PECO 4100, Applied Science

Elementary Mechanics & Dynamics
Elementary Chemistry & Thermodynamics
Plant Communications
Power Plant/Heating Plant Safety
Environment
Material and Welding
Piping and Valves

4 Credits, 4 Weeks

Instructors

Indika Arachchi
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Sholeh Kazemi
Elizabeth McElman
Gallage Silva
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Office Hours

9:00 am – 4:00 pm

Delivery Method(s):

In Person

Class location: SSWC 2323
Contact: 780-791-4955
Email: powerprocess@keyano.ca

Day	Time	Location
Mon – Fri	9:00am - 12:00pm 1:00pm – 4:00pm	SSWC 2323

Required Resources

- 4th Class Power Engineering Learning Materials (Edition 3.5), PanGlobal Training Systems
- CSA B51/B52 Academic Extract Pan Global Training System
- 2018 ASME Boiler & Pressure Vessel Code, An International Guide, Academic Abstract American Society of Mechanical Engineering, Volume 1
- CSA approved safety boots - minimum 6" from sole to top - Required for in-class lab tours, safety training and 200- hour Power Lab course.
- Pen and paper
- Geometry Math Set & 12" or 18" Ruler
- Symbols Template (optional)
- Standard, scientific calculator programmable calculators are not allowed.
- Students attending in-person should have an electronic device that will allow them to access their course material in Moodle.

Assessment Details and Dates

Assessment	Weighting	Course Learning Outcome
Unit Quizzes	10%	CLO 1 - 29
Section Test 1 09th Sept. 2024	20%	Elementary Mechanics & Dynamics: CLO 1 - Perform basic calculations and define basic terms used in the study of mechanics. CLO 2 - Perform calculations using forces and moments and determine whether a system is in equilibrium. CLO 3 - Define simple machines and perform calculations relating to mechanical advantage, velocity ratio, and efficiency. CLO 4 - Define and identify scalar and vector quantities and solve simple vector problems graphically. CLO 5 - Define speed, velocity, distance, displacement, and acceleration, and solve simple linear problems involving these terms. CLO 6 - Define force, work, pressure, power, and energy and perform calculations involving the relationships between these mechanical terms CLO 7 - Describe friction and solve problems involving friction on a horizontal plane. CLO 8 - Explain the following:

		a. The physical properties of materials and how these properties affect the materials behaviour when external forces are applied b. Stress and the deformation of bodies caused by externally applied forces as well as the internal forces that resist these deformations, including tensile, compressive, and shear stresses plus factor of safety CLO 9 - Explain the common examples of power transmission systems, including speed changes, transmitted power, and efficiency. Elementary Chemistry & Thermodynamics: CLO 10 - Explain basic chemistry principles, basic types of matter, and their properties. CLO 11 - Explain the principles of thermodynamics, including the laws of thermodynamics. CLO 12 - Explain the modes of heat transfer and theory of operation of heat exchangers. CLO 13 - Describe the principles of the thermodynamics of steam and the associated terms. Plant Communications: CLO 14 - Describe how to setup plant and equipment sketches as well as how to complete a plant line tracing diagram. CLO 15 - Describe the common types of diagrams used in plants. CLO 16 - Describe the different types of and proper use of plant communication systems.
Section Test 2 20th Sept. 2024	20%	Power Plant/Heating Plant Safety: CLO 17 - Describe general plant safety in power, heating, pressure and Industrial plants that employ Power Engineers. CLO 18 - Describe the common safety programs that are generally implemented in plants. CLO 19 - Describe the procedures for safe storage and handling of dangerous materials.

