EGR 240 Thermodynamics I

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Class: BL 155, MWF 9:30-10:20, Spring 2015

DEPARTMENT: Institute of Engineering

COURSE PREFIX: EGR **COURSE NUMBER: 240** **CREDIT HOURS:** 3

I. **TITLE: Thermodynamics I**

II. **COURSE DESCRIPTION AND PREREQUISITE(S):** Fundamental engineering concepts of power systems, cooling systems and system efficiency. First and second law analysis. Entropy; exergy; reversible and irreversible processes. Ideal gases. Applications to simple physical, chemical and engineering problems. Three lectures per week incorporating laboratory activities for students and demonstrations as appropriate.

Prerequisite(s): PHY 235. Corequisite: MAT 308

III. **COURSE OBJECTIVES:** The student will be able to

A. describe and apply the fundamental laws of physics that have involve thermodynamic processes,
B. understand how mathematics may be used to describe the physical processes associated with thermodynamics,
C. know how property values are determined for various thermodynamic states and properties, and
D. apply the models of thermodynamic processes in the application of real world systems

IV. **CONTENT OUTLINE:**

A. Introduction of concepts and definitions
B. The first law of thermodynamics
C. Properties of pure substances
D. Control volume energy analysis
E. The second law of thermodynamics
F. Entropy
G. Exergy
H. Gas power systems. Gas power cycles

V. **INSTRUCTIONAL ACTIVITIES:** Lecture, discussion, questions, problem solutions, and examinations

VI. **FIELD, CLINICAL, AND/OR LABORATORY EXPERIENCES:** Field experiences will be offered as they become available.

VII. **TEXT(S) AND RESOURCES:**

A. Thermodynamics: An Engineering Approach, 8th Edition, by Cengel and Boles.
B. Engineering Equation Solver (EES) software. (F-chart/WCB McGraw-Hill) – For problem solving and property analysis
C. Canvas – Class announcements, resources, and grading. The course is listed as EGR240-01-SP15
D. Instructor office hours – Tuesday, Thursday and Friday afternoons are best. I am not available on Monday or Wednesday, except directly after class. Additional times are available. Contact me to schedule longer extra instruction periods.

VIII. EVALUATION AND GRADING PROCEDURES:

A. Three hour exams and one final exam will be given

B. Homework will be assigned on a weekly basis. Homework is due at class time on Wednesday. Generally I will choose one problem to be graded for problem solving technique for half of the homework grade. The remaining half will consist of a level of effort in completing the assignment.

C. Weighting for the course grade is as follows.
   1. Homework – 24% (Best 12 assignments. No late homework accepted.)
   2. Unit Exams – 36% (3 exams, 12% each)
   3. Final Exam – 30%
   4. Greater of Unit Exam average and Final Exam – 10%

D. Final grade is based on the following

   $90\% \leq A \leq 100\%$; $80\% \leq B < 90\%$; $70\% \leq C < 80\%$; $60\% \leq D < 70\%$; $0 < E < 60\%$

   The instructor reserves the right to apply a slight upward curve to the final grade.. Whether this curve is applied and the amount typically depends on perceived level of involvement through class attendance. It also depends upon how grades are clumped. No student will be bumped above a student with a higher numeric grade.

E. If an exam is missed, the instructor is to be notified before the exam time, by phone if necessary. In an emergency situation, the instructor is to be notified as soon after the exam as possible. Do not simply wait until the next class period. Instructor may apply a substantial penalty (20% per work day) for any late exam.

IX. ATTENDANCE POLICY:

Students are expected to adhere to the MSU Attendance Policy outlined in the current *MSU Bulletin*.

X. ACADEMIC HONESTY POLICY:

Murray State University takes seriously its moral and educational obligation to maintain high standards of academic honesty and ethical behavior. Instructors are expected to evaluate students' academic achievements accurately, as well as ascertain that work submitted by students is authentic and the result of their own efforts, and consistent with established academic standards. Students are obligated to respect and abide by the basic standards of personal and professional integrity.

Violations of Academic Honesty include:

Cheating - Intentionally using or attempting to use unauthorized information such as books, notes, study aids, or other electronic, online, or digital devices in any academic exercise; as well as unauthorized communication of information by any means to or from others during any academic exercise.

Fabrication and Falsification - Intentional alteration or invention of any information or citation in an academic exercise. Falsification involves changing information whereas fabrication involves inventing or counterfeiting information.

Multiple Submission - The submission of substantial portions of the same academic work, including oral reports, for credit more than once without authorization from the instructor.

Plagiarism - Intentionally or knowingly representing the words, ideas, creative work, or data of someone else as one's own in any academic exercise, without due and proper acknowledgement.

Instructors should outline their expectations that may go beyond the scope of this policy at the beginning of each course and identify such expectations and restrictions in the course syllabus. When an instructor receives evidence, either directly or indirectly, of academic dishonesty, he or she should investigate the instance. The faculty member should then take appropriate disciplinary action.

Disciplinary action may include, but is not limited to the following:

1) Requiring the student(s) to repeat the exercise or do additional related exercise(s).
2) Lowering the grade or failing the student(s) on the particular exercise(s) involved.
3) Lowering the grade or failing the student(s) in the course.

If the disciplinary action results in the awarding of a grade of E in the course, the student(s) may not drop the course.

Faculty reserve the right to invalidate any exercise or other evaluative measures if substantial evidence exists that the integrity of the exercise has been compromised. Faculty also reserve the right to document in the course syllabi further academic honesty policy elements related to the individual disciplines.

A student may appeal the decision of the faculty member with the department chair in writing within five working days. Note: If, at any point in this process, the student alleges that actions have taken place that may be in violation of the Murray State University Non-Discrimination Statement, this process must be suspended and the matter be directed to the Office of Institutional Diversity, Equity and Access. Any appeal will be forwarded to the appropriate university committee as determined by the Provost.

XI. NON-DISCRIMINATION POLICY STATEMENT:

Policy Statement

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact the Executive Director of Institutional Diversity, Equity and Access, 103 Wells Hall, (270) 809-3155 (voice), (270) 809-3361 (TDD).

Students with Disabilities

Students requiring special assistance due to a disability should visit the Office of Student Disability Services immediately for assistance with accommodations. For more information, students should contact the Office of Student Disability Services, 423 Wells Hall, Murray, KY 42071. 270-809-2018 (voice) 270-809-5889(TDD).

XII. Engineering Physics Program Educational Objectives and Student Outcomes

The Engineering Physics program at Murray State University produces graduates who:

A. are equipped to function as productive, qualified engineering professionals in entry-level corporate research, development, and production positions. This includes the ability to communicate effectively, work collaboratively, and solve problems creatively.
B. are able to practice engineering in areas where the traditional science and engineering disciplines overlap, utilizing their ability to incorporate significant computational, analytical, and experimental skills in accomplishing the engineering task.
C. are prepared to successfully enter and complete programs of graduate study in one of several engineering fields as well as in physics
D. are aware of their responsibility to contribute to society as ethical, socially conscious practitioners of their profession

Graduates of the Engineering physics program at Murray State University will demonstrate:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design an conduct experiments, as well as to analyze and interpret data;
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
d. an ability to function on multi-disciplinary teams;
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context
i. a recognition of the need for, and an ability to engage in life-long learning;
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;
l. a competence in the use of computational tools and in the use of a high-level programming language
m. a depth of knowledge in calculus-based physics at an advanced level;