

MME 2204a – Thermodynamics I

COURSE OUTLINE - 2021-2022

CALENDAR DESCRIPTION:	Properties of a pure substance, first law of thermodynamics, processes in open and closed systems, second law of thermodynamics; ideal gases, compressors and energy conversion systems.
COURSE INFORMATION:	<p>Instructor: Prof. C.T. DeGroot, Ph.D., P.Eng. Room SEB 3096 Email: cdegroo5@uwo.ca Telephone: 519-661-2111, ext. 84455</p> <p>Lectures: Mo 2:30-3:30pm Th: 8:30-9:30am Fri: 9:30-10:30am</p> <p>Tutorial: Tu: 11:30am-1:30pm</p> <p>Labs: 2 Lab exercises will be conducted during the term (Schedule to be posted)</p>
PREREQUISITES:	AM 1413 Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.
ANTIREQUISITES:	CBE 2214a/b; MSE 2214a/b
ACCREDITATION UNITS:	Science = 40%, Engineering Science = 60%
TOPICS:	<ul style="list-style-type: none">• Introduction and definitions• Properties of a pure substance• Work and heat; first law and the closed system• First law and the open system• First law application• Second law of thermodynamics• Power Cycles and Refrigeration Cycles• Entropy changes of closed, open, reversible, and irreversible systems• 1st and 2nd law relationships and the universal principal of entropy increase• Second law application <p>Introductory lectures will be selected from the following topics: Reciprocating machines; Steam power cycles; Refrigeration cycles.</p>
LEARNING OUTCOMES:	Upon completion of this course, students will be able to: <ol style="list-style-type: none">1. apply fundamental theories of classical thermodynamics including equilibrium, irreversibility and state postulate;2. characterize the thermodynamic state of a pure substance in any phase or combination of phases;

3. classify a thermodynamic system as isolated, open or closed, identify transfers of energy via work and heat, and apply the first and second laws of thermodynamics;
4. characterize thermal efficiency and isentropic efficiency of systems and devices in terms of the laws of thermodynamics and corollaries of these laws.

CONTACT HOURS: This course will be delivered online, with video lectures being provided on a weekly basis. Students will be expected to watch the video lectures and be familiar with the associated sections of the assigned textbook. Students must also be prepared for one online meeting per week, scheduled during the timetabled lecture hours. Students must be available for the scheduled tutorial hours each week for collaborative exercises and Q&A. Laboratory experiments will be provided as videos and measured data will be sent to students for processing using the worksheets provided in the lab manuals. This is a half course.

TEXT: "Thermodynamics, An Engineering Approach", 9th Edition. Yunus A. Cengel, Michael A. Boles; McGraw-Hill.

REFERENCES: "Fundamentals of Engineering Thermodynamics," 6th Edition, Copyright 2008; Michael J. Moran & Howard N. Shapiro, John Wiley & Sons Inc. ISBN 978 0470 106747

UNITS: SI

EXAMINATIONS AND QUIZZES: The midterm and final examination are **closed book type**. Only non-programmable pocket calculators are allowed.

EVALUATION:

Weekly Tutorial Exercises:	10%
Laboratory	10%
Midterm	30%
Final Examination:	50%

In addition, problems will be assigned from the textbook on a weekly basis. These problems will not be handed in or graded, but will be discussed each week during the tutorial sessions.

If a student is excused from writing a midterm for legitimate reasons, and with the approval of the Department Chair, the weighting of the final examination may be adjusted accordingly.

ENGLISH: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests and examinations for the improper use of English. Additionally, poorly written work with the exception of final examinations may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

COURSE POLICIES Computing requirements: All students are to ensure that they have a functional camera and microphone connected to their computer (irrespective of Windows or Mac-based). These two accessories will be required for participation in synchronous/live sessions or attending virtual office hours.

Tutorial exercises: All tutorial exercises must be submitted the end of the designated writing period. No late submissions will be accepted. There are no make-up options regardless of the reason for which the exercise was missed. Of the maximum of 10 exercises, the lowest grade will not be counted towards the student's grade.

