

Engr 222 Principles of Engineering II

Department: Mathematics, Physics and Engineering

Credit Hours: 3

Required or Elective (circle one)

Current Catalog Description:

Principles of Engineering II. (3-0) Theory and application of energy methods in engineering; conservation principles to investigate "traditional" thermodynamics and internal flow fluids.

Course Schedule:

3 lecture hr per wk, 0 lab hr per week

Textbook(s):

Coordinator:

Dr. Mircea Agapie

Course Web Page:

Prerequisites by Topic:

ENGR 112 Foundations of Engineering II

MATH 209 Calculus II

Grading:

Program Outcome and Course Learning Goals Map:

The Program Outcomes for Engineering Physics are:

- A. an ability to apply knowledge of math, engineering & science
- B. an ability to design and conduct experiments, as well as to analyze and interpret data
- C. an ability to design system, component or process to meet 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, economic, environmental, and societal context
- I. a recognition of need for, and ability to engage in life-long learning
- J. a knowledge of contemporary issues
- K. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
- L. a depth and breadth of knowledge in engineering and physics necessary to work in a multidisciplinary environment

Course Learning Goals:	Program Outcome(s):
Students completing this course with a C or better will:	
1. Understand and describe basic system properties including pressure, volume, temperature, and intrinsic and extrinsic quantities	A,L
2. Understand how work, heat and energy are related through conservation principles in closed and open systems.	A,E,L
3. Understand and be able to apply the three laws of Thermodynamics.	A,E,L

4. Be able to calculate the work, heat and energy exchanges involved in thermodynamic processes and cycles.	A,E,L
5. Be able to perform calculations involving enthalpy and entropy.	A,E,L
6. Understand the nature of working fluid changes produced by various equipments.	A,E,L
7. Be able to calculate the efficiency of heat processes and cycles.	A,E,L
8. Be able to communicate orally and in writing the solutions to problems and projects related to processes and cycles.	A,D,E,G,L

Topics	# Lectures (Approximate)
Basic Concepts and Measures: Temperature Scales, Pressure, Volume	3
Properties of Pure Substances, Intensive Quantities, Extensive Quantities, Thermodynamic Tables	6
First Law for Closed Systems: Conservation of Energy, Heat, Work, Specific Heat, Enthalpy	6
First Law for Control Volumes: Conservation of Energy, Heat, Work, Conservation, Mass Flow, Mass Balance, State Change, Constant Volume Processes, Constant Pressure Processes, Specific Heats, Enthalpy	6
Ideal Gasses, Compressibility	3
Second Law of Thermodynamics: Entropy, Heat Engines, Carnot Cycle, Air Conditioning, Heat Pumps, Coefficient of Performance	9
Rankin Cycle	3
Chemical Reactions: Combustion, Otto Cycle, Diesel Cycle, Brayton Cycle	8

Academic Honesty:

Cheating, plagiarism (submitting another person's materials or ideas as one's own), or doing work for another person who will receive academic credit are all-impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, or term papers, or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

Students with Disabilities Policy:

It is the policy of Tarleton State University to comply with the Americans with Disabilities Act (ADA) and other federal, state, and local laws relative to the provision of disability services. Students with disabilities attending Tarleton State University may contact the Office of Disability Services at (254) 968-9478 to request appropriate accommodation. Furthermore, formal accommodation requests cannot be made until the student has been officially admitted to Tarleton State University.

Contribution of Course to Meeting the Professional Requirement:

Engineering Topics: 100%

Status of Continuous Improvement Review of this Course:

Prepared by: Tom Talley, Tom Mewhinney

Date: 08/31/04

Reviewed by: Denise Martinez (FE Coordinator)

Date: 05/09/05

Review Notes:

05/09/05 – This course is designed to provide fundamental thermodynamics background to prepare students for the FE; review was conducted based on an outline of FE content. This course is currently being taught by an adjunct with significant experience with nuclear power and power plants. -- DMM
Fall 06 to current – taught by engineering faculty