Course Number and Title

NAU: WU@TTU 502 Wind Energy Finance, Economics and Policy
TTU: WE 5311 Wind Energy Finance, Economics and Policy
UMass:

Effort: 3-credits, semester

Prerequisites:
Graduate Student Status. This is a writing-intensive course in which you will be required to analyze and discuss finance and economics topics related to energy policy. There will be case studies in which you are given a complex set of facts and materials to review and investigate then use analytical skills to summarize the financial and socioeconomic impacts of specific hypothetical wind energy projects.

Textbook / Resources:
All resources will be provided through the instructor. Reading material will consist of statutes, case law, project planning documents, environmental impact reports, and other documents, videos and podcasts relating to the subject material.

Course content may be supplemented by guest lectures from experts in industry when available.

Course description:
The purpose of this course is to develop an understanding of the economic principles affecting wind project development from greenfield to decommissioning or repower. The course begins with an overview of basic financial and economic topics related to commercial-scale wind energy projects. Students will learn to complete and analyze a pro-forma invoice for a project. Students will learn the main financial agreements and their structuring for wind projects. Student will learn about risk assessment for projects and how insurance companies underwrite projects to secure financing. Students will learn about the trend toward decommissioning finance structures now being required in new and repower projects and how to address those extra costs. Students then dive into energy policy and how it has evolved through a look at FERC and PURPA. Students will learn about the PTC and ITC, both historically and contemporaneously, and how subsidies have evolved in the industry. Students will learn the basics of energy markets and how electricity is bought and sold. Finally, students will learn about the nexus of climate change and energy policy and eventually a discussion of offshore wind in the U.S. and the economics of a new branch of the wind industry.

At the beginning of the course the students choose an address in the United States and use that address as a proposed project site to complete assignments throughout the course.

The course is broken into learning modules with corresponding assignments as follows:

1. The Basics – An overview of the basic terminology and theories of finance and economics related to energy development and policy.
2. Pro-Forma Invoice – A detailed look at the how's and why's as students complete a pro-forma invoice for a hypothetical wind project.
3. Project Financing –Students will learn the main types of financing of projects (PPA, VPPA, hedges) and various offtake-agreement structures. Students will do a case study wherein they choose the best finance option from each of the three standard models.

4. Insurance and Risk Assessment – Without insurance there is no financing. Students will learn about risk assessment and the issues insurers look at when assessing a project.
5. Decommissioning – Students will learn the various decommissioning bonds, siphoning agreements, and tax structures currently being implemented that impact the viability of a project.
6. FERC and PURPA – A look at the Federal Energy Regulatory Commission and its system of governing energy markets. The recent storage conundrum will be the focus of a case study in energy regulation of evolving technologies.
7. PTC, ITS, RECs, and subsidies. How do state and federal tax incentive programs help the industry? Do we still need them?
8. Energy Markets – How is electricity bought and sold?
9. Climate Change and Energy Policy. We are at nexus.
10. Offshore Wind – A look at the dollars and sense of it.

Learning Outcomes:

The following list contains the learning outcomes for the course. As a graduate-level course covering a very broad topic, many outcomes are anticipated.

1) an understanding of the breadth of the financial and economic topics necessary to understand wind energy development and operations
2) an understanding of the key terms and concepts used in the wind industry
3) an ability to identify and describe the main federal policy relating to the wind industry
4) an understanding of the impact of wind energy in a global/societal context; in this case how wind energy fit into societies energy needs and clean energy solutions
5) an ability to apply economic principles to wind energy development projects
6) an ability to identify and finance concepts related to wind energy projects
7) an ability to identify, formulate and solve problems related to wind energy project development
8) a recognition of the need for and an ability to engage in life-long learning, as related to sustainable energy and wind energy
9) a knowledge of contemporary issues related to wind energy
10) an ability to use analytical thinking skills to research and understand financial models and economic concepts as applied to the wind industry
11) an ability to communicate effectively in the form of written memoranda and reports on financial and economic topics

Topics:

Introduction; Basic Financial and Economic Concepts and Terminology
Pro-Forma Invoices
Project Financing
Insurance and Risk Assessment
Decommissioning
FERC
PTC, ITC, RECs, and Subsidies
Energy Markets
Climate Change and Energy Policy
Offshore Wind

Assessment:

Students will be assessed via the traditional measures: performance on homework, exams and project-related work. The exact method of assessment will depend upon the faculty instruction the course. For the bulk of the assessment, some instructors may use homework and exams, and other projects and applied problems.