

## **ENGR 4602: Wind Power**

### **3 Credit Hours**

*Prerequisite: Engineering Standing Requirements*

This course builds upon the basic understandings of fluid mechanics, statics and electrical concepts to provide students with wind energy knowledge as a key renewable energy resource. The course starts with a review of the structure of wind industry in comparison with other renewable and non renewable (conventional) energy resources. Then a detailed engineering analysis and design of wind turbine components and various design configurations will be discussed. The principles of wind power, maximum power, actual power and force analysis on the blades, mean wind and energy velocities will be studied. The Magnus Effect, the lift force, the drag force and different wind turbine designs will be covered. Designing a wind turbine system that can generate power with high efficiency requires a thorough understanding of the principles of aerodynamics and structural dynamics of the rotor system. Therefore, the influence of the number of the blades, the tilt angle of the blades on the power output of the wind turbine will be reviewed in the course. The current-voltage characteristic of wind turbine with constant rotational speed and constant wind speed will be studied as well. The construction, operation and speed control of three-phase induction motors will be thoroughly covered. The course finishes up with a design project of a wind turbine. Students will be assigned to use computer software for wind energy analysis.

## **ENGR 4603: Geothermal and Bioenergy Systems**

### **3 Credit Hours**

*Prerequisite: Engineering Standing Requirements*

This course discusses the resource required for the use of geothermal energy in order to generate electricity, such as fluid, heat and permeability. It also discusses Low-Temperature & Co-produced Resources for electricity generation. An in depth discussion will be provided towards understanding the Enhanced Geothermal Systems (EGS) that hold potential to powering millions of houses and businesses. The course also discusses types, use, and future of Biofuels.