

## Course Syllabus

### **ELEC-2913 - Motors & Controls for Electric Vehicles & Industrial Applications**

**3.00 credits**

**Course Fee: \$105.00**

*Prerequisite:* None

An introduction to A.C. motors and A.C. motor controls. Topics include: Fundamental concepts of electricity and magnetism, A.C. Motors, Traction Motors, A.C. Synchronous Permanent Magnet Motors, adjustable frequency drives, also MatLab and Simulink Modeling of various components associated with an electric vehicle. (4 contact hours) South Campus.

---

## Macomb Community College Official Course Syllabus

### **ELEC-2913 - Motors for Electric Vehicles & Industrial Applications**

#### **Outcomes and Objectives**

**OUTCOME 1:** Upon completion of this course, students will be able to describe the operation of AC motors.

**OBJECTIVES:**

- A. Identify the parts of an AC motor.
- B. Describe the function of a three phase induction motor.
- C. Describe the function of single phase motors.
- D. Describe the advantages of three phase induction motors over single phase motors.
- E. Describe the operation of a three phase motor as it applies to the electric vehicle.

**OUTCOME 2:** Upon completion of this course, students will be able to describe the operation of an adjustable frequency drive.

**OBJECTIVES:**

- A. Identify the components of an adjustable frequency drive.
- B. Explain the operation of an adjustable frequency drive.
- C. Configure the drive parameters.
- D. Explain the operation of a bi-directional power supply.

**OUTCOME 3:** Upon completion of this course, students will be able to model and simulate various parameters associated with an electric vehicle's motors.

**OBJECTIVES:**

- A. Using MatLab software the student will be able to model battery, motor and drive parameters.
- B. Using MatLab software the student will be able to adjust in real time parameters associated with bi-directional power supply.
- C. Using Simulink software the student will be able to program in 3D various motor parameters and view these parameters.
- D. Using Simulink software the student will be able to modify various parameters of an electric vehicle and see in real time what these effects have on the system.

**Common Degree Outcomes**

- X 1. The graduate can integrate the knowledge and technological skills necessary to be a successful learner.
- X 2. The graduate can demonstrate how to think competently.
- X 3. The graduate can demonstrate how to employ mathematical knowledge.
- X 4. The graduate can demonstrate how to communicate competently.
- 5. The graduate is sensitive to issues relating to a diverse, global society.

**Course Assessments**

Pretest/Posttest

**Course Content Outline**

1. Orientation – Introduction to single-phase motors
2. Motor Operation Theory
3. Basic Motor controls
4. Introduction to three phase motors
5. Three phase motor controls
6. Theory of Operation: Adjustable frequency drive
7. Configuring drive parameters
8. Simulation of parameters using MatLab software
9. Simulation of electric vehicle parameters using Simulink software

**Department Contacts**

Faculty: John Wiecezra, Art Knapp, Anthony Ventura  
Associate Dean: Peter Klein

**Academic Development Office Use Only**

OAD: Mary Lou Kata

Experimental Course 09/14/11