

**Boston University ENG ME 304: Energy and Thermodynamics**  
**SYLLABUS FOR FALL 2024**

**NOTE:** You are expected to read through this document and be familiar with the policies and dates described within; print out, sign, and pass in the signature page with your first homework assignment. Some dates may be subject to change; changes will be announced in class, via email, and on the website. Check this document prior to emailing your section instructor for logistical information.

**Class**      A1: TR 1:30 – 3:15 PM, PHO 203

Prof Caleb Farny ([farny@bu.edu](mailto:farny@bu.edu)), 110 Cummington Mall, Rm 207, 617-353-8664

Office hours: Mondays 2 – 3 pm, Thursdays 4 – 5:30 pm, or by appointment

A2: TR 9 – 10:45 AM, CDS B64

Prof Sean Lubner ([slubner@bu.edu](mailto:slubner@bu.edu)), 730 Commonwealth Ave, Rm 202D, 617-353-0137

Office hours: Thursdays 3 – 4:30 pm, or by appointment

**GST**      Halim Polat ([halopolo@bu.edu](mailto:halopolo@bu.edu))

## RESOURCES

**Summary:** Discussion sections, office hours, blackboard example problem videos, textbook and posted lecture notes, reviewing HW solutions, and graded exams.

**Text:** Moran and Shapiro, *Fundamentals of Engineering Thermodynamics*, Wiley, via zyBooks. (The Moran & Shapiro print, ebook, or 8<sup>th</sup> edition of are all fine as well; we will typeset the HW problems for you). Note that this zyBooks edition features interactive Participation, Challenge, and Quiz problems. These are all helpful to work through, and we've identified the particular Participation Activities that we think are the most relevant. These and the text sections are identified in the course schedule and on each homework set.

**Website:** The course website is on BlackBoard ([learn.bu.edu](http://learn.bu.edu)). Electronic materials will be posted periodically throughout the semester, so check the website often for updates. These will include the course syllabus, homework problems, and solutions. **NOTE** that while grade assignments will be posted for your review, we do NOT use the Blackboard grade book to calculate semester grades. Ignore any interpretation of your grade based on whatever Blackboard-reported “points” that are displayed.

**Example problems:** We have a library of videos of example problems for you to reference and study. They will be made available to Blackboard in the Example Videos folder on a weekly basis. We encourage you to review these as you study the material and prepare for the homework.

## DISCUSSION SECTION

ME304 instruction consists of your twice-weekly class and a discussion section. **Lecture is where you will learn the theory, and discussion is where you will learn how to apply it practically to solve problems. Be sure to attend both of the sections you registered for.** Your Discussion section will be run as a general open office hour homework-help setting and will periodically administer quizzes.

- Section B1: Thursdays 11:15 – 12:05 pm, EPC 208
- Section B2: Fridays 11:15 – 12:05 pm, EPC 204
- Section B3: Thursdays 3:35 – 4:25 pm, EPC 204
- Section B4: Thursdays 6:30 – 7:20 pm, EPC 208

The discussion section schedule starts on Thursday September 12<sup>th</sup>, and will continue throughout the semester. There will be no discussion section meetings prior to September 12<sup>th</sup>.

## COURSE LEARNING OUTCOMES

As an outcome of completing this course, students will:

- i. Understand underlying principles of engineering thermodynamics: properties of simple compressible fluids, use of "steam tables" for fluids, use of closed-form expressions for gasses, first and second laws of thermodynamics for closed and open systems, concept of entropy, thermodynamic temperature scale, concept of humidity.
- ii. Understand and be able to analyze simple gas and vapor cycles: Carnot cycle, Rankine cycle, Brayton cycle, refrigeration cycle, Otto and Diesel cycles.
- iii. Be able to carry out experiments involving thermal systems: application of 1st law to open and closed systems; refrigeration system performance.
- iv. Be able to write clear, concise, technical reports: Individual reports are required for each laboratory exercise. Students are expected to succinctly describe the experimental system, present the measured results, and compare results to the theory developed in class.
- v. Be able to use computational tools: The analysis of experimental data and a selection of homework problems require the use of computational programs such as Matlab or Excel.

