ECO 612
Offshore Wind Energy – Project Economics, Deployment, and Business Logistics

Meeting Time:
Online, Asynchronous

3 Credits

Instructor:
Dwayne Breger, Ph.D.
Environmental Conservation

Weekly Online Synchronous Sessions:
Office hours, content review, guest speakers or on-line contact time

Guest Instructors & Speakers:
(Listed in Course Outline below)

Teaching Assistant:
Max Dilthey

Course Description:

Construction of an offshore wind farm raises significant financing and insurance issues, and requires a well-established local workforce, supply chain, and infrastructure. Wind industry professionals must understand this complex process to make informed decisions on planning and construction of offshore wind development. This course will touch on the critical aspects of getting an offshore wind farm up and running, from the planning stages until construction is complete and the wind farm is operational.

The on-line course will consist of recorded lectures with slides, assigned readings, problem sets, and two exams. Students will engage with the instructor, teaching assistant, guest instructors and speakers, and fellow students through robust on-line discussion sessions and postings.

Learning Objectives:

Upon successful completion of this module, students will understand:

- Capital cost, levelized cost of energy, and revenue cash flows of OSW projects;
- Financial structures for development, construction, operations;
- Financial risks and mitigation: insurance, long term contracts, energy market hedges;
- Federal and state policy incentives and ISO-NE market structures for offshore wind;
- Offshore wind supply chain: current status and emerging needs;
- Workforce needs: number and description of jobs;
- Safety and training requirements and standards, and educational programs;
- Supply chain coordination and build up;
- The Jones Act;
- Global perspectives and construction and operational experience;
- Project and construction management;
- Port-side fabrication of offshore wind subsystems;
- Port deployment and construction procedures;
- Cable-laying, substations, subfloor transmission, interconnection;
- Project commissioning; and operations and maintenance.

Course Outline:

Session Week	Topics	Guest Instructor
OSW Economics, Policy, Electric Markets, and Project Finance		
Week 1 (May 17)	Offshore wind system costs, interconnection configurations, costs and implications; energy generation and prices, levelized cost of energy (LCOE) analysis; federal/state incentive programs State goals, procurement and long-term contract & OREC policies and processes. Competitive dynamics between states, lease areas	Bob Grace and John Keene, Sustainable Energy Advantage LLC
Week 2 (May 24)	ISO New England (de-regulated) electricity markets, interconnection process	
	BOEM leasing process and agreements, offshore wind financing structures, financial risks/mitigation, insurance	Guest Industry Speaker, Jordan Shoesmith, Vineyard Wind/Copenhagen Infrastructure Partners
Exam 1		
OSW Supply Chain and Deployment Logistics		
Week 3 (May 31)	Project and construction management System assembly/staging at port Turbine, electric system, tower deployment Installation vessel and port requirements, overseas logistics, The Jones Act Commissioning/start-up process	Matt Shields, National Renewable Energy Laboratory
Week 4 (June 7)	Operations and maintenance procedures Supply chain modeling and U.S. supply chain development needs and challenges Workforce needs, recruiting, training, and certifications	
Exam 2		
OSW Construction: Global Experience and Project Management		
Week 5 (June 14)	OSW database of global construction and operational experience	Nick Zenkin, LAUTEC
Week 6 (June 21)	Project management software tutorial	
Final Exam/Activity		

Course Policy and Requirements:

This course does not have any predetermined scheduled meeting times and the course site and modules can be accessed at any time during the semester. A weekly course calendar is provided to suggest the reading and lecture schedule. However, homework assignments and exams will be subject to strict timeframes and due dates, and will not be accepted late without express advance permission from the instructor. Homework assignments will be graded with feedback provided.

There will be 5-10 homework sets given during the course of the semester. There also will be one mid-term exam, and one final exam. The exams will be taken on your own time but during a prescribed time period. All homework sets and exams will be subject to the UMass Academic Honesty Policy, and work is to be completed individually by each student.

Homework sets and exams are required to be submitted as PDF files through Moodle, and will undergo similarity checks.

Grading Scale and Criteria:

Individual grades for the course will be based on the following scale.

A	93-100%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
F	Per policy of the Graduate School, grades below a C will result in a failing grade

Students who are taking the course as an elective graduate course, and who are not taking the course in fulfillment of the Offshore Wind Professional Certificate, may elect to take the course as an Optional Letter Grade (OPG).

The weights of course assignments and activities are as follows.

Exam 1	25%
Exam 2	25%
Participation	10%
Homework	40%
Total	**100%**

*As an on-line course, participation will be evaluated based on 1) evidence (available from the on-line platform) that the students has spent the expected time engaged with each asynchronous module/lecture, 2) student engagement in accessing and contributing to on-line posts prompted throughout the course, and 3) active engagement of student in weekly real-time discussion sessions with instructor.

Academic Honesty Policy Statement:

The integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, and academic honesty is required of all students at the University of Massachusetts.

Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair.

For more information about what constitutes academic dishonesty, please see https://www.umass.edu/honesty/.

The procedures outlined at the website listed above are intended to provide an efficient and orderly process by which action may be taken if it appears that academic dishonesty has occurred and by which students may appeal such actions. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent.

Accommodations:

The University of Massachusetts is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you are in need of accommodation for a documented disability, register with Disability Services to have an accommodation letter sent to your faculty. It is your responsibility to initiate these services and to communicate with faculty ahead of time to manage accommodations in a timely manner. For more information, consult the Disability Services website at http://www.umass.edu/disability/.