



FIRST SEMESTER 2016-17

Course Handout

02/08/2016

Course No. : CHE G557
Course Title : Energy Systems Engineering
Instructor-in-Charge : DR. RAMAN SHARMA

Course Description:

Cradle to grave overview of major current and future energy conversion processes. Energy sources such as coal, natural gas, petroleum, biomass, uranium, wind, and solar. Fuel processing techniques such as Fischer-Tropsch synthesis, gasification, methane reforming, and CO₂ reforming. Power generation technologies including steam turbines, gas turbines, wind turbines, fuel cells, and solar panels. Sustainability impact factors including water consumption, smog formation, and CO₂ emissions. Advanced processing techniques such as combined cycles, turbine/fuel cell hybrids, and CO₂ capture technologies. Real world use and application.

Scope and Objectives

This course aims at providing students knowledge about

- Various sources of energy.
- Fuel processing techniques.
- Power generation technologies.
- Advanced fuel processing techniques.
- Various techniques for CO₂ capture.

Prescribed Text Book

- T1. Vanek, F.M. and Albright, L.D., Energy Systems Engineering – Evaluation and Implementation, McGraw Hill, 2008.

Reference Book

- R1. Metz, B., Davidson, O., de Coninck, H., Loos, M. and Meyer, L., IPCC Special Report on Carbon Dioxide Capture and Storage, Cambridge University Press, 2005.
- R2. World Energy Outlook, International Energy Agency, 2009.





Plan of Self Study:

S.No.	Topics	Learning objectives	Reference To Text Book
1	Cradle to grave overview of current and future energy conversion processes	Overview of exiting energy conversion process and possible future processes	Lecture notes will be provided
2	Energy sources such as coal, natural gas, petroleum, biomass, uranium, wind, and solar	Current energy use pattern and future demand	Ch. 1 (R2)
3	Fuel processing techniques	Knowledge about various fuel processing techniques	Lecture notes will be provided
4	Power generation technologies	Knowledge about various available power generation techniques	Lecture notes will be provided
5	Combined cycle	Introduction and understanding about combined cycle	Ch. 3 (T1)
6	Turbine/fuel cell hybrids	Hybrid systems will be studied. These system comprise of integrated gas turbines and fuel cells with other technologies.	Lecture notes will be provided
7	CO2 capture techniques	Various carbon capture techniques will be discussed	Ch. 3 (R1)
8	Review Session		

Evaluation Scheme:

EC No.	Evaluation Component (EC)	Duration	Weightage (%)	Weightage (Marks)	Date, Time	Remarks
1	Mid Semester Test	1.5 hrs.	30	90	<TEST_1>	CB
2	Assignments/Quiz	-	10	30	-	-
3	Project and project presentation	-	10+10	60	-	-
4	Comprehensive Exam	3 hrs.	40	120	<TEST_C>	CB

Chamber consultation hour will be announced in the class.

- The **notices**, if any, concerning the course, will be displayed on the notice board of the Department of Chemical Engineering **only**.





BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
Instruction Division

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- **Make-up** will be granted for **genuine cases only**. Certificate from authenticated doctor, say from the Medical Center, must accompany make-up application (*only prescription or vouchers for medicines will not be sufficient*). Prior permission of IC is compulsory.

Instructor-in-charge | **CHE G557**



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