		CLO 20 - Explain fire safety in a plant. CLO 21 - Describe the causes of, the extinguishing methods, and preventive measures for fires. --- Environment : CLO 22 - Explain how the environment is related to the operating plant. CLO 23 - Explain how gas and noise emissions affect plant operation. CLO 24 - Explain how liquid and solid emissions affect plant operation. --- Material and Welding: CLO 25 - Describe the mechanical properties of engineering materials and the ability of alloying elements to change the mechanical properties of materials, and identify nonferrous materials as used in engineering. CLO 26 - Describe the welding processes that are relevant to the plant and Power Engineer. CLO 27 - Describe the inspection and testing methods of welds and materials used in plants. --- Piping and Valves: CLO 28 - Describe the basic types of piping, piping connections, supports, and drainage devices used in the industry. CLO 29 - Describe the design and uses of the valves designs most commonly used in industry plants and on boilers.
E1 Final Exam 23rd Sep., 2024	50 %	CLO 1 - 29

Proposed Course Schedule

Week & mode of delivery	Topic(s), Activities, Readings	Graded Assessments (%)	Tentative Due Dates
Week 1 27 Aug – 29 Aug, 2024	4A1- 1/4 to 4A10- 3	-Chapter unit quizzes	Due before S1 test (09th Sep 2024)
Week 2 3rd Sep – 6th Sep, 2024	4A1- 5 to 4A2- 4	-Chapter unit quizzes	Due before S1 test (09th Sep 2024)
Week 3 09th Sep – 13th Sep, 2024	4A4- 1 to 4A5- 3	-Section 2 exam 20% (4A4 to 4A7) -Chapter unit quizzes	20th Sep 2024 Due before S2 (20th Sep, 2024)
Week 4 16th Sep – 20th Sep, 2024	4A6- 1 to 4A7- 2	-Chapter unit quizzes -Section 2 Exam 20% (4A4 to 4A7) -E exam 50% (4A1 to 4A7 + 4A10) Excluding 4A3	Due before S2 (20th Sep, 2024) 20th Sep, 2024 20th Sep, 2024

Please Note:

- The date and time allotted to each topic are subject to change.
- Students will have access to their Moodle course shells for 15 days following completion of their course.
- Every effort has been made to ensure that the information in this course syllabus is accurate at the time of publication. Keyano College reserves the right to change the course syllabus content if it becomes necessary so that course content remains relevant. Any changes to the course syllabus during the semester will be communicated to students in writing by the instructor in a timely manner. A revised course syllabus will be posted to the LMS.
- A minimum GPA of 1.7 or higher is required for students to remain in good academic standing and progress to the next semester, unless otherwise indicated for a specific program.

Keyano Performance Requirements and Student Services

Student Responsibilities

As a student, it is your responsibility to contact the Office of the Registrar to complete the required forms, including the Withdrawal/Drop Form. All forms are available on the College website. Please refer to the important dates listed in the Academic Schedule in the Keyano College credit calendar and/or on the College website. It is the responsibility of each student to be aware of the guidelines outlined in the Student and Academic Policies.

Attendance

The Power Engineering program is considered an extension of the workplace in terms of attendance, punctuality, and conduct.

Classes are scheduled from Monday to Friday 9:00 am – 4:00 pm.

• One hour lunch break from 12pm- 1pm.

• Attendance will be taken twice a day.

• Students must personally notify their instructor(s) and the Power Engineering Department via email at powerprocess@keyano.ca if they are unable to attend a scheduled class. It is expected that personal appointments will be made outside of scheduled class hours.

• Instructors do not grant excused absences without notification from health services. All doctors' notes to be submitted directly to healthservices@keyano.ca for assessment.

• It is expected that students will manage their time in accordance with the program schedule, policy and procedures and will attend and be punctual for all classes every day.

Student Attendance

Class attendance is helpful for two reasons: First, class attendance maximizes a student's learning experience. Second, attending class is an excellent way to keep informed of matters relating to the course administration (e.g., the timing of assignments and exams). Ultimately, you are responsible for your learning and performance in this course. It is the responsibility of each student to be prepared for all classes. Absent students are responsible for the material covered in those classes, and students must ensure they are ready for their next class, including completing any missed assignments and notes.

