BIOBASED PRODUCTS
ABE 4655

Catalog Description	This course is to provide knowledge on the production of chemicals and materials from renewable resources. The course includes the fundamental principles and practical applications of bio-based products, biorefinery and materials and chemicals from biomass, life cycle analysis, policy and economics. 3 credits (Fall)
Pre-requisites and Co-requisites	A background in general chemistry and physics is required for this course. Knowledge of material balances and reaction kinetics is also recommended. Because students will come from varied backgrounds, this interdisciplinary course will include any necessary background materials.
Instructor	***Name:*** Dr. Pratap Pullammanappallil ***Office location:*** 203 Frazier Rogers Hall, 1741 Museum Road, Gainesville ***Telephone:*** (352) 294-6719 ***E-mail address:*** pcpratap@ufl.edu ***Instructor web site:*** https://abe.ufl.edu/people/faculty/pratap-pullammanappallil/ ***Course website:*** elearning.ufl.edu ***Office hours on zoom:*** **2:00 – 3:00 PM** on Fridays. Link for office hours will be available on course elearning site. If unable to attend scheduled office hours, email the instructor to schedule alternate meeting times.
Teaching Assistant	None
Meeting Times	Asynchronous online class. Lecture videos posted on elearning site
Meeting location	100% asynchronous online
Material and Supply Fees	None

Course Objectives

Upon successful completion of this course, students will be able to:

1. Identify and characterize various biorenewable feedstocks and assess their potential for product generation.
2. Analyze and compare different pretreatment methods for biomass.
3. Apply principles of reaction engineering and bioprocess engineering to design and analyze biochemical conversion processes (e.g., fermentation, enzymatic hydrolysis).
4. Apply principles of reaction engineering and thermodynamics to design and analyze thermochemical conversion processes (e.g., pyrolysis, gasification, hydrothermal liquefaction).
5. Evaluate and select appropriate downstream processing strategies for the recovery and purification of bioproducts.
6. Perform material balances for integrated biorefinery processes.
7. Conduct preliminary techno-economic analysis (TEA).
8. Understand the challenges and opportunities in scaling up and commercializing biorenewable

product technologies.

Textbook
Required Textbooks and Software: None

Recommended Reading
Title: Biorenewable Resources – Engineering New Products from Agriculture
Authors: Robert C. Brown and Tristan R. Brown
Edition: 2 e
Publisher: John Wiley, 2014
ISBN: 978-1-118-52495-4
e-book available in library

Title: Biomass as a Sustainable Energy Source from the Future: Fundamentals of Conversion Processes
Authors: Wiebren de Jong & J. Ruud van Ommen
Publication date: 2014
Edition: First edition
ISBN: 978-1-118-30491-4
Publisher(s): John Wiley & Sons, Inc.,

Course Schedule

Week	Topic
1	Motivation and challenges for a bioeconomy
2	Terrestrial Biorenewable Resource Base
2	Algae as Biorenewable Resource Base
3	Biomass Characterization
4	Biomass Pretreatment Technologies
5-6	Biochemical Conversion - Steady State Mass Balances
7	Biochemical Conversion – Reaction Engineering
8-9	Downstream Operations for Product Recovery
10	Thermochemical conversion - Gasification
11	Thermochemical conversion – Pyrolysis and Hydrothermal Processing
12	Chemical Conversion Pathways
13	Techno-economic Analysis
14	Environmental Impacts of Biobased Economy
15	Case Studies, Process Integration & Outlook

Evaluation of Grades

Homework	25 %
Group work/ Discussion	15%
Exam# 1	20%
Exam# 2	20 %
Exam# 3	20 %

Grading Scale (Tentative)

Grading Scale: A (94-100%), A^- (90-94%), B^+ (85-90%), B (80-85%), B^- (75 -80%), C^+ (70 – 75%), C (65-70%), C^- (60-65%) D^+ (55 – 60%) D (50-55%), D^- (45-50%), E (< 45%)

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Academic Policies and Resources

Please refer to the following link to review University of Florida Academic Policies and Resources:
https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Communication and Technical Assistance

- For course related questions, please contact instructor by email (pcpratp@ufl.edu) or phone (352-294-6719)
- For technical assistance and for resolving issues related to access to elearning site visit the helpdesk website (https://it.ufl.edu/helpdesk/) or call 352-392-4357.