## GRADING

Your progress and evaluation for the course material will consist of weekly problem sets, two lab exercises, two quizzes, two midterm exams, and a final exam. The breakdown for the grade weighting is:

Homework accuracy	10%
Homework completion	5%
Quizzes	5%
Lab reports	20%
Exams	60%

Nominally, the mean of the overall score across the class will set the dividing line between a B and a B-, but note that a curve will only ever be applied if the semester class average is *below* the standard low-80% range for a B/B- boundary. If the average exceeds this range, no curve will be applied.

## PROBLEM SETS

One of the best methods to learn the material is to read the text *before* the material is presented in class, attend and pay attention in class, and work through the assigned problem sets. The course is structured to give you ample feedback regarding your understanding of the material through the problem sets. Assistance will be provided in Office Hours and your Discussion Section, so please seek out help if you need it!

Another helpful practice is to alternate teaching the problems to your classmates, which will force you to think about how to tackle and solve a problem. It is common for engineers to work in groups, so keeping in mind the Ethics Code, we encourage you to form groups to discuss (but not copy) the problem sets.

**The exams are solo efforts however, so it is in your best interest to make sure you understand the problems and not rely too heavily on your classmates or the GST.**

A perfect homework solution (this applies to exams as well) should be:

- (a) legible and well organized, with labeled diagrams

- (b) demonstrate a thought process and worked-out steps
- (c) correct!

Each problem will be graded for accuracy on a 10/7/3/0 scale. A high score of 10 indicates that you worked through the entire problem and came to a correct or mostly correct solution. A score of 7 indicates that you made a valiant effort, a 3 will be given for a starting effort with several mistakes or incomplete work, and a 0 will be given for a minimal attempt or lack thereof. You will receive full “completion” points for any submitted homework with at least a starting attempt on each problem (score of at least 3), so it is best to always at least attempt every problem. Partial credit will be given for all forms of evaluation, so steps (a) and (b) are in your best interest! If you are short on time (particularly for exams), please at least attempt to set up and show your steps for how to solve the problem. Please keep the following rules in mind when writing up your solution:

- (a) Your name, section number, and problem set number must appear at the top of every sheet.
- (b) Do not submit work that has ragged edges.
- (c) Start each problem on a new page.
- (d) Indicate the final solution by drawing a solid box around it.

Problem sets will be based on class material, and will be collected via Gradescope, most Fridays, but make sure to consult with the semester schedule AND assignment heading, as some dates will shift. Office hours and the Discussion section will be one of your best resources for assistance with questions on the homework. Solutions to the problem sets will be automatically released after the final submission deadline (Fridays), so **late problem sets are not permitted** and will receive a zero. The lowest homework grade will be dropped, primarily in recognition of medical or personal circumstances that make meeting the submission deadline difficult to achieve.

## EXPERIENTIAL COMPONENTS

There are two lab exercises in this course: a First-Law Boiling Lab and a Second-Law Refrigeration Lab. The GSTs will assist with the labs. Lab reports will be written in groups of two. Details on the report formats will be discussed in class and posted on the course website.

## QUIZZES

There will be two graded quizzes, to help give you a check on your level of understanding of core concepts prior to each midterm exam. These will be administered in **your** discussion section, on the weeks of September 23<sup>rd</sup> and October 28<sup>th</sup>. You will be permitted to bring a single sheet of reference notes and a calculator but the quiz will otherwise be closed book. The session will allow for a brief discussion of the quiz problems with a small group (3 students maximum) prior to taking the quiz, but your work will ultimately be submitted on an individual basis.

## EXAMS

There will be two in-class exams given during the semester; see the schedule for dates. The final exam will be given during the final exam period, and the date is TBD. Since the Registrar will set the date later during the semester, **DO NOT MAKE TRAVEL PLANS BEFORE THE END OF THE EXAM PERIOD (December 20)**.

Make-up exams will be given only in extreme circumstances. It is your responsibility to let your instructor know as far in advance as possible of an unavoidable conflict or medical emergency.

## CLASS POLICY

We expect that if you are registered for ME304, you should attend class – in person if possible but online if not. Most of the course material can be found in a textbook, but not everything, and you will be tested

on what is covered in class, not what is simply covered in the textbook. Tuition at B.U. is expensive, so make the most of your time and money by taking advantage of all the resources you are paying for! We also expect that you will do your best to pay attention during class. You will have a busy schedule with many academic (and social) demands, so we know from experience that paying attention 100% of the time can be a difficult task. However, we do ask that you not distract your peers if your attention starts to wander. Please ignore all forms of non-approved (!) electronic communication temptation (texting, email, web surfing, etc).

