UNIVERSITY OF NORTH TEXAS
Department of Mechanical and Energy Engineering

MEEN 4110.001 Alternative Energy Sources (With China Trip)
MEEN 4110.002 Alternative Energy Sources
MEEN 5110.001 Alternative Energy

Summer 2015
5 week session 1 (June 8 - July 10, 2015)

A. LOGISTICS

INSTRUCTOR :	Drs. Yong X. Tao (section 001) & Xiaohua Li (section 002) Dr. Tao Office: F101, Phone: 940-565-2400, email: yong.tao@unt.edu Dr. Li Office: F101G, Phone: 940-369-8020, email: xiaohua.li@unt.edu
OFFICE HOURS:	Dr. Tao: By appointment Dr. Li : MoTuWeTh 3-4 pm
CLASS SCHEDULE:	MoTuWeTh 8:00AM-9:50 AM Room: B157
TEXTBOOK:	Principles of Sustainable Energy Systems by Frank Kreith and Susan Krumdieck, ISB#13:978-1-4665-5696-6, 2014, CRC Press (Taylor & Francis)
REFERENCES:	Lecture PPT Slides (posted in Blackboard)

B. CATALOG COURSE DESCRIPTION

MEEN 4110. Alternative Energy Sources. 3 hours.

This lecture/research/project based summer course will cover the following topics: introduction to sustainable energy, economics of energy generation and conservation Systems, wind energy, capturing solar energy through biomass, fundamentals of solar radiation, photovoltaics, and solar heating and cooling of buildings.

Students enrolled in this summer course will have to complete a two-week international field trip to China. Some of the lectures will be given by invited professors from Tongji University and other top Chinese Universities. Students will also have the opportunity to collaborate with Chinese students on research project while staying in ICBR Center and Tongji University.

Prerequisite(s): MEEN 3110 Thermodynamics II and MEEN 3210 Heat Transfer

C. COURSE OBJECTIVES

1. Understanding the definition, scope and limitation of energy, sustainability and their measures
2. Identify various energy resources: renewable and non-renewable
3. Conduct thermodynamic analysis and energy system analysis
4. Recognize the limits of fossil fuels and fossil energy
5. Estimate the advantage and disadvantage of biomass energy, geothermal energy and hydro power
6. Analyze the potential and obstacles for utilizing solar and wind energy
7. Recognize the potential and obstacles for ocean energy and nuclear energy
8. Identify energy conservation strategies
9. Perform building energy utilization analysis using software

D. RELATIONSHIP OF COURSE TO ACHEIVING MECHANICAL AND ENERGY ENGINEERING STUDENT OUTCOMES (MEEN 4110)

(a) Ability to apply knowledge of mathematics, science, and engineering
(d) Ability to function on multi-disciplinary teams
(e) Ability to identify, formulate, and solve engineering problems
(f) Understanding of professional and ethical responsibility
(g) Ability to communicate effectively
(h) Broad education necessary to understand the impact of engineering solutions in a global and societal context
(i) Recognition of the need for, and an ability to engage in, lifelong learning
(j) Knowledge of contemporary issues
(k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(m) Knowledge of mathematics and of basic engineering science necessary to carry out analysis and design appropriate to mechanical engineering

E. PREREQUISITE KNOWLEDGE:

1. Techniques and applications of derivatives and integrals.
2. Mass conservation in fluid flow.
3. Momentum conservation in fluid flow.
4. Energy conservation in control volume.
5. Viscous flow characteristics.
6. Thermal conduction, convection and radiation
7. Computational skills using a mathematically functional spreadsheet such as Excel.
8. Understanding programming flow chart.
9. Conduct research using the literature database and web.

F. COURSE REQUIREMENTS:
General Plan

The class will focus on both understanding of concepts and problem solving. It will emphasize your figuring out things using your own mind, not simply memorizing what is in a textbook. On a typical day you will be given lecture on main concepts and typical problem solving methods. You will then be engaged in questioning and discussion in class for the problem solving practice. You are encouraged to assess and monitor your own progress using criteria and standards discussed in class. If at any time in the semester you feel unsure about your "grade", you should request an assessment from the professor.

The knowledge acquired through your learning experience in this course will be reinforced by a combination of written assignment, either from the textbook or from the professor, and class projects. Those assignments should follow the recommended format and reflect a logical reasoning of your thinking. Approximately twice a month, an assessment will be given in a form of a written quiz. At the mid semester and near the end of the semester, a test will be given in place of a quiz.

You are encouraged to improve your performance, increase your strengths and diminishing your weaknesses.

