

**Fall 2020 - PECO 4200 A****4<sup>th</sup> Class Power Engineering Coop****PECO 4200 Plant Services**

*4 credits, 4 weeks, 120 hours*

Topics include applied math, applied mechanics, thermodynamics, and applied science as identified in the Alberta Boilers Safety Association Reference Syllabus for the first 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).

**Program Faculty**

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**Office hours**

As per request from students, instructors are available outside of instructional hours. Please arrange a time with your instructor.

**Required Resources:** (Available at Keyano College Bookstore)

Power Engineering Fourth Class (Textbook), Part A PanGlobal, Edition 3.0, ISBN 978-1-77251-071-3

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

2018 ASME Boiler & Pressure Vessel Code Volume 1, Academic Abstract 2018 Edition, ISBN 978-177251108-6

**Technology required for virtual classroom (online) theory instruction: Computer/ laptop, microphone, camera and internet access etc.**

## Course Outcomes

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

- Describe basic electricity and electromagnetism, and apply concepts to calculations using voltage, current, resistance, and power.
- Discuss metering devices, motors, generators, and transformers, and understand electrical distribution circuits.
- Describe energy plant controls and instrumentation, as well as process measurement and types of control systems commonly used in plants.
- Illustrate methods of plant communications, energy plant sketching, and plant diagrams, and understand the importance of these with regard to safe plant operation.
- Describe common types of boilers found in power and heating applications, including their construction and ancillary equipment.
- Describe the elements, and importance, of various boiler systems including fuels and combustion, draft, feedwater, blowdown, and sootblowing.

## Evaluation

The minimum standard for passing all S & E exams and the overall course is a grade of **65%**. In addition, a **PASS** mark for completion of six month work experience co-op is required.

|                               |      |
|-------------------------------|------|
| Chapter and Unit Quizzes..... | 10%  |
| Section Test 1.....           | 20%  |
| Section Test 2 .....          | 20%  |
| E – Exam.....                 | 50%  |
| Total.....                    | 100% |

***\*Please note that this change in evaluation criteria is a unique change directly related to the circumstances from COVID-19\****

## Learning Outcomes

1. Apply the concepts of basic electricity while performing simple calculations using voltage, current, resistance, and power.
2. Describe the basic principles of magnetism.
3. Describe the design and application of electrical metering devices.
4. Describe the operating principles of the various types of AC and DC motors and generators.
5. Describe the operating principles of electrical transformers.
6. Describe an electrical distribution system.
7. Describe the overall purpose and function of plant instrumentation systems.
8. Describe the construction and operation of common devices used to measure pressure, level, flow, temperature, humidity, and composition.
9. Describe the basic types and functions of transmitters, recorders, controllers, and control actuators.
10. Describe the operation of programming controls for boilers, including applicable testing and maintenance procedures.
11. Describe the design and operation of electronic control systems.
12. Describe the design and operation of electrical control systems.
13. Make basic engineering sketches of plant equipment.
14. Identify common types of diagrams used in plants.
15. Describe the types and proper usage of plant communication systems.
16. Describe the historical development of boilers, boiler design, components, and configuration.
17. Describe the design, components, and characteristics of firetube boilers.
18. Describe the design, components, and characteristics of watertube boilers.
19. Explain the general design and application of electric boilers.
20. Describe the special design considerations of boilers used in heating plants.
21. Differentiate between ASME Section I and ASME Section IV boilers.
22. Discuss the basic theory of combustion and the equipment used to provide proper combustion conditions within a boiler.
23. Describe common fuel systems found in boiler systems.
24. Describe basic concepts and equipment used to supply combustion air to boiler furnaces.
25. Describe Feedwater systems used with boilers.
26. Describe the equipment, operation, and purpose of boiler blowoff and blowdown systems.
27. Describe the importance of fireside cleanliness, and the equipment and methods to maintain fireside cleanliness.

## Performance Requirements

### 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](https://www.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](http://Fast.com).

**System requirements:**

| Microsoft Windows   | Apple  |
|---|--|
| <p><b>Minimum Requirements:</b></p> <p>A Windows 10 <b>computer/laptop</b></p> <ul style="list-style-type: none"> <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> <p>A Macintosh (V10.14 and above) <b>computer/laptop</b></p> <ul style="list-style-type: none"> <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.