drainage systems used in facilities.
9. Explain the basic concept of refrigeration and refrigerants.
10. Describe the operating principles of compression refrigeration systems.
11. Describe the purposes and operating principles of refrigeration system operational and safety controls.
12. Explain the operating principles and maintenance of refrigeration systems.
13. Describe the operating principle, maintenance, and operation of absorption refrigeration systems.
14. Outline the potential hazards inherent to refrigeration plants, the CSA requirements intended to mitigate hazards, and typical responses taken in the case of a significant leak.
15. Explain the methods and techniques for condition air for plants and buildings.
16. Explain the equipment and principles of humidification.
17. Describe the air flow behavior and movement of air through distribution systems.
18. Describe the various ventilation systems, including various types of air filters used in these systems.
19. Understand the designs and components of duct systems used in HVAC applications.
20. Describe the various types and operation of coils used in HVAC systems.
21. Describe the components, operating principles, and maintenance procedures of steam heating systems.
22. Describe the various designs, equipment, and operation of hot water heating systems.
23. Describe common heating systems encountered by Power Engineers.
24. Explain central, unitary, and combined HVAC systems.

25. Describe heat gains and losses, and common methods for energy recovery.
26. Explain the control system strategies used in HVAC systems.
27. Identify steam-related processes employed in common hydrocarbon plants.
28. Identify steam related processes in common energy intensive industries