Laboratory sessions: Attendance to laboratory sessions is mandatory. All pre-lab exercises must be completed prior to attending the lab in order to receive full grades. All lab data and calculations must be handed in by the end of the laboratory period for grading. Should a student miss a lab without legitimate reason, a grade of zero will be given and no opportunity to complete the lab at a later date will be provided.

Midterm tests: No make-up midterm options will be offered, regardless of the circumstances for which the midterm test was missed. If a student misses a midterm test, the student must follow the Instructions for Students Unable to Write Tests and provide documentation to Undergraduate Services within 24 hours of the missed test. If a student is going to miss the midterm examination for religious reasons, they must inform the instructor in writing within 48 hours of the announcement of the exam date or they will be required to write the exam. Missing a midterm test with academic consideration will automatically shift the weight of the missed midterm test to the final exam. If no reasonable justification for missing a midterm test is provided, then the student will receive a grade of zero for the test.

Online Class Demeanor/Netiquette: Some components of this course will involve online interactions. To ensure the best experience for both yourself and your classmates, please abide the following rules:

- All live sessions will take place via Zoom meetings. The links to be accessed for each class will be distributed through OWL.
 - You will be required to authenticate in the Zoom meeting with your Western credentials **only** (SSO authentication on the westernuniversity.zoom.us domain). In the event you attempt to authenticate in the Zoom meeting with different credentials, you will be removed from the online session without any warning.
 - Ensure that your Zoom participant name matches the one from the official class roster. Failure to do so will mean that you will be removed from the online session without any warning.
 - To minimize the background noise, please mute your microphone for the duration of class unless speaking. Only speak once invited to speak by the instructor. Failure to do so might result in your immediate removal from the meeting.
 - Do not share your screen during the meeting unless asked by the instructor.
- The course instructor will act as moderator of the online live session and will attempt to answer the questions received from Zoom meeting participants. In this regard, please consider the following:
- If you wish to speak during the live meeting, please use the “raise hand” feature in Zoom and wait for the instructor to nominate you to speak.
 - Zoom keeps track of the order in which the “raise hand” feature was activated by each participant. Meeting participants will be asked to speak in the Zoom indicated order.
 - Please remember to unmute your microphone and turn on your video camera (if turned off) before speaking.
 - Please self-identify yourself at the beginning of your comment.
 - Please remember to mute your microphone after speaking (unless directed otherwise).
 - Please put down your “virtual hand” after speaking.
- Some general considerations pertaining to “netiquette”:

- Be courteous with all Zoom meeting participants.
- Be professional in all online postings and questions.
- Please note that disruptive behavior of any type to occur during online classes (including inappropriate use of the chat function) is unacceptable.
- Students found guilty of “Zoom-bombing” a class or of other serious online offenses may be subject to disciplinary measures covered by the Code of Student Conduct.

Masking Guidelines: Students will be expected to wear triple layer, non-medical, paper masks at all times in the classroom as per University policy and public health directives. Students who are unable to wear a mask must seek formal accommodation through Western Accessible Education, and present medical documentation. Students are not permitted to eat or drink while in class to ensure masks stay in place. Students will be able to eat and drink outside of the classroom during scheduled breaks. Students unwilling to wear a mask as stipulated by Western policy and public health directives will be referred to the Dean, and such actions will be considered a violation of the student Code of Conduct.

Course Absences Due to Daily COVID Screening Questionnaire: Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal academic considerations (typically self-reported absences and/or academic counselling). Methods for dealing with missed work and course content are at the discretion of the instructor(s). Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year. Your instructor will provide you with further information as to how this applies within this course. Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

Contingency Plan for Shifting to 100% Online Learning: In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor. In the event that online learning is required, a stable internet connection with working microphone and webcam will be required. As has been the case in the past, the decision to pivot to online learning will be made by Western, and not individual instructors or departments (excepting temporary online instruction in the event of instructor illness).

