

## PRGR 615 Biofuels

### Catalog description: Biofuels (2 credits)

Course content includes studies of types, sources and processing of biodiesel, biomass, bio-methane and bioethanol, and assessing advantages, problems and principles in biofuel production. Biogas and digester design.

**Textbook:** There is no single text book to adequately cover the entire course description.

The class will focus on interactive discussion, reading literature articles, book chapters, websites, and handouts.

### References

1. Biorenewable Resources: Engineering New Products from Agriculture by Robert C. Brown, Wiley-Blackwell.
2. Gasoline, Diesel and Ethanol Biofuels from Grasses and Plants by Ram B. Gupta and Ayhan Demirbas, Cambridge University Press.
3. Biofuels Engineering Process Technology by Cave Drapcho, John Nghiem, and Terry Walker, McGraw Hill Publications.
4. Biofuels: Production, Application and Development, A.H. Scragg, Cambridge University Press.

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### Educational Objectives/Learning Outcomes

Students that successfully complete this course will be able to:

1. Be familiar with the concept and potential of bioenergy and its impact on societal and global context.
2. Have awareness of emerging technologies and their impact on environmental and economic issues.
2. Understand different generation and platforms for biofuels (Gas, Liquid, and Solid).
3. Have a comprehensive knowledge of biotechnology issues, solutions, and topics related to bioenergy
4. Summarize recent developments of the field and develop hypothesis and application for research plans.

### Topics covered

Week	Topics
1	Introduction, energy units, terminologies, energy security, and renewable energy sources
2	Greenhouse gases and climate change
3-4	Biological solid fuel and biomass
5-6	Gaseous biofuels (Hydrogen and methane from biomass and Algae)
7-8	Liquid Biofuels to Replace Petrol (methanol, ethanol, bio-oil and biobutanol)
9-11	Liquid Biofuels to Replace Diesel (Biodiesel)
13	Economic and environmental impact of biofuels
14	The Benefits and Deficiencies of Biofuels

**Assessment and grades**

The student evaluations will rely more on homework, reports, seminar/presentation, and two class exams (mid-term and final). The course will require students to present a paper which can be on the general topic of biofuels or very specific targeting a single aspect of bioenergy.

**Resources for the course**

International laboratories biomass/biofuels reports and reviews, notes, handouts, and supplementary reading material will be posted on Moodle.

**Computer usage**

Use of spreadsheet, word processor, internet browsing and Moodle.