MEC 301 THERMODYNAMICS
FALL 2021

Instructor: Jason Loprete, 139 Light Engineering Building, Jason.Loprete@stonybrook.edu

Instructor Office Hours: 2:30 – 4:30 pm Monday; 1:00 – 4:30pm Wednesday; 2:30 – 4:30 pm Friday

Course Time and Location: Mon/Wed/Fri 11:45 AM – 12:40 PM, 143 (Old) Engineering

Credits Allocated: 3

Bulletin Description: *MEC 301: Thermodynamics*.
Variables that describe the thermodynamic state of a system or control volume, including absolute temperature, internal energy, enthalpy, and entropy are introduced, and basic principles governing the transformations of energy, especially heat and work, are developed. Underlying principles are used to analyze and solve problems related to thermodynamic systems and to determine the changes in properties of the systems and surroundings implied by changes in inputs, configuration, or constraints.

Prerequisites: AMS 261 or MAT 203; PHY 125 or 131 or 141; CHE 131

Learning Objectives: The emphasis in this course will be on learning the fundamentals of thermodynamics and in applying them to solve real-world engineering problems. Key topical areas include the first and second laws of thermodynamics, the concept of entropy, theoretical and practical maximum efficiencies for heat engines, and refrigeration, and the basics of gas power and refrigeration cycles.

Please note: I can only provide very limited email support to the course. There are ~70 people registered for this class. I am likely not going to be able to answer convenience questions such as what we covered in class, what will be on the exam, or how to do a particular homework problem via email. You will probably get a much faster and more focused answer to your question by asking questions in class, stopping by after class, and/or coming to my office hours, especially for going over problems in detail.

Text: *Thermodynamics: An Engineering Approach* (9*th ed.*), Y. A. Çengel and M. A. Boles (2019). The textbook is required. We will also use McGraw-Hill *Connect*™ for all homework assignments. The *Connect*™ subscription includes electronic access to the textbook for the 6 months and is available at the bookstore or online. Connect is required. Optional loose-leaf hardcopy of text available (~$70). Other options include rental or purchase of the textbook, if desired.

Schedule of Required Reading and Assignments: Homework assignments will be made every one or two weeks, depending on the material covered in the course during this time. We will be using the McGraw-Hill Connect™ online homework system. NO LATE HOMEWORK WILL BE ACCEPTED, except under documented emergencies (medical, death in the family).

Exams: *Two midterm exams and a final exam.*

Basis for calculating final grade: The final grade for the course will be based on the following percentage breakdown:

• Homework: 10%
• First midterm: 20%
• Second midterm: 30%
• Final examination: 40%.

The numeric score for each of these items will be weighted by the percentage stated to arrive at a final numerical score for the course, from which final letter grades will be issued.

Exam dates and times: In recognition that you have other classes with their own exams, projects and deadlines, I will, as a courtesy to the class, present several candidate dates for each midterm when we get close to the time for an exam. The class will then vote, with a simple majority determining the date on which the exam will be held. As a consequence, however, we will not know the specific date of the exam until a few weeks before each exam when the class has voted. Note also that the last day to withdraw from the course is **Friday October 22 at 4:00pm**. We need to have the first

midterm completed and graded by this date so that anyone who wishes to drop the course will have an initial indication of how they are doing in the course. This means the *last* possible day for the midterm is Monday, October 18, although it could be earlier if the class votes to do so. All midterm exams will be held during normal class times (replacing the lecture for that day). The final exam will be held at the date and time as determined by the university's standard final examination scheduling policy

(https://www.stonybrook.edu/commcms/registrar/registration/_exams/fall21-finals.php). The exam room will be determined and made available before the end of the classes for the semester.

> **Tips for success**: Practice makes perfect and if you read the text, study the example problems, do the assigned problems (and others if you have time), and ask questions if you are not sure about any of the above you should do well in this course. This material is cumulative; if you fall behind you will find it hard to understand what is being discussed in class. Thermody namics is a very deceptive topic to study: the math is not difficult and the concepts, when isolated, can seem trivial, however when combined together things can get very confusing.

Prerequisites by Topics: Concept of mechanical energy and work, Chemistry, Multivariable calculus
Topics: Chapters 1–7, portions of 8, 10, and 11 (time permitting)

> **The Golden Rule:** I have only one rule for this course: I will not tolerate in any way one person infringing on another's opportunity to learn in the classroom. Among other things, this means (i) absolutely <u>no talking during class</u>, and (ii) <u>the use of laptop computers is strongly discouraged </u>(they are a visual and aural distraction). If you wish to use a laptop, please sit either in the back three rows of the classroom or to the far right. Surface/pen devices are acceptable. Please turn your cell phones off before class. Thank you.

Student Accessibility Support Center Statement. If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacua tion/evacuation-guide-disabilities and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement. Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stony brook.edu/commcms/academic_integrity/index.html.

Critical Incident Management Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Allowed Calculators

Following the Mechanical Engineering Department's mandatory calculator policy, **only** the following calculators will be allowed to be used on the midterm and final exams. There will be no exceptions. This list of calculators is identical to that allowed for the *National Council for Examiners for Engineering and Surveying* (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year, as well as the Professional Engineering (PE) exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better. If you have any questions on this policy please feel free to contact me. The NCEES policy on calculators can be found here: https://ncees.org/exams/calculator/ .

Casio: All **fx-115** and **fx-991** models. (Any Casio calculator must have **fx-115 or fx-991** in its model name.)

Hewlett Packard: The **HP 33s** and **HP 35s** models, but no others.

Texas Instruments: All **TI-30X** and **TI-36X** models. Any Texas Instruments calculator must contain either **TI-30X** or **TI-36X** in its model name.

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