

EN 110
4th Class Power Engineering Part A-1
5 Credits

Instructor: Simon Stilgoe; Rob Collins
780 871 5497

Original Developer: Ian Kossey

Current Developer: Reg Lee

Reviewer: Robert Collins

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2602 - 59 Avenue, Lloydminster, Alberta, Canada T9V 3N7. Ph: 780 871 5700
5707 College Drive, Vermilion, Alberta, Canada T9X 1K5. Ph: 780 853 8400
Toll-free in Canada: 1 800 661 6490



EN 110 Version: 8



4th Class Power Engineering Part A-1

Calendar Description

EN 110 follows the current SOPEEC syllabus and curriculum to prepare a student to take the "A" portion of the 4th Class Power engineer's Certificate of Competency examination.

This course covers the following subject material: elementary mechanics and dynamics, codes & standards, environment, piping & valves, basic plant instrumentation and boiler operation.

Rationale

This is a required course for Heavy Oil Operations Technician and Heavy Oil Power Engineering students. It prepares the students with the specific skills and knowledge necessary to challenge the ABSA Provincial 4th Class Power Engineering examination. It provides the students with the theory and hands-on training necessary to operate heating and power boilers safely and efficiently.

Prerequisites

General Sciences (Grade 10 Physics, Chemistry, and Math preferred)

Co-Requisites

EN 114 and EN 138

Course Learning Outcomes

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

1. apply basic terms and calculations used in the study of mechanics.
2. perform calculations involving forces and moments, and determine when a system of forces is in equilibrium.
3. perform calculations relating to mechanical advantage, velocity ratio and efficiency.
4. define and identify scalar and vector quantities and solve simple vector problems graphically.
5. solve simple problems involving linear velocity, time, and distance.
6. perform calculations involving force, work, pressure, power, and energy.

7. solve problems involving friction.
8. explain physical properties of materials and how their behavior is affected when external forces are applied.
9. perform calculations pertaining to common power transmission systems.
10. identify basic types of matter, their properties, and the associated chemical principles.
11. explain the principles and laws of thermodynamics.
12. explain the modes of heat transfer and the theory of heat exchanger operation.
13. apply the thermodynamics principles through practical applications using the steam tables and the temperature-enthalpy chart.
14. apply the concepts of basic electricity while performing simple calculations using voltage, current, resistance, and power.
15. describe the basic principles of magnetism.
16. describe the design and application of electrical metering devices.
17. describe the operating principles of the various types of AC and DC motors and generators.
18. describe the operating principles of electrical transformers.
19. describe an electrical distribution system.
20. describe the overall purpose and function of plant instrumentation systems.
21. describe the construction and operation of common devices used to measure pressure, level, flow, temperature, humidity, and composition.
22. explain the basic types and functions of transmitters, recorders, controllers, and control actuators.
23. describe the operation of programming controls for boilers, including applicable testing and maintenance procedures.
24. describe the design and operation of electronic control systems.
25. describe the design and operation of electrical control systems.

Resource Materials

Required Textbooks:

Power Engineering Fourth Class Edition 3 PanGlobal Training Systems Ltd.

Power Engineering Academic Supplement 2.0 (2017) PanGlobal Training Systems Ltd.

2018 ASME Academic Extract Boiler and Pressure Vessel Code Volume1 PanGlobal Training Systems Ltd.

2018 ASME Academic Extract Boiler and Pressure Vessel Code Volume 2 PanGlobal Training Systems Ltd.

Extract of CSA Standards B51-09, B52-05 and B52S1-09 PanGlobal Training Systems Ltd.

Province of Alberta SAFETY CODES ACT “Power Engineers Regulation”

Province of Alberta SAFETY CODES ACT “Pressure welders Regulations”

Province of Alberta SAFETY CODES ACT “Pressure Equipment Safety Regulation”

Province of Alberta SAFETY CODES ACT “Pressure Equipment Exemption Order”

Province of Alberta SAFETY CODES ACT “Revised Statutes of Alberta 2000 Chapter S-1”

Required Equipment:

- Drawing Instruments
- Pencils
- Erasers
- Non-technical English language dictionary

Non programmable ABSA approved calculator from the following list:

Calculators beginning with the following will be permitted.			
CASIO	SHARP	Abacus	SX-11 Matrix...
fx-82...	EL-350...	Canon	F715...
fx-83...	EL-506...	Canon	F717...
fx-85...	EL-509...	Canon	F720...
fx-92...	EL-510...	Cebar	CD-402
fx-95...	EL-520...	Citizen	SR-135...
fx-96...	EL-531...	Citizen	SR-260...
fx-100...	EL-533...	Citizen	SR-270...
fx-115...	EL-546...	HP	HP 8S...
fx-122...	EL-W516...	HP	HP 9S...
fx-220...	EL-W531...	HP	HP 10S...
fx-260...	EL-W532...	HP	HP 300...
fx-270...	EL-W535...	Insystem	IN-82SC...
fx-300...		Jastek	JasCS1...
fx-350...		Kenko	KK 82-TL...
fx-550...		Kenko	KK 87-MS...
fx-570...		Kenko	KK 350-TL...
fx-580...		KLT	FG-82BL...
fx-820...		Office One	720...
fx-901...		Office One	3000...
fx-911...		RadioShack	EC-4032...
fx-991...		RSB	FB 350...
fx-992...		Scholar	DS-82MS
HL4...		Scholar	KD-350MS...
		Tandy	EC-4032...
		Texas Instruments	TI-30...

			TI-34...
			TI-36...
			TI-40...
		Texnet	Albert2,3,5...
		Texnet	fx1000...
		UBT	FA-83W...

Conduct of Course

This course is delivered by classroom instruction using the material from the latest PanGlobal training systems Ltd. The course covers the topics outlined in the latest SOPEEC syllabus which is in line with Alberta Boiler Safety Association (ABSA). Additional reference materials are used to supplement the core material.

The course along with EN114 is 218 hours in length and consists of lectures, assignments, tests, and a midterm and final exam. The assignments are composed of handouts, workbook or D2L platform or a combination of these.

Evaluation Procedures

D2L Quiz and Assignments	20%
Unit Tests	40%
Final	40%

65% is the overall required course mark and a minimum of 50% on the final exam.

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

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

Attendance

The Hoot and HOPE programs are approved courses by ABSA, and as such require our students to attend class. Section 4.A. The “School of Energy Hoot & Hope Student Handbook” provides the attendance details for this course.

Course Units/Topics

Unit 1A Elementary Mechanics and Dynamics

Introduction to Basic Mechanics
Forces and Moments
Simple Machines
Scalars and Vectors
Linear Velocity
Force, Work, Pressure, power, and Energy
Friction
Stress and Strain
Power Transmission

Unit 2A Elementary Physical, Chemical and Thermodynamic Principles

Introduction to Matter and Chemistry
Introduction to Thermodynamics
Introduction to Heat Transfer and Heat Exchangers
Thermodynamics of Steam

Unit 8A Basic Concepts In Electrotechnology

Basic Electricity
Magnetism and Electromagnetism
Electrical metering Devices
Motors and Generators
Transformers
Electrical Distribution Circuits

Unit 9A. Energy Plant Instrumentation and Controls

Introduction to Energy Plant Controls & Instrumentation
Introduction to Process Measurement
Basic Controls & Instrumentation Components
Introduction to Programmable Controllers
Electronic Control Systems & Computer Applications
Electrical Control Systems



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