

SAMPLE SYLLABUS

This syllabus is to be used as a guideline only. The information provided is a summary of topics to be covered in the class. Information contained in this document such as assignments, grading scales, due dates, office hours, required books and materials may be from a previous semester and are subject to change. Please refer to your instructor for the most recent version of the syllabus.

ABET Course Syllabus EEE473

1. **Course: EEE 473 Electrical Machinery**
2. **Credits and Contact Hours:** 3 Credit Hours (lecture), Topics: Engineering
3. **Course Coordinator:** Dr. Raja Ayyanar , Professor
4. **Textbook:** N. Mohan, *Power Electronics: A first course*, 2012, Wiley
Supplemental materials: <http://myasucourses.asu.edu>
5. **Specific course information**
 - a. **Catalog description:** Operating principles and modeling of different types of electric machines including DC, brushless DC, induction, permanent magnet and conventional synchronous machines; control aspects of these machines within modern electric drives for applications such as industry automation, energy conservation through variable speed drives, wind generators and electric vehicles.
 - b. **Prerequisites or co-requisites:** EEE 360.
 - c. **Required/elective/selected elective:** Elective
6. **Specific goals for the course**

Students will be able to analyze, select, and control electric machines and understand modern electric drives that are important in today's industry.

 - a. **Outcomes of instruction:**
 - Students will have good understanding of the basic principles of electro mechanical energy conversion
 - Students will understand the operating principles, performance characteristics and modeling of conventional machines such as dc motors and dc generators, ac motors and generators, and transformers.
 - Students will understand the operating principles and modeling of modern machines such as permanent magnet motors, brushless dc motors, stepper and reluctance motors
 - Students will have a basic understanding of machine control using power electronic converters, and be able to design feedback controllers for simple motion control applications
 - b. **Outcomes of Criterion 3 addressed by the course:**

(1) Students utilize modern tools such as the computer to solve problems, and modern methods such as space vector theory to analyze ac machines. Students gain an appreciation of how electric machines are used and controlled in a wide variety of applications such as power generation, process industry and automotive applications. Students must apply both mathematics and physics to understand and solve problems in this course. Students perform design type analyses and solve engineering problems in homework as well as in the mini-project.
7. **Brief list of topics to be covered**
 - Mechanical system requirements and electric drives
 - Review of magnetic circuits
 - Principles of electro mechanical energy conversion
 - DC machines – operating principles, constructional details
 - Transformers – operating principles, important parameters, test methods
 - AC induction and synchronous machines

- Permanent magnet and brushless dc motors
- Stepper motors and reluctance motors
- Modeling and speed control of motors
- Power electronic converters used in electric drives
- Applications of modern machines

Computer Usage: Computer usage is significant in this class. Students are encouraged to use Mathcad, Matlab, and/or other standard software packages for solving homework problems. Simulation tools such as PLECS and PSpice are used in a project that accounts for nearly 20% of the grade.

Laboratory Experiments: None.

Course Contribution to Engineering Science and Design:

- This course contributes to engineering science by teaching students how to apply the theory studied in introductory physics courses to understand and analyze electric machines. New concepts, including space vector methods, for analyzing ac machines are introduced.
- This course has significant engineering design component. For example, as part of the required mini-project, the students need to consider a motion control application, convert the mechanical system requirement to electrical specifications, select and design a suitable electric motor and design suitable controllers to achieve speed or position control.

Person preparing this description and date of preparation: Raja Ayyanar, K. Tsakalis, June, 2021.