SCHOOL OF ENGINEERING

DEPARTMENT OF PETROLEUM ENGINEERING

Details of ENTREPRENEURSHIP Courses

Course Code: PET1007	**Course Title:** Introduction to Energy Trading and Future Options **Type of Course:** 1] Open Elective 2] Theory Only	**L- P- C**	2	0	2
Version No.:	2.0				
Course Pre-requisites:	NIL				
Anti-requisites:	NIL				
Course Description:	This course intends to give overview of the Energy Trading and the Future Options feature of stock exchange. The students will develop a strong foundation about stock markets, Future Options, Energy trading, etc. The course is theoretical in nature with special emphasis on the knowledge of trading on stock exchange. Students should have strong background in economics, and mathematics in order to excel in this course.				
Course Objective:	The objective of the course is to familiarize the learners with the concepts of Introduction to Energy Trading and Future Options and attain **Entrepreneurship** through **Participative Learning** techniques.				
Course Outcomes:	On successful completion of the course the students shall be able to: CO1: Explain the basic Future and Options Contracts and Markets CO2: Explain the behavior of Commodity Futures Prices CO3: Apply Strategies for Energy trading				
Course Content:					
Module 1:	Introduction to Futures and Options Contracts and Markets	Term paper	Data Collection and Review Paper	08 Periods	
Topics: Introduction, Commodity futures and options Contracts and markets, Commodity Futures Exchanges, Future Contracts: Pricing relationships and hedging relationships; Electronic Trading, Regulations, Basics of Trading, Brokerage Firms and Commissions					
Module 2:	Behavior of Commodity Futures Prices	Assignment	Quiz	10 Periods	
Topics: Principles of Futures Prices, Structure of Futures Prices, Forward and Futures Markets; Forward and Futures Pricing: Valuing forward contract, valuing future contract, the relationship between forward and future prices; Commodity Price dynamics, Stochastic Volatility, Seasonal Commodities, Non-Storable Commodities, Speculation and Position Trading, Spreads, Hedging					
Module 3:	Introduction to Options on Futures	Assignment	Article Review	06 Periods	
Topics: Options Terminology, Option Payoffs, Option Valuation; Option Pricing; Energy Options Strategies					
Targeted Application and Tools that can be used: Applications: Business Analyst in the Stock Market / Market Outlook Tool: MS Excel					
Text Book: T1: Errerra and S. L. Brown, Fundamentals of Trading Energy Futures and Options, 2nd Edition, PennWell. T2: Stefano Fiorenzani, The Handbook of Energy Trading, 1st Edition, 2012, Wiley.					
References: R1: Parag Diwan , Energy Trading,1st Edition, 2008, Pentagon Press. **e-resources:** 1.Presidency University e-access portal:https://presiuniv.knimbus.com/user#/home 2. Fundamentals of Energy Trading Market (Youtube Channel) :https://www.youtube.com/watch?v=8lC8e2YjGNM 3.Energy					

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:(YoutubeChannel):https://www.youtube.com/watch?v=SiMLey6XLTI&list=PLWVdW85uAEcqZVfjn8sRB7NKIDu0KE_LM 4. Energy Options Strategies (Youtube Channel):https://www.youtube.com/watch?v=8lC8e2YjGNM 5. Energy Speculation and Position Trading (Youtube Channel): https://www.youtube.com/watch?v=jlR9JJWYxB8 6. Basics of Trading(Youtube Channel) :https://www.youtube.com/watch?v=CJEm99cp0Os
Topics relevant to "ENTREPRENEURIAL SKILLS": Behavior of Commodity Futures Prices for developing **Entrepreneurial Skills** through **Participative Learning** techniques. This is attained through the **Assignment** as mentioned in the course handout.

