ME 353, THERMODYNAMICS II
SYLLABUS


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COURSE CONTENT

The content of the course and the approximate class time devoted to each topic is outlined below.

Chapter                              Topics
11        Vapor power systems, Vapor refrigeration systems.
12        Gas power systems
13 Non-reacting ideal gas mixtures, properties of such mixtures, moist air calculations, applications of such mixtures.
14  Equations of state, Thermodynamic relationships, generalized thermodynamic properties, applications of such relationships and properties.
15        Combustion process, energy analysis of reacting mixtures, second law analysis.
16       Chemical equilibrium, equilibrium composition of mixtures.

COURSE OUTCOMES

1. Students will be exposed to selected equations of state used to model the behavior of real gases. (a, e)

2. Students will understand the concept of generalized thermodynamic relationships and be able to use these relationships to model the behavior of real substance, especially at high pressures. (a, e)

3. Students will understand the thermodynamics of non-reacting mixtures of ideal gases and be able to apply these concepts to engineering problems such as the psychometrics of air-water vapor mixtures. (a, e)

4. Students will understand the concepts of reacting mixtures (example is the combustion process) and will be able to evaluate the energy transfer for such processes. (a, e)

5. Students will understand the concepts of chemical equilibrium and equilibrium of mixtures.
They will also be able to apply these concepts to typical engineering problems. (a, e,)

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6. Students will apply the thermodynamic concepts to evaluate the performance of selected power and refrigeration cycles. (a, e)

7. The student should be able to apply the engineering design procedure to a problem. (c)

8. The project should help the student develop skills that would apply to lifelong learning. (i)

*Items in parenthesis refer to the affected Program outcomes (see below).*

**COURSE GRADES**

The grades for the course will be determined as follows:

- Exams 50 %
- Final exam 30 %
- Quizzes, homework and design project 20 %

*Individual makeup exams will be given for missed exams at the discretion of the instructor and only for an excused absence.*

The final exam will be given at the time designated by the University final test schedule. All students must take the final exam at this time.

Homework assignments will be given daily and are considered due the following class period. Homework problems may occasionally be collected at the *beginning of class* and may be graded. **No late papers will be accepted.** Homework must be in acceptable engineering form including given and find statements and labeled drawings of the system being considered or it will not be graded.

Final course grades will assigned according to the following scale.

- A 90% or greater
- B 80% to less than 90%
- C 70% to less than 80%
- D 60% to less than 70%
- F less than 60%

**STUDENTS WITH SPECIAL NEEDS**

Students who have any disability that might affect their performance in this class are encouraged to speak with the instructor early in the semester.

**All work in this course must be completed in a manner consistent with NDSU University**
MEA Honor Pledge:
“On my honor I will not give nor receive unauthorized assistance in completing assignments and work submitted for review or assessment. Furthermore, I understand the requirements in the College of Engineering and Architecture Honor System and accept the responsibility I have to complete all my work with complete integrity.”

Department of Mechanical Engineering, North Dakota State University

Mission

To educate undergraduate and graduate students in the fundamentals of the discipline, and prepare graduates (BS, MS, or PhD) to effectively function in society in the field of their choice while also having the learning skills to adapt to evolving personal and professional goals.

Student Outcomes

To foster attainment of the educational objectives, the MEAM Department has developed a curriculum that insures students will achieve the following outcomes by the time of graduation:

a) Graduates must have the ability to apply knowledge of mathematics and science to solve engineering problems.

b) Graduates must have the ability to design and conduct experiments as well as to analyze and interpret data.

c) Graduates must have the 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) Graduates must have the ability to function on multidisciplinary teams.

e) Graduates must have the ability to identify, formulate, and solve fundamental engineering problems.

f) Graduates must have an understanding of professional and ethical responsibility.

g) Graduates must have the ability to communicate effectively.

h) Graduates must possess the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

i) Graduates must recognize the need for, and possess an ability to engage in, life-long learning.

j) Graduates must possess knowledge of contemporary issues.

k) Graduates must have the ability to use techniques, skills, and modern engineering tools necessary for engineering practice.