The University of Toledo
Department of Mechanical, Industrial, and Manufacturing Engineering
MIME 3410 (Thermodynamics II)

Instructor:	Dr. Hossein Sojoudi	**Term**:	Spring 2019
Email:	Hossein.Sojoudi@utoledo.edu	**Class Location**:	Palmer 3070
Office Hours:	T 11 AM-2 PM, TR 11 AM-1 PM	**Class Day/Time**:	TR 9:35-10:55 AM
Office Location:	NI 4024	**Teaching Assistant**:	Qifan Yang
Office Phone:	419-530-6007	**TA Office Hours/Location**:	W 3-5 PM / NE 2047
Prerequisite:	MIME 3400	**TA Email**:	qifan.yang@rockets.utoledo.edu

COURSE/CATALOG DESCRIPTION

Review of open and closed systems in thermodynamics, the Carnot principle, and cycle efficiency concepts. Application to gas and vapor power cycles and refrigeration cycles. Thermodynamic property relations, gaseous mixtures, and combustion.

REFERENCES

- Textbook: "Thermodynamics: An Engineering Approach (Eighth Edition)" by Yunus A. Çengel and Michael A. Boles, McGraw Hill. (Same as MIME 3400.)
- Please note that no textbook is required for this class.

PREREQUISITE MIME 3400. (Students should be reasonably familiar with topics in Chapters 1-7 of the textbook.)

COURSE OVERVIEW

Chapter	# of Lectures (approx)	Chapter Topics (tentative)
1-7	2	Review of Thermodynamics I (Basic concepts such as systems, processes, states, heat and work, 1st and 2nd Laws of Thermodynamics)
9	6	Gas power cycles (Otto, Diesel, and Brayton cycles, Jet engines)
	1	Exam 1
10	4	Vapor and combined power cycles (Carnot and Rankine cycles and variations)
11	6	Refrigeration Cycle
	1	Exam 2
13-14	5	Non-reacting gas mixtures (gas mixtures and psychrometrics)
15	3	Reacting gas mixtures (chemical reactions & combustion)
	During the finals week	Exam 3

STUDENT LEARNING OUTCOMES

At the end of this course students will be able to:

1) *Understand the concept of entropy, enthalpy, first and second law of thermodynamics, and efficiency.*
2) *Identify and analyze liquid-vapor power and refrigeration cycles and their variations.*
3) *Identify and analyze gas cycles such as the Rankine, Otto, Diesel, and Brayton and their variations.*
4) *Perform thermodynamic calculations involving combustion processes.*
5) *Perform thermodynamic calculations involving non-reacting gas mixtures.*

TEACHING/LEARNING STRATEGIES

1) *Recitations will focus on reviewing analytical methods used in thermodynamics and applying them to solve representative thermodynamic problems on the white board.*
2) *Before each class: **review class slides posted on blackboard** on the material to be presented – it will help you to focus on the lecture and to better understand the concepts.*
3) *Come to the lecture and focus on what is being presented; take notes; ask questions if needed; raise your hand and respond to the questions asked in class.*
4) *After each class:*
   - *a) Review course slides.*
   - *b) Read your notes and handouts; redo, on your own, the problems solved in class.*
   - *c) Solve, on your own, the homework problems posted; compare your results to the provided solutions.*
   - *d) If you do not know how to do a homework problem, ask for help (instructor, colleague, tutor).*
5) *Before a test: make sure you go again through all **homework problems** and **class problems**; ask for help if needed.*

TECHNOLOGY REQUIREMENTS

Web assist: Blackboard https://blackboard.utdl.edu

Blackboard will be used to post course materials, announcements, and homework/examination solutions.

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA)

The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.

ACADEMIC ACCOMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

ACADEMIC POLICIES

The University of Toledo and the College of Engineering academic dishonesty and missed class policies will be applied. Please refer to the MIME Undergraduate Student Handbook, Appendices 1, 2, and 3 for more information. You can find this document online at

http://www.eng.utoledo.edu/mime/undergraduate/handbook/MIME_Handbook_Fall_2012.pdf

***Academic dishonesty OF ANY SORT will result in FAILING THE COURSE & REPORTING to the College of Engineering Undergraduate Office**. Please note that in case of excused absence, any missed work must be completed and written documentation of the circumstance (such as a doctor's note) must be provided to be kept on file.*

COURSE EXPECTATIONS

Any behavior that negatively influencing the learning of other students, such as conversation that can be heard from a few rows away, or cell phone ringing/vibrating, will not be allowed. Cell phones and other similar devices must be turned off (not just in silent mode) during lectures and during examinations.

If you do not understand something, there is a good chance that others have the same problem. Never be embarrassed to ask for help if you find something confusing.

COMMUNICATION GUIDELINES

For other than in-person discussion, please use email to communicate with me. Please refrain from asking through email detailed explanations on solutions or other course problems. Use the office hours for these issues.

STUDENT SUPPORT SERVICES

The university offers tutoring and student support service work to enhance your academic journey. Use these resources for additional support. https://www.utoledo.edu/success/

ACCEPTABLE USE OF COURSE MATERIALS

Materials provided to students in any format (including, but not limited to: electronic and hard-copy documents, video recordings, etc.) are provided solely for their personal use in completing the coursework. Students are not permitted to share or distribute course materials by any means (including, but not limited to: uploading to a 3rd party website, emailing, etc.), except where prior written permission is provided by the instructor. Unauthorized distribution of any material will be considered an academic offense and may constitute copyright infringement. As clarification to the above, it is acceptable for students enrolled in the course to share material with other students enrolled in the course (while they are both enrolled).

HOMEWORK

Recommended homework problems and solution sets will be posted on the course website throughout the term. Completion of these assignments is strongly recommended to facilitate your development of an in-depth understanding of the course material. It is recommended that you attempt to fully solve the problems before you refer to the solution pages. **Homework will NOT be graded**.

EXAMS

Exams 1 & 2 will be held at dates and times set during the class. A final exam (Exam 3) will be held during the final exam period at a date and time set by the University Registrar. Aids permitted will include a "crib sheet" (8.5x11 paper, **two sides total**), non-programmable calculator, ruler/straight-edge, and Property Tables.

POP QUIZ

There will be several pop quizzes. **The quiz with the lowest grade will be dropped**. (10 % of the final grade)

GRADING/ASSESSMENT

Exam 1	30%
Exam 2	30%
Exam 3	30%
Quiz	10%
Total	*100%*

* *The final grade will be determined using a straight scale as follows.*

Numerical Average	Grade
≥ 93.00	A
89.33 – 92.99	A–
85.67 – 89.32	B+
82.00 – 85.66	B
78.33 – 81.99	B–
74.67 – 78.32	C+
71.00 – 74.66	C
67.33 – 70.99	C–
63.67 – 67.32	D+
60.00 – 63.66	D
< 60.00	F