Catalogue prepared by:	Dr. Suman Paul, Dr. Deepjyoti Mech, Dr. Kalpajit Hazarika, Mr. Ankur Neog
Recommended by the Board of Studies on:	14th Meeting of the Board of Studies held on 27th July 2022
Date of Approval by the Academic Council:	18th Meeting of the Academic Council held on 3rd August 2022

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Course Code: **PET1008**	**Course Title:** **Sustainable Energy Management** **Type of Course:** **1] Discipline Elective** **2] Theory Only**		**L- P- C**	2	0	2
Version No.:	2.0				
Course Pre-requisites:	NIL				
Anti-requisites:	NIL				
Course Description:	The purpose of this course is to enable to understand the status of energy sector with respect to sustainability. The overall theme of the course is to emphasize the process of thinking: qualitatively and quantitatively; strategically, using concrete; real-life practical examples. The course is theoretical in nature. The course develops the critical thinking and analytical skills.				
Course Objective:	The objective of the course is to familiarize the learners with the concepts of Sustainable Energy Management and attain **Entrepreneurship** through **Participative Learning** techniques.				
Course Outcomes:	On successful completion of the course the students shall be able to: CO1: differentiate between various forms of energy, CO2: discuss factors affecting planning and implementation of energy management, CO3: describe priorities of sustainable energy development.				
Course Content:					
Module 1:	Energy and Sustainable Development	Assignment	Data Collection	10 Periods	
Topics: Introduction to Energy: Definition, Need for energy, Forms / Type of Energy, Renewable versus Non-renewable Energy. Sustainable development, Sustainable development Principles, Energy sustainability, Problems of Future Energy Development, Need for long term development.					
Module 2:	Energy Management Planning and Implementation	Assignment	Data Collection	12 Periods	
Topics: Concepts of energy management, Sustainability approach to energy management, Strategic analysis of energy sector, Implementation of energy management plan: Basic approach, Traditional approach, System approach, Eco-management approach, life cycle analysis.					
Module 3:	Priorities of Sustainable Energy Development	Quiz	Data Collection	12 Periods	
Topics: Renewable Energy: Solar energy, Biomass energy, Wind energy, Geothermal energy, Hydropower Energy, Management of Renewable Energy Sources; Energy efficiency: Introduction, Energy audit, Energy Transition.					
Targeted Application and Tools that can be used: Application area is as a Sustainability Analyst as it helps in the decision making of the projects and also assessing the risk associated with new projects. Application tools include Excel, Power BI.					
Text Book: T1: Sustainable Energy Management. Mirjana Radovanovic (Golusin), Stevan Popov, Sinisa Dodic, 1st Edition, 2012					
References: R1: Renewable Energy Sources and Emerging Technologies. Kothari, 2nd Edition, 2011 **E-resource:** 1. Presidency University e-resource library: https://puniversity.informaticsglobal.com/login 2. Presidency University e-access portal: https://presiuniv.knimbus.com/user#/home					
Topics relevant to "ENTREPRENEURIAL SKILLS": Energy Management Planning and Implementation for developing **Entrepreneurial Skills** through **Participative Learning** **techniques.** This is attained through the **Assignment** as mentioned in the course handout.					
Catalogue prepared by:	Dr. Suman Paul, Dr. Deepjyoti Mech, Dr. Kalpajit Hazarika				
Recommended by the Board of Studies on:	14th Meeting of the Board of Studies held on 27th July 2022				
Date of Approval by the Academic Council:	18th Meeting of the Academic Council held on 3rd August 2022				

