Prepared by the Department of Natural Sciences & Life Fitness
Date of Departmental Approval: February 15, 2017
Date Approved by Curriculum and Programs: March 1, 2017 Effective: Fall 2017

1. Course Number: ENV177
Course Title: Introduction to Wind Energy

2. Description: This course provides an in-depth introduction to wind power as a sustainable form of energy. It examines the history, current applications, and future of wind power. Students gain a basic understanding of the fundamental science behind harnessing useable energy from the wind. The course looks at the process for siting, developing, constructing, operating, and maintaining wind energy projects of different scales – from home and small commercial to municipal and utility scale.

3. Student Learning Outcomes (instructional objectives; intellectual skills):
Upon successful completion of this course, students are able to do the following:

- Outline the main historical developments of wind power.
- Describe in detail how wind turbines produce useable energy from the wind.
- Describe the primary benefits and limitations of wind power.
- Calculate the economic return on investment for a small wind turbine.
- Describe the process for determining the physical and economic feasibility of wind energy for different sites and applications.
- Describe the different types of wind turbines and towers available on the market today.
- List the steps involved in the construction of small, medium, and large wind turbines.
- Debate the pros and cons of large scale wind energy development on land and off shore.

4. Credits: 3 credits

5. Satisfies General Education Requirement: No

6. Prerequisite: MAT020 (Prealgebra) or MAT025 (Pre-Algebra) and ENL108 (Critical Reading & Thinking) or satisfactory basic skills assessment scores

7. Semester Offered: Spring

8. Suggested General Guidelines for Evaluation: Students are graded using homework assignments, classroom activities, tests, and a final exam.

9. General Topical Outline:

I. Fundamentals:
- A. History of wind energy
- B. Variety of turbines available
- C. State of the industry
- D. Industry outlook
- E. Wind resource availability
- F. Physics of wind
  1. What is wind?
  2. Power available in wind
  3. Aerodynamic principles of turbine blades
  4. How wind turbines generate electricity

II. Small Wind
- A. How small turbines work
- B. Site assessment
- C. Choosing a turbine
- D. Choosing a tower
- E. Balance of systems
- F. Construction, operations and maintenance

G. Estimating performance & calculating economics

III. Community Wind
- A. Benefits, impacts and limitations of community wind
- B. Challenges of medium scale wind
- C. Economics
- D. Construction, operations and maintenance
- E. Local examples

IV. Utility Wind
- A. Benefits, impacts and limitations of utility wind
- B. Site selection & development process
- C. Construction, operations and maintenance
- D. Economics
- E. Public perceptions, politics and policies
- F. The offshore debate
- G. Future developments