ATTENDANCE: All scheduled components of the course are mandatory unless otherwise stated. Any student who, in the opinion of the instructor, is absent too frequently from virtual meetings will be reported to the Dean (after due warning has been given). On the recommendation of the program, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

CHEATING: University policy states that cheating, including plagiarism, is a scholastic offense. The commission of a scholastic offence is attended by academic penalties which

might include expulsion from the program. If you are caught cheating, there will be no second warning. (see Scholastic Offence Policy in the Western Calendar.

SSD:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

NOTE:

Students who have failed an Engineering course (i.e. < 50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.

The above topics and outline are subject to adjustments and changes as needed.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

NEW: Requests for Academic Consideration using the Self-Reported Absence Form

If you experience an unexpected illness or injury or an extenuating circumstance (48 hours or less) that is sufficiently severe to temporarily render you unable to meet academic requirements (e.g., attending lectures or labs, writing tests or midterm exams, completing and submitting assignments, participating in presentations) you should self-declare using the online Self-Reported Absence portal. This option should be used in situations where you expect to resume academic responsibilities within 48 hours or less.

Each student will be allowed a maximum of two self-reported absences between September and April and one self-reported absence between May and August. Self-reporting may not be used for final exams or assessments (e.g. midterm exams, tests, reports, presentations, or essays) worth more than 30% of any given course.

For full instructions about the Self-Reporting System refer to the Academic Calendar link [here](#).

A. GENERAL REGULATIONS & PROCEDURES (other than self-reported absences)

1. All first year students will report to the Undergraduate Services Office, SEB 2097, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination that is worth LESS THAN 10% of your mark, you should report to your department office to request relief. If your course work is worth MORE THAN 10% of your final grade, you will report to the Undergraduate Services Office, SEB 2097.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS (other than self-reported absences)

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, you should report to your department office to request relief. If the test is worth MORE THAN 10% of your final grade you will report to the Undergraduate Services Office, SEB 2097 to request relief.
3. Be prepared to provide supporting documentation to the Department Chair and/or the Undergraduate Services Office (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

C. FINAL EXAMINATIONS (cannot be self-reported)

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

Calendar References: Check these regulations in your 2021 Western Academic Calendar available at www.westerncalendar.uwo.ca.

[Self-Reporting Absences](#)
[Absences Due to Illness](#)
[Academic Accommodations for Students with Disabilities](#)
[Academic Accommodations for Religious or Holy Days](#)
[Course Withdrawals](#)
[Examinations](#)
[Scheduling of Term Assignments](#)
[Scholastic Offences](#)
[Student Medical Certificate](#)
[Engineering Academic Regulations](#)

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Add Deadlines:

First term half course (i.e. “A” or “F”)	September 16, 2021
Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 16, 2021
Second term half course (i.e. “B” or “G”)	January 11, 2022

Drop Deadlines:

First term half course (i.e. “A” or “F”)	November 12, 2021
Full courses and full-year half courses (i.e. “E”, “Y” or no suffix)	November 30, 2021
Second term half or second term full course (i.e. “B” or “G”)	March 7, 2022

Contact Information:

Undergraduate Services Office	SEB 2097 Phone: 519-661-2130	E-mail: engugrad@uwo.ca
Chemical & Green Process Engineering	TEB 477 Phone: 519-661-2131	E-mail: cbeugrad@uwo.ca
Civil Engineering:	SEB 3005 Phone: 519-661-2139	E-mail: civil@uwo.ca
Computer, Electrical, Mechatronic Systems & Software Engineering	TEB 279 Phone: 519-661-3758	E-mail: eceugrad@uwo.ca
Integrated Engineering	ACEB 2410 Phone: 519-661-6725	E-mail: engceli@uwo.ca
Mechanical Engineering	SEB 3002 Phone: 519-661-4122	E-mail: mmeundergraduate@uwo.ca

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