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Course Code: PET2028	**Course Title:** Polymer Science and Technology **Type of Course:** 1] Open Elective 2] Theory Only		**L- P- C**	3	0	3
Version No.:	1.0				
Course Pre-requisites:	NIL				
Anti-requisites:	NIL				
Course Description:	The purpose of the course is to enable the students to understand basic scientific and engineering principles used in the polymer industry. This course will provide an integrated view of the fundamentals of polymer science and Technology. The course is theoretical in nature and needs fair knowledge of basic engineering science and computing. The course develops the critical and analytical thinking skills. The course also enhances the programming abilities through assignments.				
Course Objective:	The objective of the course is to familiarize the learners with the concepts of Polymer Science and Technology and attain **Entrepreneurship** through **Problem Solving** methodologies.				
Course Outcomes:	On successful completion of the course the students shall be able to: CO1: Explain various types of polymers and polymerization method, CO2: Describe thermal, mechanical properties & elastic behavior of polymers, CO3: Discuss various polymer additives and polymer processing operations, CO4: Apply industrial use of various polymers based on their composition and properties.				
Course Content:					
Module 1:	Introduction to Polymer Technology	Assignment	Programming	10 Periods	
Topics: Basic definition; Classification of polymers; Molecular Weight determination; Chemical structure. Step and Chain Growth Polymerization; Polymerization kinetics; Polymerization Techniques; Polymer Reactivity.					
Module 2:	Polymer Properties	Assignment	Data Collection and Presentation	09 Periods	
Topics: Solid-State Properties - Amorphous and Crystalline State, Thermal Transitions and Properties, Mechanical Properties and Solid-State Characterization Methods. Polymer Elasticity - Introduction to Viscoelasticity and Rubber Elasticity. Polymer Degradation and the Environment - Polymer Degradation and Stability; Plastic management.					
Module 3:	Polymer Components and Processing	Assignment	Data Collection and Group Discussion	08 Periods	
Topics: Polymer Components - Additives, Polymer Blends and Interpenetrating Networks, Block Copolymers, Composites. Polymer Processing and Rheology - Basic Processing Operations, Introduction to Polymer Rheology, Rheometry.					
Module 4:	Industrial Polymers	Assignment	Data Collection and Presentation	07 Periods	
Topics: Introduction to industrial polymers- Biopolymers and Other Naturally Occurring Polymers, Fibers, Thermoplastics, Elastomers, Thermosets, Industrial application of polymers, Plastics – Properties and uses of plastics as engineering materials, Ecology and environmental aspects of polymer industries; Polymer waste management.					
Targeted Application and Tools that can be used: Application: Engineer in Polymer industry (Manufacturing and Selection), Petroleum industry (Hydro-Frac & EOR) Tools: FTIR – Microscopy, Injection Molding Unit, Extruder					
Text Book: T1: Joel R. Fried, "Polymer Science and Technology", Prentice Hall. Third Edition (2014)					
References: R1: Billmeyer, F.W.Jr., "Textbook of Polymer Science", John Wiley and sons. Third Edition (1984) R2: R. Sinha, "Textbook of Polymer Technology – I and II", Biotech Pharma Publications. First Edition (2018) **e-resources:** 1. Link for Knimbus remote login: https://presiuniv.knimbus.com 2. Polymer Technology: https://www.youtube.com/watch?v=rzVeVd16vFQ 3. Introduction to polymer Technology: https://www.youtube.com/watch?v=_GBx1xzYMo8 4. NPTEL Lecture: Polymer Processing: https://www.youtube.com/watch?v=MV0MXWaxBv4 5. NPTEL Lecture: Polymer Processing: https://www.youtube.com/watch?v=T-m045Rm6G0 6. Injection molding: https://www.youtube.com/watch?v=b1U9W4iNDiQ&t=30s					
Topics relevant to "ENTREPRENEURIAL SKILLS": Polymer Components and Processing for developing **Entrepreneurial Skills** through **Problem Solving** **methodologies.** This is attained through the **Assignment** as mentioned in the course handout.					

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Catalogue prepared by:	Dr. Suman Paul, Dr. Kalpajit Hazarika, Dr. Deepjyoti Mech, Mr. Bhairab Jyoti Gogoi
Recommended by the Board of Studies on:	12th Meeting of the Board of Studies held on 9th August, 2021
Date of Approval by the Academic Council:	16th Meeting of the Academic Council held on 23rd October, 2021

