Code: ECON-417

Title: Energy Economics

Credit Hours: 03

Prerequisite: Intermediate Macroeconomics

Objectives:

The main focus of the course is to study economic relationships in energy production, consumption, demand and supply, pricing and conservation, energy policy and the development of new and renewable energy sources. The aim of the course is to provide students with the opportunity to study and develop a broader understanding of the economics of energy. There is mounting evidence that the current global energy system has been growing far beyond what is globally sustainable and already poses a serious, and potentially irreversible, threat to global environmental quality and stability in future decades.

Course Contents

Overview and Fundamental Concepts

Energy in the Economy; Global Energy Problems and Issues, Fundamental Concepts: Energy, Power; Measuring energy: units and conversion factors, Laws of Thermodynamics, 1st Law and Entropy law, Input and output energy, energy efficiency, Energy conversions (technologies), Global Energy system sustainability issues, Energy markets and energy prices; competitive market valuation and social valuation, Market Failures: Market power (monopoly, oligopoly, and cartels), Externalities, Public goods and common property resources.

Oil Resources and Economic Issues

Discounted cash flow analysis, reserve and resources, resource substation, forecasting prices and speculation, Natural resource (oil) demand and supply, OPEC

Overview of Energy Economics and Global Energy Sustainability

Primary energy supply, secondary energy and energy end use demand/consumption, Energy, economic activity, and growth: energy intensity, global energy use forecasts, Energy conversion, energy transportation and/or transmission, and clean energy use, Conditions for a sustainable global energy system, climate change and clean energy

Clean Energy Supply from Non-Conventional, Alternative and Renewable sources

Climate change and primary and secondary energy use, Energy Conservation policies, demand side management, Non-conventional and renewable alternative energy: Solar, Biomass, Wind, Geothermal, Tidal & other, Hydrogen energy, fuel cells

Energy Supply from Non-Renewable Fossil Fuel Resources

Fossil fuel resources and reserves model, Cartel models of global energy markets, Overview of Oil, Natural gas, and Coal industries, Backstop technologies and Non-renewable Resource Pricing (Hotelling model), Clean fossil fuel use; carbon sequestration

Energy Conversion and Supply by Electric Utility Industries

Electric Power demand and load duration vs. Electric energy consumption, time-of-use, Electricity production technologies and electricity production cost trade-offs, Thermal, hydro, nuclear and renewables production and transmission of electricity, Electricity pricing issues, regulation and deregulation issues, Nuclear energy issues and prospects

Sustainable Energy Policy

Jaccard's Sustainable Energy System in 2100, Energy Policy of Pakistan, Sustainable energy options and criteria for comparison, Sustainable Energy Policy Alternatives and Climate Change, International Policy Initiatives

China-Pakistan Economic Corridor (CPEC)

What is CPEC? Central Role and Key Areas, Energy sector projects, Project Financing, Benefits to Pakistan, Benefits to China and other Countries, Challenges

Recommended Books:

- Tom Tietenberg and Lynne Lewis. (2012). Environmental &Natural Resource Economics Pearson Education, Inc., 9th Edition.
- Mark Jaccard. (2005). Sustainable Fossil Fuels: The Unusual Suspects in the Quest for Clean and Enduring Energy, Cambridge University Press.
- Subhes C. Bhattacharyya. (2011). Energy Economics Concepts, Issues, Markets and Governance Springer-Verlag London Limited.
- J. M. Griffin, and H. B. Steele (1985). Energy Economics and Policy, Academic Press