

**EN210**

**4th Class Power Engineering Part B-1**

**5 Credits**

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## EN210 Version: 5



### 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.

This course covers in-depth: Prime movers, pumps and compressors, lubrication, boiler safety devices, boiler plant operation and management, and building environmental systems.

#### 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

None

#### Course Learning Outcomes

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

1. describe the importance of lubrication and the principles concerned with lubrication.
2. describe bearing types, methods and care and maintenance of bearings, and bearing lubrication systems.
3. describe the construction and operating principles of various types of pumps used in plants.
4. describe the major considerations and procedures for pump operation and maintenance.
5. describe the operating principles of the different types of compressors.

6. describe the major considerations and general procedures for compressor operation and maintenance.
7. explain the code requirements, design, and operation of pressure relief valves for power boilers, heating boilers, and pressure vessels.
8. explain the design and operation of combustion safety controls on burners and boilers.
9. describe feedwater devices, and control methods used on boilers.
10. relate the code, operation, and required fittings to the operating principles of fittings found on boilers.
11. describe the operating and safety controls found on boilers.
12. describe the operational procedures related to starting up auxiliary equipment in a boiler plant.
13. describe procedures for safely starting boiler systems.
14. describe operational procedures related to operating boilers.
15. describe operational checks for operating boiler plants.
16. describe generic shutdown and layup procedures for different boiler types.
17. describe the points and readings that need to be monitored and recorded in a plant.
18. describe the safe use of common hand tools in the powerhouse.
19. discuss and describe the safe and proper setup of equipment for hoisting and working above the ground.
20. describe the service and maintenance required for boilers.
21. discuss the procedure for preparing a boiler for inspection and cleaning, and describe mechanical and chemical boiler cleaning methods.
22. discuss the historical conversion of heat energy into mechanical energy.
23. describe the construction and operation of steam turbines.
24. describe the operation and maintenance of condensers and cooling towers.
25. describe the application, startup, operation, and maintenance required for gas turbines.
26. describe the application, construction, and operation of internal combustions engines.

## Resource Materials

### *Required Material:*

Pan Global Training Systems Ltd.

- *4th class Power Engineering. Pan Global (Edition 3.0, Part B) Calgary, AB.*
- *Academic Supplement (2.0 Edition)*
- *2018 PanGlobal ASME Academic Extract Boiler and Pressure Vessel Code (Vol 1)*
- *2018 PanGlobal 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 Safety Codes Act (ISBN#9780779789351)*
- *Current Power Engineers Regulation (ISBN#0780779780785)*
- *Current Pressure Equipment Safety Regulation (ISBN#9780779790067)*
- *Current 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.

The course is delivered face to face and includes class 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 to support demonstrations and instruction. D2L is used as a support educational resource.

EN 210 includes Part B Units 3, 4, 5, 6, 8 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 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 in the course, and or expulsion from this 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)	25%
Class Engagement (Attendance, surprise quizzes etc.)	5%
D2L Quizzes	10%
Quarter Exams	20%
Midterm	20%
Final	20%
Total	100%

The midterm exam mark for EN 210 is a combined mark from both the EN 210 and EN 214 midterm exams.

The final mark for EN 210 is a combined mark from both the EN 210 and EN 214 final exams.

The grade achieved on the midterm and final exam are recorded for each course.

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 will meet with the student and issue 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 Three Boiler Safety Devices

Unit Four Boiler Plant Operation and Management

Unit Five Energy Plant Maintenance

Unit Six Water Treatment

Unit Eight Introduction to Plant Safety

Unit Twelve Typical Industrial Plant Configurations



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