

PELM 3300 Steam Generation

Topics covered are boilers, boiler control systems, heating and air conditioning, feedwater treatment, pumps, and welding as identified in the Alberta Boilers Safety Association Reference Syllabus for the first paper of 3rd Class Part B Power Engineering.

Instructors

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Office hours

Instructors are available outside of instructional hours upon request from student.

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

Power Engineering Fourth Class (Workbook), Part A PanGlobal, Edition 3.0, ISBN 978-1-77251-075-1

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

2007 ASME Boiler & Pressure Vessel Code, An International Guide, Academic Abstract, American Society of Mechanical Engineering, 2007 Edition, ISBN 978-1-897461-24-2

Course Outcomes

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

- Discuss the designs & fabrication of many types of boilers including the high pressure fittings attached.
- Describe boiler heat transfer components and the variety of burner designs & supply systems.
- Explain boiler draft equipment including, air flow/fuel flow/multi-element combustion controls and boiler operation, maintenance, testing, start-up
 - & shut-down procedures.
- Evaluate boiler water treatment before and after boiler feedwater enters boilers.
- Analyze the designs of pumps including pump operation characteristics, pump calculations and operations
- Discuss welding processes, shielded metal arc welding, submerged arc welding, gas tungsten arc welding, gas metal arc welding, weld inspections, welding procedures, performance qualifications pressure vessels designs, operations and code requirements.

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 study group purposes. The SKILL Centre is for “support” not to “teach” you course content due to lack of attendance.

	Monday - Friday
Monday to Friday	9:00 - 4:00

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 pages 25 & 26 of the Keyano College 2017-2018 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 2016-2017, pages 34-37. 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> 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 breach 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 common designs, configurations and circulation patterns for modern bent-tube watertube boilers and steam generators and explain how boilers are rated.
2. Describe the designs, components, firing methods, and operating considerations for some special boilers used in industry.
3. Explain Code requirements, in general terms, and describe construction and assembly methods for the major components of a large boiler.
4. Explain the purpose, location, design and operating conditions for the major heat transfer components of a large watertube boiler or steam generator.
5. Describe the design and operation of common external and internal fittings attached to the pressure side of a high-pressure boiler.
6. Describe the typical components of fuel supply systems and describe common burner/furnace designs for gas, oil, and coal-fired boilers.
7. Explain boiler draft systems and fans and describe the equipment used to remove ash from flue gas
8. Explain the components and operation of automatic control systems for boiler water level, combustion, steam temperature, and start-up.
9. Describe common procedures in the operation and maintenance of high pressure boilers.
10. Define properties of saturated and superheated steam and, using information from the steam tables, calculate the heat required to produce steam at various conditions; determine the evaporation in steam boilers.
11. Explain the purpose, principles, equipment, and monitoring of boiler water pretreatment processes.
12. Describe the designs, principles, components and operating procedures for common industrial pumps.
13. Explain proper priming and start-up procedures and considerations for pumps.
14. Explain the processes and applications of different welding techniques and describe the testing of welds and procedures.
15. Explain pressure vessel design, stresses, and operating considerations.