

Program

Winter 2021

## **3<sup>rd</sup> Class Power Engineering Online**

### **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.

#### 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  
Powerprocess@keyano.ca

**Tutoring Hours**

Please contact the Power Engineering office at 780-791-4955 for an appointment. Tutoring will be delivered through Microsoft Teams.

**Required Resources**

(Available at Keyano College Bookstore)

Power Engineering 3<sup>rd</sup> Class (Textbooks), Part A & B PanGlobal, Edition 2.5,

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

2018 ASME Boiler & Pressure Vessel Code Volume 2, Academic Abstract 2018 Edition,  
ISBN 978-177251108-6

**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.

**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
  - a. 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.

**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%
<b>Total Grade</b>	<b>100%</b>

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**



**Student Responsibilities**

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the [Keyano College credit calendar](#). The Keyano College credit calendar also has information about Student Rights and Code of Conduct. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Code of Conduct Policies.

**Student Attendance**

Class attendance is useful for two reasons. First, class attendance maximizes a student's learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and notes that may be due.

**Academic Misconduct**

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own;
- The use of unauthorized aids in assignments or examinations (cheating);
- Collusion or the unauthorized collaboration with others in preparing work;
- The deliberate misrepresentation of qualifications;
- The willful distortion of results or data;
- Substitution in an examination by another person;
- Handing in the same unchanged work as submitted for another assignment; and
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on [ilearn.keyano.ca](http://ilearn.keyano.ca). Then print the certificate, sign it, and show it to each of your instructors. Your course work may not be graded until you show this signed certificate.

**Specialized Supports**

The Student Services department is committed to Keyano students and their academic success. There are a variety of student supports available at Keyano College. Due to the continuing situation with the Covid-19 pandemic, the offered support services will be implemented differently this semester by being provided mostly virtually. In-person service can be requested as needed. All Alberta Health Services guidelines will be followed for in-person appointments—wear a mask, maintain two meters of physical distance, use hand sanitizer, and stay home if you are unwell.

All student services are available during Keyano business hours: Monday to Friday, 8h30-16h30. The Library has evening and weekend hours. Please check [keyano.ca/library](http://keyano.ca/library) for current hours.

**Accessibility Services:** provides accommodations for students with disabilities. Students with documented disabilities, or who suspect a disability, can meet with a Learning Strategist to discuss their current learning barriers and possible accommodations. Students who have accessed accommodations in the past are encouraged to contact us to request them for the semester. Please

note that requesting accommodations is a process and requires time to arrange. Contact us as soon as you know you may require accommodations. For accessibility services supports and to book a virtual appointment, please contact [accessibility.services@keyano.ca](mailto:accessibility.services@keyano.ca).

Accessibility Services also provides individual and group learning strategy instruction for all students, as well as technology training and supports to enhance learning. Meet with a Learning Strategist to learn studying and test-taking strategies for online classes. Schedule an appointment with the Assistive Technology Specialist to explore technology tools for learning. Book an appointment today by emailing [accessibility.services@keyano.ca](mailto:accessibility.services@keyano.ca)

**Academic Success Coaching:** offers you support and access to resources for your academic success to help you to find the Keys to your Success. The Academic Success Coach will work with you to develop an academic success plan, develop your study and time management skills, and connect you with the right resources here at Keyano. [Academic.success@keyano.ca](mailto:Academic.success@keyano.ca) is the best way to access resources during virtual service delivery.

**Wellness Services:** offers a caring, inclusive, and respectful environment where students can access free group and individual support to meet academic and life challenges. Mental Health Coordinators offer a safe and confidential environment to seek help with personal concerns. All individual appointments will continue virtually.

Wellness Services welcomes students to participate in any of the virtual group sessions offered throughout the academic year addressing topics including mindfulness and test anxiety.

Individual virtual appointments can be made by emailing [wellness.services@keyano.ca](mailto:wellness.services@keyano.ca).

**Library Services:** provides students with research and information supports as they engage in their studies. Library staff are available to support you both virtually and in person during the fall semester. For library service supports and inquiries, please email [askthelibrary@keyano.ca](mailto:askthelibrary@keyano.ca).

Individual support with the Information Librarian will be provided virtually. Appointments can be requested by email or by placing a [Book a Librarian](#) request using the online form found [here](#).

Research and Subject Guides are helpful resources when conducting research or addressing your information needs. To view a subject or course specific guide, use the following [Subject Guides link](#)

To access additional research resources, including Citation Guides (APA, MLA, Chicago, or IEEE), go to the [Research Help Library page](#).

**Skill Centre:** provides academic support services to students registered in credit programs at Keyano College in the form of tutoring, writing support groups, facilitated study groups, workshops and study space. Tutoring services are **free** to Keyano students. Tutoring is available for Math, Writing, English, and Science subject areas.

While most courses are being offered online, the Skill Center will be offering mostly virtual tutoring services and in-person sessions as requested. Please email [Skill.centre@keyano.ca](mailto:Skill.centre@keyano.ca) to get in contact with our tutoring staff.

For the most up to date information on how to book a tutoring session, please view the [Keyano Skill Centre homepage](#).

**E-Learning**

Technology and internet will impact your online learning experience. It's important that you are able to watch an online video and other course materials, take online quizzes, and participant in a live class with your instructor and other students.

Keyano College operates in a Windows based environment and having the correct tools for online learning is important. Here's a list of recommended system requirements for Fall 2020.

**Internet Speed**

Minimum Internet speeds of 5 Mbps.

Recommended Internet speeds of 25 Mbps (especially if you are sharing your internet at home).

Check your internet speed with Fast.com.

**System requirements:**

Microsoft Windows	Apple
<p><b>Minimum Requirements:</b></p> <ul style="list-style-type: none"> <li>• A Windows 10 <b>computer/laptop</b></li> <li>• Minimum 4GB of RAM.</li> <li>• 10GB+ available hard drive storage.</li> <li>• Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>• Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>• System updates must be regularly installed.</li> <li>• Anti-Virus / Anti-Malware software</li> </ul>	<p><b>Minimum Requirements:</b></p> <ul style="list-style-type: none"> <li>• A Macintosh (V10.14 and above) <b>computer/laptop</b></li> <li>• Minimum 4GB of RAM.</li> <li>• 10GB+ available hard drive storage.</li> <li>• Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>• Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>• System updates must be regularly installed.</li> <li>• Anti-Virus / Anti-Malware software.</li> </ul>
<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>• 8GB of RAM</li> <li>• A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.</li> </ul>	<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>• 8GB of RAM</li> <li>• A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.</li> </ul>
<p>Chromebooks are <b>not</b> recommended as they are not compatible with testing lockdown browsers.</p> <p>A Microsoft Surface or iPad or iPad Pro may be possible alternatives in some program areas.</p>	

**Specific department requirements:**

Business and OA programs require Windows 10.

Other programs may utilize Windows based tools as well.

**Computer Software**

Students will be able to get access to Microsoft Office 365 for Free using Keyano Credentials by [clicking here](#).

**Recording of lectures and Intellectual Property**

Students may only record a lecture if explicit permission is provided by the instructor or by Accessibility Services. Even if students have permission to record a lecture or lecture materials, students may not publish any of the lectures or lecture materials, this includes any recordings, slides, instructor notes, etc. on any platform. Thus no student is allowed to publish or sell instructor notes without formal written permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property.

**ITS Helpdesk**

If you are having issues with your student account, you can contact the ITS Helpdesk by emailing [its.helpdesk@keyano.ca](mailto:its.helpdesk@keyano.ca) or calling 780-791-4965.