Course Outline

Power Engineering: On-Line

Fourth Class

PELM 4400 Prime Movers and Auxiliaries

4 credits

Topics include heating boiler and heating system controls, auxiliary building systems, vapour compression refrigeration, absorption refrigeration, air conditioning, air conditioning systems, boiler maintenance and types of plants as identified in the Alberta Boilers Safety Association Reference Syllabus for 4th Class Part B Power Engineering.

Prerequisite: Completion of 4th class Part A theory or 4A ABSA

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

John Cook (Chairperson)  
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Office#: BL155

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Office#: BL158

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Office#: BL157

Lawrence Brooks  
780-792-5066  
Lawrence.Brooks@keyano.ca  
Office#: BL153

Tutoring hours

Tuesday & Thursday 6:30 – 9:30 pm
Instructors are available outside of the above hours.
Please contact the Power Engineering office at 780 791-4955 for an appointment.

Supervised Exams

Please contact the Power Engineering office to schedule your supervised exam – 780 791-4955
Required Resources: (Available at Keyano College Bookstore)


Recommended Resource: (Available at Keyano College Bookstore)


Course Outcomes

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

- Identify, describe and be prepared to operate, the control systems of heating boilers safely.
- Differentiate and describe the different types of lighting, water and drainage systems used in auxiliary buildings.
- Identify and describe the thermodynamics and components of compression and absorption refrigeration systems.
- Identify and describe the scientific principles of, and components used in, air conditioning and air conditioning systems.
- Explain the basic tools and safety procedures required for efficient boiler maintenance.
- Assess boiler deficiencies to determine the maintenance and cleaning required for safe and efficient operation.
- Distinguish processes utilized in various types of industries requiring power engineers.
Evaluation
Students will be graded using percentage scales.

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<thead>
<tr>
<th>Category</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Section “S” Test</td>
<td>10%</td>
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<tr>
<td>Section “S” Test</td>
<td>10%</td>
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<tr>
<td>“E” Exams (Supervised)</td>
<td>70%</td>
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<tr>
<td>Moodle</td>
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<tr>
<td>Chapter &amp; Unit Quizzes</td>
<td>10%</td>
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<tr>
<td>Total Grade</td>
<td>100%</td>
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The minimum standard for passing all “S” & “E” exams and 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 Computer and Power Engineering Instructors. The online program is supplemented by tutorial assistance offered by qualified instructors during posted hours.

Behaviours of a Successful Student

team player
repetition
punctual
well rested
organized
attracts
practicing
helps
out
works
honest
professional
attention
additional
studies
required
homework
resources
attention
SKILL Centre Information:
The SKILL Centre is a learning space in the Clearwater Campus where students can gather to share ideas, collaborate on projects and get new perspectives on learning from tutorial staff. A student conference room is available for students to “reserve” for study group purposes. The SKILL Centre is for “support” not to “teach” you course content due to lack of attendance.

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Additional evening & weekend tutorial hours will be posted in the Skill Centre or please contact skill@keyano.ca to confirm tutoring availability.

Academic Regulations
Refer to page 26-40 of the Keyano College 2013-2014 Credit Calendar or use this link to view Keyano College’s Academic Regulations:

Keyano College Student Rights and Responsibilities:
It is the student’s responsibility to read the Student Rights and Responsibility Policy document found in the Keyano College Credit Calendar 2013-2014, pages 36-40. The information contained in this policy should guide the student’s conduct while attending Keyano College. Below are a few “Highlights” to note:

**Student Rights:** The student has the right to:
- reasonable freedom of opinion and expression in the classroom, in assignments, and in exams, where course content allows.
- confidentiality of his/her personal records.
- proper and impartial evaluation of his/her performance and the right to request a re-evaluation within time lines and procedures established by the College.
- freedom from being subjected to physical, verbal, mental, or sexual harassment including any indignity, injury, violence or unfair accusation.
Student Responsibilities: The student has the responsibility to:

- respect the rights of ALL others. Respect is earned.
- refrain from threatening to subject or subjecting any person to physical, verbal, mental, or sexual harassment including any indignity, injury, violence or unfair accusations.
- respect the faculty member's right to determine course methodology, evaluation, right to set deadlines for assigned work, and to establish penalties for failure to comply with deadlines.
- refrain from unduly disturbing, disrupting or otherwise interfering with studies, laboratories, lectures, work or other activities of fellow students or staff.
- know the consequences of plagiarism, fraud, deceit, and/or other forms of academic and non-academic dishonesty.
- not openly share marks and other confidential information/material in the classroom.

