Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCYD530	Electrochemical Strategies in energy systems	3	0	0	3

Course Objective
This course will impart ● Fundamental understanding of the applications of electrochemistry ● Electrochemical techniques related to conversion and storage energy.
Learning Outcomes
After studying this course, students should be able to: ● Understand the basic electrochemical techniques used in energy systems. ● Study the stability limits and the interpretation of E_H-P_H (Pourbaix) diagram. ● Use concepts and models of mimicking systems in artificial photosynthesis. ● Understand the basic principles and advances in Fuel-Cell and its technology.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Voltammetric, Amperometric, Potentiometric and Coulometric methods in energy systems. Stability limits of water, Pourbaix diagram and its features, Difference in Pourbaix diagram of $[Ru(tpy)(bpy)(OH_2)]^{2+}$ and $[Ru(tpy)(bpm)(OH_2)]^{2+}$. Understanding and case studies of Pourbaix diagram	18L	This unit imparts the understanding of the basic electrochemical techniques used in energy systems and E_H-P_H (Pourbaix) diagram.
2	NAD^+/NADH as a model redox system: Reaction path and case studies. Electrochemical, chemical and photochemical oxidation of Water, reduction of CO_2, Proton Reduction. Case Studies of each system. Electrochemical analogues of Water-gas shift (WGS) reaction and WGS in homogeneous systems; Syn Gas, Fischer-Tropsch process.	14L	The students will learn the use concepts and models of mimicking systems in artificial photosynthesis
3	Fuel Cells Technology: alkaline fuel cells, phosphoric acid fuel cell, molten carbonate fuel cells, solid oxide fuel cells, polymer electrolyte fuel cells; cell components, thermodynamics and kinetics, operation and performance, applications.	10L	The students will understand the basic principles and advances in Fuel-Cell and its technology
TOTAL		**42**	

Text Books:

1. Hydrogen and Fuel Cells. Emerging Technologies and Applications. B. Sørensen. 2nd Edition, 2011.

Reference Books:

1. Electrochemical Methods: Fundamentals and Applications 2nd Edition, Allen J. Bard and L. R. Faulkner, 2001.
2. Modern Analytical Chemistry, D. Harvey, 1st Edition, 2000.