

University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Electrical and Computer Engineering
Bachelor of Science in Electrical Engineering

Course Syllabus

1. General Information:	
Alpha-numeric codification: INEL 4406 Course Title: Electrical Machines Laboratory Number of credits: 3 Contact Period: 45 Required in INEL	
2. Course Description:	
English: Magnetic circuits; single phase transformers; three phase systems: passive loads and transformers; single phase and three phase induction motors; synchronous machines; direct current machines. Spanish: Circuitos magnéticos; transformadores monofásicos; sistemas trifásicos: cargas pasivas y transformadores; motores de inducción trifásicos y monofásicos; máquina sincrónica; máquina de corriente directa	
3. Pre/Co-requisites and other requirements:	
INEL 4115, INEL 4103 / INEL 4405	
4. Course Objectives:	
This course is designed to give students practical laboratory experience in the operation of three phase circuits, transformers and electric machines as well as the safe electrical measurements practices.	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input checked="" type="checkbox"/> computation <input checked="" type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input checked="" type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input type="checkbox"/> other, please specify: T	
6. Minimum or Required Resources Available:	
All students are expected to bring a solid background in circuit analysis and calculus. Students should also have basic knowledge of electromagnetic theory. Students must always bring to class the textbook and a scientific calculator (preferably one that handles complex numbers).	
7. Course time frame and thematic outline	
Outline	Contact Hours
Introduction Student learning profile Safety Rules	3
Passive loads and instrumentation connection for experiment	3
Basic analysis of single phase AC and DC circuits	3
Three phase circuits: analysis and power measurements	3
Single phase transformers: tests, loading, efficiency and voltage regulation	3
Three phase transformers: voltage and current relationships and connections	3
Three phase induction motor: no-load, speed, current and torque characteristics	6
Single phase induction motors	3
Synchronous motor: operation and control	3
Three Phase Synchronous Generator	3
DC Machines: Motors and Generators: Operation and Control	6
Exams	6
Total hours: (equivalent to contact period)	45
8. Grading System	
<input checked="" type="checkbox"/> Quantifiable (letters) <input type="checkbox"/> Not Quantifiable	
9. Evaluation Strategies(Suggested): The faculty member teaching the course will provide the student with the evaluation strategy he/she will be using throughout the semester. This will be done within the first week of	

classes.

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2	30
<input checked="" type="checkbox"/> Final Exam	1	25
<input checked="" type="checkbox"/> Short Quizzes	_____	10
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographs		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	1	10
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Laboratory Reports	_____	25
TOTAL:		100%

10. Bibliography:

Textbook:

UPRM, Electrical and Computer Engineering Department, Electric Machines Fundamentals Laboratory Manual, 7TH edition

References:

Bhag S. Guru, Huseyin R. Hiziroglu, Electric Machines and Transformers, Third Edition, Oxford Press, 2000

Theodore Wildi, Electrical Machines, Drives, and Power Systems, Third Edition, Prentice Hall, 1997

Donald V. Richardson, Arthur J. Caisse, Jr., Rotating Electric Machinery and Transformer Technology, Fourth Edition, Prentice Hall, 1997

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

12. Contribution of Course to meeting the requirements of Criterion 5:

Math	Basic Science	General	Engineering Topic
			✓

12. Course Outcomes

- Possess sufficient knowledge of circuit analysis and electromagnetic principles to enable understanding of the physical operation of electric machines
- Be able to apply linear algebra and phasor analysis concepts to descriptions and solutions of steady state electric machines engineering problems.
- Be capable of extracting specifications and physical constraints from electrical machines engineering verbal problems.
- Be capable of physical thinking, approximation and simplification of electric machines behavior as to perform laboratory test to compare actual results with theoretical ones
- Be capable of effectively describing electrical machines steady state working conditions in a way that can lead to the construction of a solution.
- Be capable to use the existing data acquisition module and computer programs to obtain and analyze the electric machines operation characteristics

Map to Program Outcomes

- (a)
- (a)
- (a)
- (b)
- (e)
- (k)

Person(s) who prepared this description and date of preparation;

Submitted by: Efrain O'Neill Nov 2006

