

**MECH 5310 Thermodynamics (CRN 17976)**  
**Course Syllabus**  
**Fall 2017**

**COURSE MOTIVATION:** This course deepens students' understanding of macroscopic thermodynamics and its applications to combustion, thermoelectricity, and electrochemistry.

**COURSE OBJECTIVES:** Upon completion of this course, the student will understand:

- Thermodynamic property relations and equations of state
- Thermodynamics and kinetics of combustion
- Thermodynamics of irreversible processes and its applications to thermoelectric phenomena and fuel cells

**TIME:** MW 10:30 am – 11:50 am

**LOCATION:** Classroom Bldg C304

**INSTRUCTOR:** Dr. Evgeny Shafirovich

**E-MAIL:** [eshafirovich2@utep.edu](mailto:eshafirovich2@utep.edu)

**OFFICE HOURS:** MTWR 2:10 pm – 3:40 pm

**OFFICE:** A112

**TEXTBOOK:** Desmond E. Winterbone and Ali Turan, *Advanced Thermodynamics for Engineers*, 2<sup>nd</sup> Ed., Butterwoth-Heinemann, Elsevier, 2015. ISBN: 978-0-444-63373-6

**BLACKBOARD:** Instructor will be using Blackboard for uploading lectures, updating the syllabus (if necessary), and communicating with students via “Announcements” and email.

**ASSIGNMENTS:** Homework assignments will be given during the semester. They will include problems and a term paper. The solutions of the problems will not be graded.

Each student will prepare an individual term paper. A list of possible topics will be provided by the instructor. Student can also propose any other relevant topic. For each student, the topic has to be approved by the instructor by the end of the second week. A two-page abstract of the term paper has to be submitted to the instructor by the end of the fourth week. The length of the term paper should be about 5000 words. Each student will submit the term paper as a Word file to the instructor by November 22<sup>nd</sup> and present it in class at a special session. Format of the two-page abstract and the paper: Times New Roman, 12pt, single spacing, single column, justified.

**EXAMS:** There are two exams. All exams are open book and close notes. See Section “Department’s Policies” for more information on the exam rules.

**GRADING:** Your grade for the course will be determined using the following formula:

Term Paper	40%
Exam 1	30%
Exam 2	30%

## COURSE CALENDAR

Week	Day	Date	Topic	Chapters
1	M	8/28	Introduction and revision. The Second Law and equilibrium	1, 2
1	W	8/30	The Second Law and equilibrium	2
2	M	9/4	<i>Labor Day</i>	
2	W	9/6	Availability and exergy	4
3	M	9/11	Availability and exergy. <b>The term paper topic is approved for each student.</b>	4
3	W	9/13	Finite time thermodynamics	6
4	M	9/18	General thermodynamic relations	7
4	W	9/20	General thermodynamic relations.	7
5	M	9/25	Equations of state. <b>A two-page abstract of the term paper is due.</b>	8
5	W	9/27	Equations of state	8
6	M	10/2	Thermodynamic properties of ideal gases and mixtures	9
6	W	10/4	Thermodynamic properties of ideal gases and mixtures	9
7	M	10/9	Thermodynamics of combustion	10
7	W	10/11	Thermodynamics of combustion	10
8	M	10/16	<b>Exam 1</b>	
8	W	10/18	Chemistry of combustion	11
9	M	10/23	Chemical equilibrium and dissociation	12
9	W	10/25	Chemical equilibrium and dissociation	12
10	M	10/30	Effect of dissociation on combustion parameters	13
10	W	11/1	Chemical kinetics	14
11	M	11/6	Chemical kinetics	14
11	W	11/8	Combustion and flames	15
12	M	11/13	Combustion and flames	15
12	W	11/15	Joule-Thomson effect	18
13	M	11/20	Irreversible thermodynamics	20
13	W	11/22	Irreversible thermodynamics. <b>The term paper is due.</b>	20
14	M	11/27	Irreversible thermodynamics	20
14	W	11/29	Fuel cells	21
15	M	12/4	Fuel cells	21
15	W	12/6	<b>Exam 2</b>	
15	F	12/8	<b>Term paper presentations ( 9:00 am – 4:00 pm)</b>	

There is no Final (comprehensive) Exam.

**ABET PROGRAM OUTCOMES:** This class addresses the following ABET objectives:

- (a) An ability to apply knowledge of mathematics, science, and engineering.
- (e) An ability to identify, formulate, and solve engineering problems.
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**ACCOMODATIONS:** If you have a disability and need classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).

## Department's Policies

### ACADEMIC HONESTY

During exams and quizzes, you are not allowed to use any form of wifi enabled electronic device, including cell phones or other electronic communication devices or methods (wrist watches, earbuds, etc.). No wrist watch or other electronic device may be worn.

No electronic version of the book, loose paper print-outs of the book or extra sheets of paper of any kind are allowed unless explicitly mentioned in writing by the instructor. As a part of the zero-tolerance policy, if you have a cellphone or other electronic device capable of communication on your person; or if any proctor sees or hears any electronic device during the exam or if you share your work with someone else, you will be reported to the proper authorities and you may receive a zero on the exam and an F in the class. Other actions including suspension may also be perused.

If you have a disability that requires the use of an electronic device during exams you must have a letter of accommodation from the Center for Accommodations and Support Services (CASS). This accommodation must be coordinated in advance with the instructor.

During exams, you will not be allowed to leave the examination room until you complete the exam. This includes restroom breaks. Students with disabilities must have a letter of accommodation and coordinate this in advance with the instructor.

Instructors and/or proctors may record and/or use their personal cell phones to document activity during the exam. Recording devices may also be located at various locations in the room and may be out of sight of the students. These recordings will be managed according to the UTEP approved regulations for such media.

If you are suspected of scholastic dishonesty you may not be directly confronted about your conduct by the instructor or proctor. You will however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam will not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes.

If you arrive more than 15 minutes late to an exam, you will not be allowed to enter the examination room.

There will be no makeup exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given.

If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid.

No food or drinks will be allowed in the examination room.

Departmental policy allows for the use of assigned seats. All students must present their UTEP issued ID prior to and during every exam and may be required to sign in. Not having a UTEP issued ID when asked will result in forfeiture of the exam.

Scholastic dishonesty on homework, lab assignments and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

### **CLASS ATTENDANCE POLICY**

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class.

### **HARASSMENT POLICY**

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment; but repeated questions about a grade or an administrative decision are.
- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.
- Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
- Similar behavior towards department staff, and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students, and should be treated with due respect.