Course Evaluation

Midterm exams and term work is to be completed at the time/date indicated in your course syllabus. It is the expectation of the College that students make every reasonable effort to complete all course evaluation, including, quizzes, midterms, and exams, as scheduled. In the event of an emergency, rescheduling of exams and/or extensions are only provided at the discretion of the course instructor. Students should contact the instructor as soon as they are able, to notify them of missing an evaluative

component. Instructors will use discretion in deciding whether circumstances justify granting a reschedule and/or extension.

Regular term quizzes, midterms, and exams are not eligible for deferral and/or date extension accommodations. Students with accommodations, please refer to Accessibility Services.

Final Exams are subject to deferral processes, please refer to the current Keyano College Credit Calendar.

Academic Integrity & Misconduct

Academic integrity requires commitment to the values of honesty, trust, fairness, respect, and responsibility. It is expected that students at Keyano College will adhere to these ethical values in all activities related to learning, teaching, research, and service. Any action that contravenes this standard, including misrepresentation, falsification, or deception, undermines the intention and worth of scholarly work and violates the fundamental academic rights of members of our community.

Academic dishonesty takes many forms:

- Plagiarism or the submission of another person's work as their own,
- The use of unauthorized aids in assignments or examinations (cheating),
- Using Artificial Intelligence (AI) to complete coursework (without instructor approval),
- 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,
- Submitting unchanged work for another assignment, and
- Breach of confidentiality.

In all academic work, the ideas and contributions of others must be appropriately acknowledged and work that is presented as original must be, in fact, original. Using an AI-content generator (such as ChatGPT) to complete coursework without proper attribution or authorization is a form of academic dishonesty. If you are unsure about whether something may be plagiarism or academic dishonesty, please contact your instructor to discuss the issue.

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 & Academic Policies* 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, Academic Integrity, and Non-Academic Misconduct Policies.

To ensure your understanding of plagiarism and academic integrity, you are required to complete the online Understanding Academic Integrity tutorial (https://keyano.libwizard.com/f/academic-integrity-tutorial) and submit the certificate of completion to your instructor(s).

Online Learning

Technology and internet connectivity will impact your online learning experience. You may be required to watch online videos, take online quizzes, or participate in live online classes. Live/virtual courses will be hosted in Microsoft Teams or Zoom. For all course delivery types, you will access your course outline, course syllabus and course resources on Keyano's learning management system: Moodle (iLearn). Login in using your Keyano username and password. Keyano College operates in a Windows-based environment and having access to the correct tools for online learning is essential.

Computer System Requirements

Keyano College software are Windows based.

Minimum Requirements and Recommended Upgrades for Windows (preferred system) and Apple devices These minimum standards are required for a Windows computer/laptop (OS 10 or 11) and a MacIntosh (OS 10.14 or above).
1. Windows 10 Operating System or above. 2. 4 GB of RAM. Recommended upgrade to 8 GB of RAM. 3. 10 GB+ available hard drive storage space. Note installing Microsoft Office 365 requires 3 GB of available hard drive space.   a. Install the Microsoft Office 365 suite (~3 GB) ***** 4. Microphone, webcam, and speakers (All modern laptops have these three accessories built-in). However, a headset or earbuds with a microphone is also recommended. 5. Windows has built-in anti-virus/malware software. It is essential to install system updates to keep your device secured regularly. *****Microsoft Office 365 is free to Keyano students.
Tablets, iPads, and Chromebooks are **not** recommended: They may not be compatible with your programs such as lockdown browsers used for assessments and/or Microsoft Office 365.

Computer Software

Students have access to Microsoft Office 365 and Read & Write for free using Keyano credentials.

See Recommended Technology for more information.

Recording of Lectures and Intellectual Property

Students may only record a lecture if explicit permission is provided by the instructor or Accessibility Services. Even if students have permission to record a lecture or lecture materials, students may not share, distribute, or publish any of the lectures or course materials; this includes any recordings, slides, instructor notes, etc., on any platform. Thus, no student is allowed to share, distribute, publish, or sell course-related content without permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property. The Academic Integrity Policy provides additional information on Keyano College's expectations from students as members of the intellectual community.

