



DEPARTMENT OF ENERGY AND ENVIRONMENT

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech Energy Engineering		
Course Title	Bio Energy Technologies		
Course Code	EN 602	No. of Credits	3
Course Code of Pre-requisite subject(s)			
Session	January 2019	Section (if, applicable)	NA
Name of Faculty	Dr.M.Premalatha	Department	DEE
Official Email	latha@nitt.edu	Telephone No.	0431-2503135
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Sources and Classification - Chemical composition, properties of biomass - Energy plantations. Size reduction, Briquetting, Drying, Storage and handling of biomass</p> <p>Feedstock for biogas, Microbial and biochemical aspects - operating parameters for biogas production. Kinetics and mechanism- High rate digesters for industrial waste water treatment</p> <p>Incineration- Processing for liquid fuel production. Pyrolysis - Effect of particle size, temperature, and products obtained. Gasification - Effect of pressure, temperature, steam and oxygen.</p> <p>Industrial effluents [Food waste, Textile, Distilleries, Glue, paper and pulp, Dairy and miscellaneous]; Waste to Energy [Domestic sewage, Municipal solid wastes]; Biorefineries; Biohydrogen production.</p> <p>Combustion of rice husk and woody biomass - Life Cycle Analysis of biofuels - Environmental aspects of biofuel utilization - Techno-economic features of bio-fuels</p>			

COURSE OBJECTIVES

To provide the concepts of handling different types of biomass and the effect of variables on the process.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Classify various sources of biomass and describe chemical properties, handling and storage of the same. (K 1)	PO 1,2,3,4,5,7,8,9,10,12
2. Discuss microbial, biochemical and operational aspects of biogas feedstock. (K 1)	
3. Describe the significance of Pyrolysis, gasification and combustion based on fuel properties of biomass. (K2)	
4. Design methodologies that could be applicable for conversion of waste to energy for industrial sector based on kinetic studies of waste water /solid degradation. (K4)	
5. Analyze the lifecycle, environmental and techno economic aspects of various biofuels. (K 5)	

COURSE PLAN – PART II

COURSE OVERVIEW

The properties and classification of biomass are defined. Different sources of biomass will be introduced along with their energy potential. Different biomass handling technologies such as bio, biochemical and thermochemical conversion will be explained along with their merits and demerits. Basic designs of biomass handling along with their limitations will be covered. Instrumental method of analysis of biomass and their derived products will be covered.

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Sources and Classification. Chemical composition, properties of biomass.	Chalk
2.	Week 2	Energy plantations. Size reduction, Briquetting, Drying, Storage and handling of biomass	Chalk
3.	Week 3	Feedstock for biogas, Microbial and biochemical aspects	Chalk

4.	Week 4	Operating parameters for biogas production	Chalk
5.	Week 5	Kinetics and mechanism	Chalk
6.	Week 6	First Cycle Test	
7.	Week 7	High rate digesters for industrial waste water treatment	Power point
8.	Week 8	Incineration- Processing for Liquid fuel production. Pyrolysis - Effect of particle size, temperature, and products obtained.	Power point
9.	Week 9	Gasification - Effect of pressure, temperature, steam and oxygen .	Power point
10.	Week 10	Industrial effluents [Food waste, Textile , Distilleries, Glue, paper and pulp, Dairy and miscellaneous]; Waste to Energy [Domestic sewage, Municipal solid wastes]; Bio refineries; Bio-hydrogen production.	Seminar Presentation
11.	Week 11	Second Cycle Test	
12.	Week 12	Combustion of rice husk and woody biomass	Chalk
13.	Week 13	Life Cycle Analysis of biofuels	Power point
14.	Week 14	Environmental aspects of biofuel utilization - Techno-economic features of bio-fuels	Power point
15.	Week 15	End Semester Examination	



COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test	6	60 min	20
2	Assignment			10
3	Mini-Project/Experiment			30
4	Group Discussion			10
CPA	Compensation Assessment*	13	60 min	20
5	End semester exam			30

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback is obtained by the institute through MIS

COURSE POLICY (including compensation assessment to be specified)

Students are encouraged to meet in my cabin **MN 102**, DEE main building or communicate through mail address latha@nitt.edu

COMPENSATION ASSESSMENT

Compensation assessment will be conducted only for students who miss the CYCLE TEST on valid/genuine grounds of medical or other emergencies.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and



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award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty M. P. S. S. S.

CC- Chairperson N. An. An. n.

HOD N. An. An. n.