

North Central
Michigan College
NCMC MASTER COURSE SYLLABUS

Last Date Revised: 2/2/2009

DIVISION/AREA: Engineering
ASSOCIATE DEAN: Pete Olson, Ph.D.
DEAN OF INSTRUCTION: Christine M. Hammond

DEPARTMENT: Occupational
ORIGINATOR: Robert J. Marsh

HOURS OF INSTRUCTION: 3

Credit hours: 3
Lecture: 3
Lab: 0
Contact hours: 52.8

COURSE TITLE: Introduction to Alternative Energy

COURSE ALPHA: ENGR **COURSE NUMBER:** 120

CATALOG DESCRIPTION:

An introduction to alternative and renewable energy. The course will include a survey of past industrial energy practices as background to a review of non-traditional, alternative energy sources. Topics covered may include solar (active/passive and photovoltaic), wind, biomass, hydroelectric, fuel cells, wave and geothermal. Through a historical review and a look towards the future, students will gain knowledge and an appreciation for strengths and weaknesses of traditional and alternative energy sources. Prerequisite: MATH 120 or equivalent.

PREREQUISITE(S): MATH 112 or MATH 120 or higher

COREQUISITE(S):

GENERAL EDUCATION DISTRIBUTION AREA:
(example: Social Science Group B)

GENERAL EDUCATION/PROGRAM OUTCOMES:

Think critically and analytically

Write effectively

COURSE OBJECTIVES AND OUTCOMES:

At the conclusion of this course the student will have an understanding of the following:

- Historical development of modern energy sources
- Electrical power generation using solar photovoltaic and wind methods
- Power generation using wave or geothermal power
- Basic fuel cell technology
- Ethanol creation and its suitability for use
- Use of biomass as a feasible alternative
- An appreciation of the relative strengths and weaknesses of energy sources
- Engineering economics in evaluating alternatives

METHODS OF INSTRUCTION: Lecture, in-class activities, guest speakers, possible field trips, homework and project assignments.

METHODS OF EVALUATION: Quizzes, exams, in-class exercises, projects, presentations, participation.

REQUIRED TEXT AT TIME OF COURSE ADOPTION/REVISION:

TEXTS Tentative possible:

Renewable Energy Made Easy, David Craddock, Atlantic Publishing

Energy Systems Engineering: Evaluation & Implementation, Francis Vanek & Louis Albright,

McGraw-Hill

Reasonable accommodations can be provided to students with documented disabilities. Please contact Learning Support Services at 348-6817 to arrange these.

TENTATIVE SUGGESTED TIME ALLOWANCE AND SEQUENCE OF INSTRUCTION:

WEEK 1	Introduction to alternative energy Historical review of energy sources and uses
WEEK 2	Review of traditional energy sources Consequences of traditional energy consumption
WEEK 3	Economics of energy use and project development, traditional and alternative
WEEK 4	Photovoltaic electrical generation
WEEK 5	Photovoltaic electrical generation Passive and active solar power/heat generation
WEEK 6	Passive and active solar power/heat generation
WEEK 7	Fundamentals of wind generation
WEEK 8	Exam I Wind generation project analysis
WEEK 9	Historical biomass-based energy sources Renewable biomass energy sources
WEEK 10	The ethanol economy Origins, use as gasoline substitute, economics
WEEK 11	The hydrogen economy Introduction to fuel cells
WEEK 12	Alternative modes of personal transportation Hybrid cars, fuel cells, all/partial electric. Commercial products on the market
WEEK 13	Energy from the earth Temperature gradients (intro to thermodynamics) Wave power
WEEK 14	Geothermal energy
WEEK 15	Fusion and fission, historical and alternative/future perspectives
WEEK 16	Final exam and/or presentations Special topics

APPROVED FOR ADOPTION/REVISION BY THE CRD/AP COMMITTEE ON 03/21/12