ITS Helpdesk

If you have issues with your student account, you can contact the ITS Helpdesk by emailing its.helpdesk@keyano.ca or calling 780-791-4965.

Specialized Supports

Keyano College is committed to Keyano students and their academic success. There is a variety of student support available at Keyano. All student services are available during Keyano business hours: Monday to Friday, 8:30 a.m. to 4:30 p.m. The College is closed on statutory holidays. If you require support outside of regular business hours, please inform the support service team, and they will do their best to accommodate your needs.

Accessibility Services provides accommodations for students living with disabilities. Students with documented disabilities or who suspect a disability can register to discuss their current learning barriers and possible accommodations. Students are required to request accommodations for each term. Please note that requesting accommodations is a process and requires time to arrange. Contact the department as soon as you know you may require accommodations to ensure timely implementation. For accessibility supports, adaptive technology, learning strategies and disability-based funding, please register with Accessibility Services by emailing wellness.services@keyano.ca, or visiting www.wellnessxp.net/wellness/, or scanning this qr code below.

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 provide a safe and confidential environment for you to seek help with personal concerns. Our Wellness Navigator offers support with finding basic needs such as housing, financial and nutritional support, and outside referrals when needed. Wellness Services welcomes students to participate in group sessions that address topics including mindfulness and test anxiety throughout the academic year. Individual appointments can be made by emailing wellness.services@keyano.ca, or visiting www.wellnessxp.net/wellness/, or scanning this qr code below.

The **Library** provides students with research, information, and educational technology services and spaces as they engage in their studies. The Library is located at CC-166 or www.keyano.ca/library. Library staff are available to help students online and in person throughout the semester. Librarians offer individual and small group consultations booked using the online Book A Librarian calendar. The library also provides virtual research and subject guides to help you with your studies. Find the guide that supports your course-related research by viewing the complete list of online Subject Guides. To start your research and access citation guides (APA, MLA, Chicago, or IEEE), visit the Research Help page. The library's collections (including print and online materials) are searchable using EDS (EBSCO Discovery Service) on www.keyano.ca/library/find. The library offers a Loanable Technology collection to support students accessing and using technology. For an up-to-date list of technology available for borrowing, visit the library's Loanable Technology webpage. For a detailed list of library resources and services, go to www.keyano.ca/library. For all inquiries, please email askthelibrary@keyano.ca or chat with us online.

The **Academic Success Centre (ASC)** provides free academic support services to registered students, such as tutoring, writing support, facilitated study groups, workshops, and study space. Academic Content Specialists are available in Business, Mathematics, Science, English, Humanities, Power Engineering, Upgrading/College Prep, and more. Peer Tutors are available to provide peer academic support to students in all college programs, such as Nursing, Business, Education, Environmental Science, among others. Students are encouraged to visit the Academic Success Centre at CC-119 to discuss strategies for academic success. Specialists in the Academic Success Centre also work with students to develop academic success plans, time management skills, study strategies, and homework plans. For additional information, please email Academic.Success@keyano.ca

Work Integrated Learning (WIL) is located in the ASC in CC-119. Career Services WIL staff assist students with their program-related WIL and co-op placements, provide resume advice, and support with using the GradLeaders platform. Additionally, they coordinate several career fairs for students throughout the academic year and host coop and resume workshops for students. Students can reach WIL by emailing: WIL@keyano.ca or by visiting them in person.

Course Syllabus Template Version 1.0

Signatures & Date

Name of Instructor:

Instructor Signature: _____Rajiv Parashar_____

Date:

Name of Course Lead:

Course Lead Signature: _____

Date:

Name of Chairperson/Program Manager:

Chairperson/Program Manager Signature: _____

Date: