

SYLLABUS
ME 446
Energy Management (3 cr)
August 19, 2013

Meeting Time

Monday 5-7:50 PM, except as noted in the schedule

Instructor

Kanchan Mondal, Mechanical Engineering and Energy Processes

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Office hours: Monday 7- 9 AM, 7:50 – 9 PM, Thursdays 9-110 AM, or by appointment

I. Department, Number, and Title of Course

Mechanical Engineering and Energy Processes, ME 446, Energy Management

II. Designation as a 'Required' or 'Elective' course

Elective

III. Course (catalog) Description

Fundamentals and various levels of analysis of energy management of commercial buildings and industrial processes and buildings. Use of energy management systems and economic analysis are required in course projects.

IV. Prerequisite(s)

ME 302

V. Textbook(s) and/or Other Required Material

None

VI. Course Objectives

The objective is to provide the students with: (1) the knowledge and understanding of need and techniques to maximize the utilization of energy, (2) the ability to apply the principles of thermodynamics and heat transfer to systems, (3) with rigorous training in exergy and exergy analysis for evaluating industrial and commercial usage of energy, and (d) help them develop problem-solving skills and acquire the ability to solve related engineering problems related to energy management.

VII. Topics Covered

- 1) Energy Analysis, 1st law, second law, energy and enthalpy, exergy
- 2) Energy Accounting, Energy Carriers, Energy Statistics, HHV, LHV, Energy Balance, Load Factors and Load Duration Curves
- 3) Energy Usage –buildings, manufacturing and transportation
- 4) Energy Markets –oil, natural gas, coal, heat, electricity

- 5) Energy conversion –renewable and non renewable fuels, combustion gasification, electricity production, cogeneration, new alternatives –IGCC, AGCC
- 6) Hydrogen Economy, Fuel Cells, Sustainable development
- 7) Energy analysis, Exergy analysis, Energy Chain Analysis, Life Cycle Energy Analysis
- 8) Heat transfer, Pinch Analysis
- 9) Building energy audit
- 10) EPA strategy
- 11) Case studies – Boilers, Furnaces, Cycles, IGCC plants, buildings, process industry – cement,
- 12) Sustainability

VIII. Class/Laboratory Schedule

1 sessions of class each week, 2 hrs 50 minutes per session
 3 hours of help sessions each week

IX. Contribution of Homework, Quizzes, Tests, Laboratory Reports, or Research Papers

Attendance	5 %
Homework	20 %
Quizzes	10 % (random)
2 of 3 exams	20% (each exam 10%).
	9/23/2013 – take home
	11/4/2013 – in class
	11/25/2013 – need computer
Comprehensive Final Exam	25%
Project	20%

X. Contribution of Course to Meeting the Professional Component.

The course utilizes the basic mathematics knowledge of algebra, root finding and calculus along with the engineering principles in thermodynamics and heat transfer to solve the problems. In addition the general knowledge of conventional and non conventional energy production techniques, energy conservation techniques and the EPA approved energy management approach along with several contemporary case studies were used in this course. It helps the student to acquire analytical ability to improve energy usage efficiency as well as formulate or devise new pathways to achieve the same goal.

XI. Person(s) Who Prepared This Description and Date of Preparation:

Kanchan Mondal, Fall 2013

Emergency Procedures

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency

Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website www.pds.siu.edu (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

Schedule, Topics, Assignments

Schedule (T=Tuesday and R= Thursday)

DATE	TOPICS	DESCRIPTIONS/SUPPORTING INFORMATION
8-19	Introduction Intro to Thermodynamics Concepts	
8-26	Energy Analysis	Homework 1
9-2	Labor Day	
9-9	Exergy,	
9-16	Exergy Analysis	Homework 2
9-23	Combustion	Exam1 – Take home
9-30	Combustion Continued Power Plants	Combustion Practice Topics for Projects
10-7	Life Cycle Analysis	
10-14	Fall Break	
10-21	Heat Transfer Principle Intro to Pinch Analysis	Homework 3
10-28	Pinch Analysis	Case Study Homework 4
11-4	Gasification, electricity production, cogeneration, new alternatives, Renewables	EXAM 2 (1 hr in class)
11-11	Veteran's Day	
11-18	Energy Management Practices	
11-25	Sustainability	EXAM 3
12-2	Case Discussions	Project Reports Due
Finals Week		