

1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

ME 326B THERMODYNAMICS II

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Application of thermodynamic principles; steam generators, engines and turbines; combustion, vapor cycles; refrigeration; internal combustion engines.

4. Prerequisites: ME 326A (Thermodynamics I)

5. Text and Materials: Fundamentals of Thermodynamics, Sixth Edition, Sonntag, Borgnakke Van Wylen, John Wiley and Sons, 2003

6. Course Objectives: The student will gain experience in the application of the principles of thermodynamics and in the design and analysis of complex thermal energy conversion systems

Course Outcomes

- the ability to apply the first law and second law of thermodynamics
- the ability to find thermodynamics properties of fluids at given states
- the ability to predict the performance of a thermodynamic cycle
- the ability to predict the thermodynamic performance of engines and heat pumps
- the ability to design and analyze power or refrigeration cycles
- an understanding of ideal gas mixtures
- the ability to predict air-vapor mixture properties and performance of a psychometric system
- the ability to balance chemical reactions between fuels and oxidizers
- the ability to predict the thermodynamic performance of a combustor

7. Topics Covered: (in Order of Presentation)

- Review of First Law and Second Law
- Otto & Diesel Cycles – Ch. 11
- Internal & External Combustion Engines – Ch. 11
- Stirling Cycle – Ch. 11
- Brayton Cycle & Ericsson Cycle – Ch. 11
- Jet Engine Cycle – Ch. 11
- Rankine Cycle & Power Plants – Ch. 11
- Reheat & Regeneration Cycles – Ch. 11
- Air Refrigeration Cycle – Ch. 11
- Vapor-Compression Refrigeration – Ch. 11
- Mid-Term Exam
- Ideal Gas Mixtures – Ch. 12
- Gas-Vapor Mixtures – Ch. 12
- Psychometrics – Ch. 12
- Combustion Process – Ch. 14
- First Law of Reacting System – Ch. 14
- Enthalpy of Formation– Ch. 14
- Adiabatic Flame Temperature – Ch. 14
- Second Law of Reacting System – Ch. 14
- Combustion Efficiency – Ch. 14

8. Class Schedule: Number of Sessions per week: 2
Duration of each session: 1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 51 upper division units required for the mechanical engineering program.

Engineering Science	2 units
Engineering Design	2 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of how mechanical engineering integrates into inter-disciplinary systems

Skill outcomes:

- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

11. Prepared by: Chivey Wu

05/2005