EN 210

4th Class Power Engineering Part B-1

5 Credits

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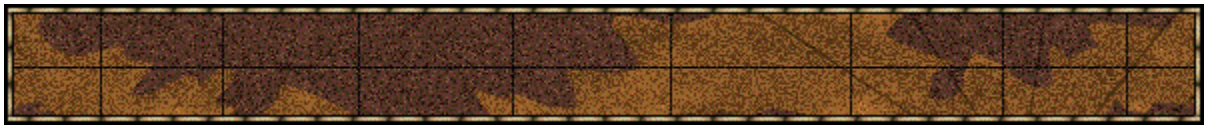

4th Class Power Engineering Part B-1

Calendar Description

EN 210 follows the SOPEEC syllabus and curriculum required at the 4th Class Power Engineer level.

The course material covers in-depth: Water treatment, plant auxiliary systems, basic concepts of compression and absorption refrigeration, HVAC fundamentals for facility operators, building environmental systems and control, and typical industrial plant configurations.

Rationale

This is a required course for the Heavy Oil Power Engineering program (HOPE) and the Heavy Oil Operations Technician program (HOOT). The areas of study prepare the students for part B of the Provincial 4th class power engineer's examination/certification. It provides the students with the theory and hands-on training necessary to operate a high pressure boiler plant safely and efficiently.

Prerequisites

None

Co-Requisites

EN 214 and EN 139

Course Learning Outcomes

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

1. describe the general principle, methods, and equipment used in preparing raw feedwater for steam production.
2. describe the general principles, methods, and equipment used for internal water treatment.
3. discuss the general principles, methods, and equipment used for the treatment of condensate.

4. discuss the general principles, methods, and equipment used for the treatment of condenser water, and their effects on the cooling tower.
5. discuss recirculating water systems, their effects, treatment, and tests.
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. describe 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 case of a significant leak.
15. explain the methods and techniques for conditioning air in plants and buildings.
16. explain the equipment and principles of humidification.
17. describe the airflow behaviour and movement of air through distribution systems
18. describe the various ventilation systems, including various types of air filters used in these systems.
19. describe 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. describe central, unitary and combined HVAC systems.
25. describe heat gains and losses, and common methods for energy recovery.
26. describe the control systems strategies used in HVAC systems.
27. identify steam-related processes employed in common types of plants.
28. identify steam related processes employed in common types of plants.

Resource Materials

Pan Global Training Systems Ltd. *Requires Material:*

- *4th Class Power Engineering. Pan Global* (Edition 3.0 Part B) Calgary, AB.
- *Academic Supplement* (2.0 Edition)
- *2018 Pan Global ASME Academic Extract, Boiler and Pressure Vessel Code* (Vol 1)
- *2018 Pan Global ASME Academic Extract, Boiler and Pressure Vessel Code* (Vol 2)
- *Extract of CSA Standards B-51 and B-52* (June 2012 Printing)

Alberta Queens Printer Required Material:

- *Current Alberta Safety Code Act* (ISBN#9780779789351)
- *Current Alberta Power Engineers Regulation* (ISBN#0780779780785)
- *Current Alberta Pressure Equipment Safety Regulation* (ISBN#9780779790067)

- *Current Alberta Pressure Welders Regulation* (ISBN#9780779782772)
- *Current Pressure Equipment Exemption Order* (ISBN#9780779782017)

NOTE: Additional resource material may be provided or accessed through D2L

Conduct of Course

EN210 is delivered in lecture format using the material from the latest Pan Global Training Systems. The course covers the topics outlined in the SOPEEC syllabus which is in line with the Alberta Boiler Safety Association. Throughout the course, additional reference material is introduced, as well as cut-aways and displays are used to supplement the core material.

This course is delivered face to face and includes lectures, group discussions, demonstrations, assignments and projects. Cut-away models and or actual equipment may be used to assist the demonstrations. Where applicable video clips may be used as a support educational resource

EN 210 includes Part B Units 6, 9, 10, 11, and 12. Instruction will take the form of assigned pre-reading, in-class discussions, knowledge exercise assignments and pre-test review of covered content.

This course consists of 100 hours of lecture. Assignments are composed of handouts and/or D2L quizzes or a combination of both.

Plagiarism and cheating are serious offences and may be punished by failure on an exam, paper or project, failure of the course, and or expulsion from the course.

Evaluation Procedures

Lakeland College is committed to the highest academic standards. Students are expected to be familiar with Lakeland College policies related to academic conduct and academic honesty and to abide by these policies.

The marking scheme for this course is:

Assignments (Quizzes, written assignments)	20%
Unit Tests	40%
Final Exam	40%
Total	100%

A minimum grade of 50% on the final exam and a total grade of 65% overall is required to pass this course.

Grade Equivalents and Course Pass Requirements

A minimum grade of C+ (65%) is required to pass this course.

Letter	F	C+	B-	B	B+	A-	A	A+
Percent Range	0-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

Attendance

Course Lecture Class Attendance:

This course is comprised of 100 hours. If a student is absent 10% of the total hours for the course, the instructor of the course may issue a warning letter. At 15% absence, the Department Chair meets with the student and issues a final warning letter. At 20% the student may be withdrawn from the course.

Program Attendance:

Refer to the student handbook

Special Circumstances:

Refer to the student handbook

Course Units/Topics

Unit Six: Water Treatment

1. External boiler water treatment
2. internal boiler water treatment
3. condensate treatment
4. cooling tower and condenser water treatment
5. recirculating system water treatment

Unit Nine: Basic Concepts of Compression and Absorption Refrigeration

1. refrigeration basics
2. compression refrigeration systems
3. refrigeration control and operation
4. refrigeration system operation and maintenance
5. absorption refrigeration systems
6. refrigeration plant safety

Unit Ten: HVAC Fundamentals for Facility Operators

1. conditioning the air
2. humidification
3. fans for air distribution systems
4. ventilation and air filters
5. HVAC duct systems

Unit Eleven: Building Environmental System and Control

1. steam heating
2. hot water heating
3. other heating systems
4. cooling systems and combined systems
5. heat gains and losses, and heat recovery methods
6. HVAC control strategy

Unit Twelve: Typical Industrial Plant Configurations

1. common plant configurations in hydrocarbon industries
2. common plant configurations in energy intensive industries

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