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Course Code: **PET2031**	**Course Title:** **Overview of Material Science** **Type of Course:** **1] Open Elective** **2] Theory Only**		**L- P- C**	3	0	3
Version No.:	2.0				
Course Pre-requisites:	NIL				
Anti-requisites:	NIL				
Course Description:	Materials Science is a dynamic field, which involves analysis of processing, structure, property and performance relation for engineered materials and methods of manufacturing such materials having desired applications. Material scientists working in laboratories, industries, strive to understand and manipulate the structure of materials at molecular level to gain control over their properties. All sophisticated devices like computers, aircraft, biomedical devices etc., require materials manufactured to precise specifications. The evolution of advanced products can be hobbled by the limitations of the available materials.				
Course Objective:	The objective of the course is to familiarize the learners with the concepts of Overview of Material Science and attain **Entrepreneurship** through **Participativ Learning** techniques.				
Course Outcomes:	On successful completion of the course the students shall be able to: CO1: define material science and importance of the material engineering world, CO2: identify the mechanical behavior for different types of materials, CO3: discuss different phase diagrams for alloy systems, CO4: explain mechanical characteristics for a material often results from a phase transformation				
Course Content:					
Module 1:	Structure of Metals	Term Paper	Data Collection and Analysis	07 Periods	
Topics: Classification of Materials, Structure of Metals and Ceramics, Unit cell, FCC, BCC, SC, HCP, Atomic Packing factor, Miller indices for line, plane, Polymer structures, Imperfections in Solids.					
Module 2:	Mechanical Properties	Assignment	Data Collection and Analysis	08 Periods	
Topics: Introduction, Concepts of Stress and Strain, Stress-Strain Behavior, Ductile material, Brittle material, Mechanical Behavior – Metals – Ceramics – Polymers, Hardness, Property Variability, Safety Factors.					
Module 3:	Phase Diagrams	Assignment	Programming Task	08 Periods	
Topics: Introduction, Equilibrium Phase Diagrams, The Phase Rules – Single Component System – Binary Phase Diagrams – Ternary Phase Diagrams, Typical Phase Diagrams – Magnesia–Alumina System – Copper–Zinc System – Iron–Iron-carbide System.					
Module 4:	Phase Transformations	Term Paper	Simulation / Data Analysis	09 Periods	
Topics: Phase Transformations In Metals – Multiphase Transformations, Microstructural and Property Changes In Iron–Carbon Alloys, Precipitation Hardening – Heat Treatments – Mechanism of Hardening – Miscellaneous Considerations, Crystallization, Melting, and Glass Transition Phenomena In Polymers.					
Targeted Application and Tools that can be used: Application: Engineer in Oil and Gas Industry, Steel Industry, Manufacturing Industry Tools: Image Analysis Software / Polarizing Microscope (Professionally used Software / Equipment)					
Text Book: T1. Raghavan V, "Materials Science and Engineering: A First Course", 6th Revised Edition, PHI Learning Private Limited-New Delhi, 2015. T2. James F. Shackelford, William Alexander, MATERIALS SCIENCE AND ENGINEERING HANDBOOK, 3rd edition, 2001 by CRC Press, 2001					
References: R1. William Callister S., "Materials Science and Engineering", 2nd Edition, Wiley India, 2014. R2: George E. Dieter, "Mechanical Metallurgy", 3rd Edition, McGraw Hill, 1988. **e-resources:** 1. https://puniversity.informaticsglobal.com/login 2. https://www.nap.edu/read/10435/chapter/2 3. https://www.linearmotiontips.com/mechanical-properties-of-materials-stress-and-strain/ 4. https://nptel.ac.in/content/storage2/courses/112108150/pdf/PPTs/MTS_07_m.pdf					

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Topics relevant to "ENTREPRENEURIAL SKILLS": Phase transformation for developing **Entrepreneurial Skills** through **Participative Learning** techniques. This is attained through the **Presentation** as mentioned in the course handout	
Catalogue prepared by:	Dr. Suman Paul, Dr. Deepjyoti Mech, Dr. Kalpajit Hazarika, Mr. Bhairab Jyoti Gogoi, Mr. Ankur Neog
Recommended by the Board of Studies on:	14th Meeting of the Board of Studies held on 27th July 2022
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