

School of Engineering and Computer Science
ECE 411: Electric Machines
Master Syllabus

Catalog Data:	ECE 411: Electric Machines; 3 (2-3) credits Provides a solid background in power transformers and stationary electric machine analysis, covering fundamental concepts, techniques, and methods for analysis and design. Discussion and presentation of some new systems and applications.	
Class Schedule:	Two lecture hours per week, for one semester	
Laboratory Schedule:	3-hour laboratory session per week, for one semester	
Prerequisites by Course:	ECE 321 ECE 370	
Prerequisites by Topic:	1. Knowledge of basic circuit theory including DC circuits and transient response. 2. Knowledge of phasors and steady-state circuit analysis. 3. Knowledge of electromagnetic fields and waves	
Typical Text:	Chapman, S., Electric Machinery Fundamentals , McGraw Hill, 2011, ISBN: 978-0073529547, 5 th edition.	
Course Coordinator:	Dr. Hang Gao	
Course Objectives:	Students will: 1. Model and analyze magnetic circuits 2. Understand and use a transformer equivalent circuit to find the voltage and current transformations across a transformer 3. Understand the equivalent circuits of different types of electric machines 4. Be able to sketch phasor diagrams for different types of electric machines 5. Be able to conduct practical laboratory experiments with electric machines	
Topics Covered:	1. Basic machinery concepts 2. Transformers 3. DC motors and generators 4. Synchronous motors and generators 5. Induction motors and generators 6. Single-phase and special-purpose motors	
Lab Experiments and Activities:	1. Single-phase transformers 2. Three-phase transformers 3. Separately-excited DC motors 4. Shunt-excited DC motors 5. Permanent-magnet AC motors 6. Induction motors	
Course Outcomes:	Students will be able to:	
	Assessed for Program Outcomes	1.c. Use appropriate electric machine circuit models to formulate solutions. 1.d. Apply electromagnetic and circuit theory to solve electric machine problems. 6.b. Use appropriate equipment and techniques for electric machine experimentation. 6.c. Conduct analysis and interpretation of the data. 6.d. Draw conclusions by evaluating experimental results with respect to electric machines knowledge.

	<i>Other</i>	2.a. Define engineering problems from specified needs for electric machines. 2.b. Apply the design process to satisfy project requirements for electric machine design and operation. 5.b. Share responsibilities and information on laboratory project schedule and tasks with other members of the team		
<i>Relationship of Course to Program:</i>		Meets: Educational Objectives <u>1, 2, 3, 7</u> Program Outcomes <u>1, 2, 5, 6</u>		
<i>Prepared by:</i>		Dr. Josue Campos do Prado	Date:	Apr. 20, 2022
<i>Approved by CAC:</i>		2022		