Teaching & Learning Methodologies

The Power Engineering online program through iLearn (Moodle); [http://ilearn.keyano.ca](http://ilearn.keyano.ca) is a system that provides students with a quick assessment of their academic achievement while they progress at their own pace, on their own schedule. Students can enroll at any time and have one year from the date of registration to complete both Part A and B theory. A total of two three-month extensions may be purchased. Extended hours and the ability for students to access the system from home or work are features designed to make the training as accessible as possible. **Please note:**

- iLearn/Moodle will be used for ongoing assessment purposes. Please be patient and forward questions/concerns regarding the test bank to the Power Engineering Department.
- All quizzes and exams on iLearn will open in a SECURE window. **Any attempts to breaech security measures** (i.e. copy, print, screen capture, right clicking, navigation away from quiz/exam window, etc.) will automatically “kick” 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.
Specialized Supports & Duty to Accommodate

Disability Support Services: Learner Assistance Program (LAP):
If you have a documented disability or you think that you would benefit from some assistance from a Disabilities Counsellor, please call or visit the Disability Supports Office 780-792-5608 to book an appointment (across from the library). Services and accommodations are intended to assist you in your program of study, while maintaining the academic standards of Keyano College. We can be of assistance to you in disclosing your disability to your instructor, providing accommodations, and supporting your overall success at Keyano College.

Specialized Supports and Duty to Accommodate:
Specialized Support and Duty to Accommodate are aligned with the office of Disability Support Services: Learner Assistance Program (LAP) guided by federal and provincial human rights legislation, and defined by a number of Keyano College policies. Keyano College is obligated by legislation to provide disability-related accommodations to students with identified disabilities to the point of undue hardship.

Please Note: 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
8115 Franklin Avenue
Fort McMurray, AB
T9H 2H7
Tel: (780) 791-4801
Fax: (780) 791-4952
Keyano College Main Switchboard Toll Free: 1-800-251-1408
Email: registrar@keyano.ca
www.keyano.ca
Learning Outcomes

1. Describe the various feedwater control methods and devises used on low-pressure steam boilers.
2. Name and describe the various operating controls found on low-pressure heating boilers.
3. Explain the design and operation of various combustion controls on heating boilers.
4. Explain the purpose of the various components found in a pneumatic control system.
5. Describe and explain the various components of an electric control circuit.
6. Describe and explain the function of the various components of an electronic control circuit.
7. Explain the various lighting systems and some of the basic design considerations for lighting a space.
8. Explain the various water supply systems used in buildings.
9. Describe the design and components of various sanitary drainage systems used in buildings.
10. Explain the terms and principles associated with the thermodynamics of refrigeration.
11. Describe the different refrigerants and explain the classification and various properties of each refrigerant.
12. Describe the operating principles of compression refrigeration systems.
13. Describe the operating principles and the components of refrigeration compressors.
14. Describe the different types of heat exchangers used in refrigeration systems.
15. Describe the purpose and operating principles of the operational and safety controls on a refrigeration system.
16. Describe the operating principles of refrigeration metering devices and capacity controls.
17. Describe the various accessories used in refrigeration systems.
18. Describe the various operation and maintenance procedures used on compression refrigeration systems.
19. Describe the various operation and maintenance procedures used on compression refrigeration systems.
20. Describe the operating principle of the absorption refrigeration systems.
21. Describe the various operation and maintenance procedures used on absorption refrigeration systems.

22. Describe the psychrometric properties of air.

23. Solve problems using a psychrometric chart.

24. Describe the air flow behaviour and movement of air through distribution systems.

25. Describe the designs and components of duct systems used in air conditioning.

26. Describe the various types of coils used in air conditioning systems.

27. Describe the operation of the various types of coils used in air conditioning systems.

28. Explain the equipment and principles of humidification.

29. Describe the operation of various air conditioning systems.

30. Describe the design and operation of combined air conditioning systems and explain the factors to consider when selecting an air conditioning system.

31. Explain the purpose, design and operation of heat recovery in air conditioning systems.

32. Describe the control systems used in air conditioning.

33. Describe the various ways a building gains and loses heat.

34. Describe the safe use of common hand tools in the powerhouse.

35. Discuss and describe the safe and proper setup of equipment for hoisting and working above ground.

36. Discuss the designs and safe applications and attachment of lifting cables and ropes and the designs and uses of metal fasteners.

37. Describe the service and maintenance required for boilers.

38. Discuss the procedure for preparing a boiler for inspection and cleaning and describe mechanical and chemical boiler cleaning methods.

39. Discuss the basic design of a hot oil system and the requirements for the safe operation of a direct fired heater.

40. Describe the basic equipment and processes used in the treatment of natural gas and in the production of pulp and paper.

41. Identify steam related processes in food processing plants, sawmills, and oil refineries.