Engineering Technology –MET Option

Course Number and Name: ET 306, Fundamental and Applied Thermodynamics

Credits & Contact Hours: 3cr., three lectures weekly of 50 min. each.
Total semester contact hours are approximately 40.

Instructor's name: Craig Ricketts
Textbook *title*, author, and year: *Thermodynamics - An Engineering Approach*, Çengel, Y. A. and Boles, M. A., 2008.
Supplemental materials: *CyclePad*, a shareware application for cycle analysis.
Specific Course Information:

a. **Course Catalog Description** - First and second laws, properties of substances, thermodynamic cycles including power generation and refrigeration.
b. **Prerequisites** – Chem 110G Basic Chemistry, ET 240 Statics, and Math 235 Calculus I.
c. **Laboratory** – See documentation for ET 306L Thermodynamics Laboratory.
d. **Augmenting** – This is a required course in the CET and MET curricula.

Course Goals and Objectives:

Student acquires an understanding of the physical concepts and basic principles of fundamental and applied thermodynamics. Also, student becomes acquainted with relevant problem solving methods and tools of good practice. Through repeated application of focused and systematic approaches to problem solving, student gains pertinent experience in the analysis of important contemporary thermodynamic processes.

Related ABET Outcomes:

The **following** are the MET (x.) and ABET student outcomes that directly relate to Criterion 3. *An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline;* to include:

(1.) **Algebra**, trigonometry, Boolean mathematics, calculus, statistics and probability, **fundamental principles and concepts of science and engineering technology**, **good practice in problem solving**, and **methods of standard practice in the analysis** and applied design **of mechanical systems**.
Also ABET 3.a., 3.b., 3.e., 3.f., and 3.k.

(4.) **Current software corresponding to good practice in the application of mechanical engineering technologies. Software application functions to include:** word processing, **spreadsheet calculations**, **graphing**, presentation media, computer assisted drafting and manufacturing, manufacturing processes, statistics, data acquisition, project management, and **the analysis** and applied design **of systems involving** mechanisms, machines, or **fluid and thermal processes**.
Also ABET 3.a., 3.b., 3.f., and 3.k.

Course topics and class hours devoted to each topic:

Topics	Class Hours
· Introduction: field overview and significance, historical perspectives	1
· Units and basic definitions, pressure, temperature, and 0^{th} law	1
· Properties of pure substances	1
· Property diagrams and tables, equations of state, and compressibility factor	3
· Specific heats: for ideal gases and for solids and liquids	1
· The first law and closed systems: rigid tanks, piston/cylinder devices	3
· The first law and open systems: turbines, compressors, nozzles, diffusers, mixing chambers, heat exchangers	4
· The second law and its applications	3
· Entropy and applications	3
· Exergy and applications of second law analysis	1
· Gas power cycles: Otto, Diesel, and Brayton	3
· Vapor and combined power cycles: Rankine, Brayton/Rankine	4
· Cogeneration	1
· Refrigeration cycle for refrigerators, air conditioners, and heat pumps	3
· Software application for thermodynamic cycle analysis	1
· Fundamentals and applications of psychrometrics: chart, cooling towers	2
· Examinations	4
· Topic Reviews	4

Laboratory Projects: See relevant documentation for separate laboratory course.

Examples of lab topics: See relevant documentation for separate laboratory course.

Prepared by: Craig Ricketts **Date**: 12/18/10