STATE UNIVERSITY OF NEW YORK ! COLLEGE OF TECHNOLOGY ! CANTON, NEW YORK !



MASTER SYLLABUS

COURSE NUMBER – COURSE NAME AREA 310 - BIOFUELS

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Canino School of Engineering Technology !

Department: Mechanical & Energy Technology !

Semester/Year: Fall/2018 !

A. <u>TITLE</u>: Biofuels

B. <u>COURSE NUMBER</u>: AREA 310

C. <u>CREDIT HOURS</u>: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

Credit Hours: 3
Lecture Hours: 3 per week
Lab Hours: per week
Other: per week

Course Length: 15 Weeks

D. WRITING INTENSIVE COURSE: Yes No

E. <u>GER CATEGORY</u>: None: Yes: GER ! *If course satisfies more than one*: GER !

F. <u>SEMESTER(S) OFFERED</u>: Fall Spring Fall & Spring

G. <u>COURSE DESCRIPTION</u>:

This course covers alternative, renewable fuels derived from biological sources and their applications as an energy source for homes, industry and transportation. Wood, urban, and agricultural solid waste are discussed as potential sources of energy conversion. In addition, the production of methane and alcohol based fuels and their roles as a transportation fuel will lead to a re-discovery of opportunities to replace fossil-based fuels. Bio-diesel and vegetable oil topics are necessary to show a true alternate energy source for internal combustion engines. Throughout this course, students will examine both advantages and disadvantages of Biofuels as an energy source.

H. <u>PRE-REQUISITES</u>: None Yes X If yes, list below:

CHEM 101, Intro to Chemistry, Junior Status or permission of instructor

<u>CO-REQUISITES</u>: None Yes If yes, list below:

I. <u>STUDENT LEARNING OUTCOMES</u>: (see key below)

By the end of this course, the student will be able to:

<u>Course Student Learning Outcome</u> [SLO]	<u>Program Student Learning</u> <u>Outcome</u> [PSLO]	<u>GER</u> [If Applicable]	<u>ISLO & SUBSETS</u>	
Describe the theory of operation of the different types of bio-fuels energy sources and how they produce energy.	SO #1 An appropriate mastery of the knowledge, techniques, and skills, and modern tools of their disciplines utilizing renewable energy systems and design parameters		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA Subsets Subsets Subsets
Analyze the positive and negative aspects of the various bio-fuels energy technologies	SO # 6 An ability to identify, analyze and solve technical problems.		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA Subsets Subsets Subsets
Explain the effects of Biofuels on the current world energy situation.	SO #10: A knowledge of the impact of engineering technology solutions in a societal and global context.		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Acquire specific bio-fuels energy information and conduct original research.	SO # 7 An ability to communicate effectively through written, oral, and graphic methods related to renewable energy systems.		1-Comm Skills 2-Crit Think ISLO	W IA Subsets Subsets
Demonstrate recommended applications of various commercially available bio-fuels energy technologies	SO # 6 An ability to identify, analyze and solve technical problems.		2-Crit Think ISLO ISLO	CA Subsets Subsets Subsets

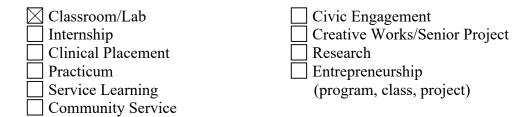
KEY	Institutional Student Learning Outcomes [ISLO 1 – 5]			
ISLO	ISLO & Subsets			
#				
1	Communication Skills			
	Oral [O], Written [W]			
2	Critical Thinking			
	Critical Analysis [CA], Inquiry & Analysis [IA], Problem			
	Solving [PS]			
3	Foundational Skills			
	Information Management [IM], Quantitative Lit,/Reasoning			
	[QTR]			
4	Social Responsibility			
	Ethical Reasoning [ER], Global Learning [GL],			
	Intercultural Knowledge [IK], Teamwork [T]			
5	Industry, Professional, Discipline Specific Knowledge and			
	Skills			

*Include program objectives if applicable. Please consult with Program Coordinator !

J. <u>APPLIED LEARNING COMPONENT:</u>

Yes	\square	No	
100	$\nu \sim$	110	

If YES, select one or more of the following categories:



K. <u>TEXTS</u>:

21st Century Complete Guide to Biofuels and Bioenergy: Department of Energy Alternative Fuel Research, Agriculture Department Biofuel Research, Biomass, Biopower, Biodiesel, Ethanol, Methanol, Plant Material Products, Landfill Methane, Crop Residues (CDROM

L. <u>REFERENCES</u>:

M. <u>EQUIPMENT</u>: None Needed:

N. **<u>GRADING METHOD</u>**: A-F

0. <u>SUGGESTED MEASUREMENT CRITERIA/METHODS</u>:

Tests, Quizzes and Homework, Alternative Fuel Project, Oral Presentation/ Demonstration

P. <u>DETAILED COURSE OUTLINE</u>:

- 1. Wood
 - a. As heat sources
 - b. In production of other energy types
 - c. Regional Advantages/Disadvantages
- 2. Urban, Agricultural and Industrial Wastes (solids)
 - a. Biomass and Energy Farms
 - b. Farm Waste as an Energy Source
 - c. Urban Waste as an Energy Source

3. Methane, Ethane (gases)

- a. Production of Methane
- b. Capture and recovery of methane and ethane
- c. Conversion to a useable energy source
- 4. Alcohol Fuels (liquids)
 - a. Alcohol production methods

b. Gasahol as a Motor Fuelc. MTBE and Ethanol's role in Reformulated Gasoline

- 5. Bio-diesel/Vegetable Oil
 - a. Algae in Oil Production
 - **b.** Crop maximization
 - c. Other uses for waste products of Bio-diesel Production
 - d. Bio-diesel Blending
- 6. Biofuels Testing Methods a. Compare/contrast to diesel fuel test methods
- 7. Biofuels Marketing
 - a. Petroleum Industry Perspective on Biofuels
 - b. Current Trends in Biofuels Use
 - c. Development: government and industrial
- 8. Brief Survey of Conventional Fuels
 - a. Oil, Natural Gas, Electric and Nuclear
 - **b.** Sources
 - c. Production
 - d. Use Advantages and Disadvantages

Q. <u>LABORATORY OUTLINE</u>: None Yes