Requirements

All students must complete all of the following:

1. Homework assignments
2. Quizzes in open book format
3. One midterm exam, in open book format. Covers: Economics of Energy; Fundamentals of Solar Radiation; Photovoltaic
4. Class project (presentation and final project report)
4. Classroom attendance and active participation (extra credit)

Grade Evaluation

The class will be graded based on a percentage and point system. Following weigh factors are applied to calculation of the final grade:

HOMEWORK ASSIGNMENTS	20%
QUIZZES	20%
TEST (One Midterm Exam)	30%
CLASS PROJECT	30%
ACTIVE CLASS PARTICIPATION (for extra credit. A class roll will be circulated.)	5%
TOTAL	100% +5%

Class Policies

Homework must be turned in on the due day. Late submission will NOT be collected.

Excusable absence from the quizzes or tests is accepted only if the student informs the professor before the event such as illness and non-reschedulable prior appointment, or after the event, such as medical or other emergencies, within a reasonable time frame. In all the cases, academic honesty is expected. Under this condition, a make-up test can be honored.

***Grade Significance*:**

GRADE	SCORE RANGE	GRADE	SCORE RANGE
A	100 - 85 %	C	69.9 - 55 %
B	84.9 - 70 %	D	54.9 - 40 %
		F	< 40 %

Dishonesty

Any form of dishonesty during the semester will result in a final grade of F for the course and a recommendation for expulsions to the Provost. No exceptions. Please avoid cheating or any other form of misconduct. If you are having personal problems, come and talk to the instructor.

G. CONTENTS:

1. Introduction to Sustainable Energy
2. Economics of Energy Generation and Conservation Systems
3. Fundamentals of Solar Radiation
4. Photovoltaics
5. Wind Energy
6. Solar Heating and Cooling of Buildings
7. Energy Storage

H. TENTATIVE SCHEDULE OF READING ASSIGNMENT*

Week	Lecture Dates	Lecture Topic and Activities		QUIZ /TEST/PROJECT
1 (UNT)	06/08/15	Introduction to Sustainable Energy		HW Assignment 1 Quiz 1 Project topic discussion
	06/09/15	Economics of Energy Generation and Conservation Systems		
	06/10/15	Economics of Energy Generation and Conservation Systems (cont.)		
	06/11/15	Fundamentals of Solar Radiation (Quiz 1: Economics of Energy)		
2 (UNT)	06/15/15	Fundamentals of Solar Radiation (cont.)		Quiz 2 HW Assignment 2 **Midterm Exam**
	06/16/15	Photovoltaic		
	06/17/15	Photovoltaic (cont.) (Quiz 2: Fundamental of Radiation)		
	06/18/15	**Midterm Exam (Thursday)**		
3 (UNT/ China)		Section 001 China Trip	Section 002 Regular Session	Quiz 3 HW Assignment 3 (China trip group turn in Quiz & HW by email)
	06/22/15	Shanghai /Tongji Program*-Day 1 (Lecture & Lab Activities)	Solar Heating and Cooling of Buildings	
	06/23/15	Shanghai /Tongji Program*-Day 2 (Lecture & Lab Activities)	Solar Heating and Cooling of Buildings (cont.)	
	06/24/15	Shanghai /Tongji Program*-Day 3 (Lecture & Lab Activities)	Solar Heating and Cooling of Buildings (cont.)	
	06/25/15	Shanghai /Tongji Program*-Day 4 (Lecture & Lab Activities) (Quiz 3: Solar Heating and Cooling of buildings)	Wind Energy (Quiz 3: Solar Heating and Cooling of buildings)	
4 (UNT/ China)		Section 001 China Trip	Section 002 Regular Session	Quiz 4 HW Assignment 4 (China trip group turn in Quiz & HW by email)
	06/29/15	Beijing Program*-Day 1 (Lecture & American House)	Wind Energy (cont.)	
	06/30/15	Beijing Program*-Day 2 (Lecture & American House)	Wind Energy (cont.)	
	07/1/15	Hangzhou Program*-Day 1 (Lecture & Lab Activities)	Capturing Solar Energy through Biomass	
	07/2/15	Shanghai / Tongji Program*-Day 5 (Lecture & Lab Activities)-wrap up (Quiz 4: Wind Energy)	Capturing Solar Energy through Biomass (cont.) (Quiz 4: Wind Energy)	
5 (UNT)	07/6/15	Energy Storage		**Project Presentation** **Project Report due**
	07/7/15	Student Final project presentations		
	07/8/15	Student Final project presentations		
	07/9/15	Student Final project presentations Final Project report due on 11:59 pm July 10th 2015, Friday		

Disclaimer

The course schedule, content, and assignments are subject to modification when circumstances dictate and as the course progresses and matures. If changes are made, you will be given due notice.