



## Course Outline

### 3rd Class Power Engineering Online 2019-2020

#### **PELM 3200 Plant Services**

This course covers industrial legislation, codes, boiler calculations, fuels and combustion, piping, electro technology, electrical calculations, control instrumentation and fire prevention and plant safety as identified in the Alberta Boilers Safety Association Reference Syllabus for the second paper of 3rd Class Part A 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  
Power.engineering@keyano.ca

## 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 A PanGlobal, Edition 3.0, ISBN 978-1-77251-071-3

Power Engineering Fourth Class(Textbook), Preparatory Topics for Power Engineers, PanGlobal, ISBN 978-1-77251-074-4

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

2018 ASME Boiler & Pressure Vessel Code Volume 2, Academic Extract, 2018 Edition, ISBN 978-1-77251109-3

## Course Outcomes

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

1. Discuss provincial, national and international codes for boilers, pressure vessels & power engineers including code calculations from American Society of Mechanical Engineers boilers and pressure vessels.
2. Describe types of characteristics of fuels, flue gas analysis, piping design, connections, supports, steam traps, water hammer concerns, insulation, types of valves and actuators.
3. Explain electricity fundamentals including, electrical theory, AC/DC machines, switchgear, safety, electrical calculations, control loops & strategies.
4. Analyze instrumentation & controls, distributed control systems, and logic controls
5. Discuss safety management programs including Occupational Health & Safety, workplace safety, work permits systems, equipment lockout, confined space entry, WHMIS and accident investigation procedures.

6. Distinguish between fire protection systems including, fire detection & alarm systems, sprinklers, deluge water systems and emergency fire response procedures.

## 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 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



### 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 student group purposes. The SKILL Centre is for support and reinforcement of course concepts. Hours of operation are Monday – Friday 8:30am - 4:30pm. Additional evening and weekend tutorial hours will be posted in the Skill Centre or please contact [skill@keyano.ca](mailto:skill@keyano.ca) to confirm tutoring availability.

### Keyano College Student Rights and Code of Conduct:

It is the student’s responsibility to familiarize themselves with the Student Rights and Responsibility Policy found in the Keyano College Credit Calendar 2019-2020, pages 40-43. The information contained in this policy should guide the student’s conduct while attending Keyano College.

### Teaching & Learning Methodologies

This course is delivered by online testing through iLearn/Moodle; <http://ilearn.keyano.ca>

- 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 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** 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](mailto:registrar@keyano.ca) [www.keyano.ca](http://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. Explain the purpose of, general content of, and interaction with, the legislation and codes that pertain to the design and operation of boilers and related equipment.

2. Given the tube material specification numbers, and other necessary parameters, use the formulae in PG-27.2.1 to calculate either the minimum required wall thickness or the maximum allowable working pressure for a boiler tube.
3. Explain the properties and combustion of common fuels and the analysis of combustion flue gas
4. Discuss the codes, designs, specifications, and connections for ferrous, non-ferrous and non-metallic piping and explain expansion and support devices common to piping systems.
5. Explain the designs and operation of steam trap systems, the causes and prevention of water hammer. Describe the designs, configurations and operation of the common valve designs that are used in power and process piping.
6. Describe the designs, configurations and operation of the common valve designs that are used in power and process piping.
7. Explain basic concepts in the production of electricity and the design, characteristics and operation of DC generators and motors.
  
8. Explain formation and characteristics of AC power, and describe the design, construction and operating principles of AC generators, motors and transformers.
9. Identify the components of typical AC systems and switchgear and discuss safety around electrical systems and equipment.
10. Define terms and perform simple calculations involving DC and AC power circuits.
11. Explain the operation and components of pneumatic, electronic and digital control loops, and discuss control modes and strategies.
12. Design and explain the principles of common temperature, pressure, flow and level instruments.
13. Explain the general purpose, design, components and operation of distributed and programmable logic control systems.
14. Explain the intent, scope and purpose of safety management programs including Occupational Health & Safety, workplace safety, work permits, confined space entry, Work Place Hazards Material Information System and accident investigation procedures.
15. Discuss the classes and extinguishing media of fires, and explain systems that are used to detect and extinguish industrial fires.