ENME 436 - Renewable Energy Technologies
Spring 2024
Thursdays from 4:00 PM to 6:40 PM;
Office hours: Tuesday 1:30 to 3:30PM (or by appointment)

Instructor: Prof. A.K. Gupta, Office Room 2159, Phone 301-405-5276, E-mail: akgupta@umd.edu

Course Description:
This course will provide students with fundamental, design tools, and state of the art renewable and alternative energy technologies. The course after describing the energy consumption and gross national product, will provide different types of energy and resources, and their use in various applications. The specific renewable energy topics will include biomass, municipal solid wastes, hydro, geothermal, solar, wind, wave, and ocean. The efficient energy conversion from the above resources will also be described. The pollutants to the atmosphere from biomass and other resources will also be discussed. The course will be open to senior level undergraduates and graduate students.

Prerequisites: Undergraduate Thermodynamics and Fluid Mechanics

Course Outline:	**Week #**
Fundamentals of Thermodynamics, and heat transfer, and Energy use	1
Introduction, trends on energy consumption and demand, renewable energy	2
Biomass energy (photosynthesis, production, yield, potential, chemistry)	3
Biomass energy (liquefaction, reforming technologies)	4
Municipal solid waste (MSW), Environmental problems	5
Wind Energy (principles, turbine design)	6
Wind Energy (operation, site selection)	7
Spring Break	*8*
Hydro Energy	9
Wave Energy (ocean temperature difference, recent developments)	10
Geothermal Energy (energy potential, operation)	11
Solar Thermal Energy	12
Solar PV and Applications	13
Energy Storage	14
Energy and Society	15
Project 2 - Group Presentation	16

Grading:
Homework: 15%
Class summaries: 10%
Quizzes: 25%
Projects: 25% (10% for each project and 5% for project 2 Group presentation)
Final Exam: 25%

Learning Outcome: Learn about the much-needed clean energy options for fueling engines, furnaces, domestic, and other societal energy needs. These options will become increasingly important as we seek sustainable clean and green energy solutions to replace fossil fuels that has caused growing levels of CO2 in the environment and is known to cause global warming. The USA and most countries in the world are seeking for renewable energy resources. The available fossil

fuel resources will continue to diminish. This course will make students aware of the options available and how to use them effectively in the current and future energy and power infrastructure.