

## 3<sup>rd</sup> Class Power Engineering Coop

### **PECO 3400 Prime Movers and Auxiliaries**

*4 credits, 4 weeks, 120 hours*

This course covers prime movers, air compressors, refrigeration, and lubrication as identified in the Alberta Boilers Safety Association Reference Syllabus for the second paper of 3rd Class Part B Power Engineering.

### **Instructors**

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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**

Power Engineering Third Class (Textbook), Part A2 PanGlobal, Edition 2.0, ISBN 978-1-897461-40-2

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

## Course Outcomes

- Describe the principles, design, and operations of steam and gas turbines include steam turbine condenser systems, internal combustion engines, fired heaters, heat exchangers & cooling towers.
- Explain the operation of cogeneration systems including simple-cycle, combined-cycle, heat recovery generators and start-up procedures of cogeneration plants.
- Discuss the types of compressors in industrial plants include their theory, design, auxiliaries and operations.
- Analyze refrigeration & air conditioning systems showing their principles, auxiliaries and operations.
- Evaluate wastewater treatment plants including operations, filtering, separation, and legislation requirements.
- Describe plant maintenance & administration including communication requirements, record keeping, project management, operation procedures and monitoring requirements.

## Evaluation

Quizzes.....	20%
Section Test 1 .....	20%
Section Test 2 .....	20%

Exam 1..... 40%

Total ..... 100%

*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.*

## Performance Requirements

Technical training is considered an extension of the workplace in terms of attendance and punctuality. It is expected that students will manage their time in accordance with the published program schedule and will attend all classes.

## 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.

## Teaching & Learning Methodologies

This course is delivered in a classroom setting, supplemented by online testing through iLearn/Moodle; <http://ilearn.keyano.ca>

- iLearn/Moodle will be used for ongoing assessment purposes. Please be patient and bring questions/concerns regarding the test bank to your instructor.
- 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.
- iLearn/Moodle quizzes will be released by instructor as per course instruction schedule. Consideration will be given for exam preparation 2 days prior to exams.

## 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 2017-2018. The information contained in this policy should guide the student's conduct while attending Keyano College.

## 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. Describe the support auxiliaries for a gas turbine and explain common operational, control and maintenance procedures.
2. Describe auxiliary support and control systems for steam turbines and explain start-up and shutdown procedures.
3. Explain typical designs, components and operating principles of steam turbine condensers.
4. Explain common designs, major components, operating principles, and arrangements for industrial gas turbines.
5. Explain the operating principles, designs, support systems, and operation of industrial internal combustion engines (ICE).
6. Explain cogeneration and describe common configurations, components and applications.
7. Explain the classification, designs, and operating principles of industrial air and gas compressors
8. Explain the control and system auxiliaries for a typical instrument air system and explain startup procedures for air compressors.
9. Explain the classification and properties of refrigerants and describe the operating principles and components of compression and absorption systems
10. Explain control and safety devices on a compression refrigeration system and explain procedures and equipment to control oil, non-condensables, moisture, refrigerant, and brine.
11. Describe the design, operation, and applications of various types of industrial heat exchangers.
12. Describe the design, components, operation, and applications of direct-fired and indirect-fired natural draft process heaters.

13. Explain start-up and shutdown procedures for an indirect-fired heater.
14. Explain typical components of maintenance and administration programs for utilities and process facilities.
15. Describe designs, operating principles and major components of steam turbines.