- **A1/Farny section:** Please charge and bring your phone to class, as you will be using your phone in class as a response device.
- **A2/Lubner section: Laptops and phones may not be open or on your desk during lecture** (tablets are allowed, but only for digital note taking; put your phone and all smart devices into 'Do not disturb' mode to suppress all notifications during class).

If you find that we are going over material too quickly or you do not understand something crucial, don't hesitate to ask questions during class. For longer questions, see us or the GSTs outside of class.

**Active learning:** Many peer-reviewed studies have demonstrated that active learning/in-class engagement exercises have a measurable effect at helping students learn the material. While the math isn't difficult, ME304 is a concept-heavy course, as energy transfer and temperature are difficult concepts to wrap your hands around. For this reason, we will be featuring in-class concept-based questions. We strongly encourage you to participate in these questions. For this reason, we will be using a feedback system to help you explore the concepts and avoid misconceptions.

- **A1/Farny section:** We will use the online Quizizz platform as an in-class polling system for our active learning problems. Please register for a free account on <https://quizizz.com> and use the name you registered for ME304 as your user name.

**Accommodations for students with documented disabilities:** If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 to coordinate any reasonable accommodation requests. ODS is located at 19 Deerfield St, on the second floor. We will make every effort to accommodate such requests but (a) please notify your instructor at the beginning of the semester if you've received approved accommodations in previous semesters (even if you haven't received your paperwork for this semester yet!) and (b) provide at least one week's notification prior to each exam so we can make the necessary arrangements.

**Religious accommodations:** We are aware of and in agreement with Boston University's Policy on Religious Observance, whereby absences for any religious beliefs are understood and missed assignments on such occasions will be given a chance to be made up. We require notification at least a week in advance, particularly if an accommodation must be made, for such occasions.

**COVID 19 & BU Community Health Expectations:** You are expected to follow all university guidelines with respect to your vaccination and symptom check. For a detailed description of official BU policies regarding COVID, please visit:

<https://www.bu.edu/back2bu/campus-life-undergraduates/>

There exists the possibility that any of us may be required to quarantine and miss class. The University has been clear that class-via-Zoom is not an environment that is supported going forward. We will do our best to be in touch with you about contingency plans should we need to quarantine, and we ask that you be in touch with your instructor should you need to miss class. We have some, but not unlimited, digital resources available to present you with the course material, should you need to miss class, but it is important that you remain proactive in doing so should you need to quarantine.

## **ETHICAL RESPONSIBILITIES**

Cheating on homework, exams, project reports, or any form of assignment, may be a form of plagiarism and is an infringement of every code of engineering ethics. Plagiarism is a serious academic offense and should not be taken lightly. Understanding your ethical responsibilities is an integral part of becoming a professional. A copy of the Code of Ethics of engineers, promulgated by the Accreditation Board for Engineering and Technology (ABET) and the National Society of Professional Engineers can be found on the main course web site.

Please recall that when you enrolled at Boston University, you agreed to an Academic Honesty Pledge. The Academic Conduct Code details your responsibilities as well as the results of code violations, and is posted at:

<https://www.bu.edu/academics/policies/academic-conduct-code/>

## **DROP AND WITHDRAWAL DATES**

The last day to DROP (with no 'W' on your record): day, October 8<sup>th</sup>

The last day to WITHDRAW (with a 'W' on your record): day, November 12<sup>th</sup>

## **INCOMPLETES**

Incompletes will be permitted only for extenuating circumstances and must be arranged as soon as such a circumstance arises. This situation only pertains to assignments whose due dates have not yet passed.

## **COURSE EVALUATIONS**

There will be a standard course and instructor evaluation near the end of the semester, including an evaluation on how well you believe the course accomplished its stated learning outcomes (see above).

We are happy to discuss any comments and concerns that may arise during the semester during office hours.

---

To be submitted with HW 1:

I've read through the ME304 syllabus document and the semester dates.

Signature: \_\_\_\_\_

Name: \_\_\_\_\_