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

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL 4075
Course Title: FUNDAMENTALS OF ELECTRICAL ENGINEERING
Number of credits: 3
Contact Period: 3 hours of lecture per week
Elective course in INEL

2. Course Description:

English: Laws and fundamental concepts that govern the behavior of electric and magnetic circuits; ideal models of resistors, voltage and current sources, capacitors and inductors; three-phase circuits and transformers.

Spanish: Leyes y conceptos fundamentales que gobiernan el comportamiento de los circuitos eléctricos y magnéticos; modelos ideales de resistencias, fuentes de voltaje y corriente, condensadores e inductores; circuitos trifásicos y transformadores.

3. Pre/Co-requisites and other requirements:

(MATE 3063 or MATE 3185) and (FISI 3172 or FISI 3162).

4. Course Objectives:

The objective of this course is to introduce students to electric circuit analysis techniques, including the Kirchhoff's Laws. Basic circuits elements such as, transformer, operational amplifiers, resistors, inductors, capacitors, dependent and independent sources are introduced. Simplification of electrical circuits is considered using various techniques, including Thevenin's and Norton's theorems. Single-phase circuits power analysis and first-order linear circuit analysis techniques are also presented.

5. Instructional Strategies:

☒conference ☒discussion ☐computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring

☐research ☐other, please specify:

6. Minimum or Required Resources Available:

P-Spice, MATLAB, and demonstration of Practical Drive Systems in Laboratory

7. Course time frame and thematic outline

Outline	Contact Hours
Circuit variables and units.	2
Electric circuits, current, voltage, power, energy, active and passive circuits, resistors, Ohm's law, independent sources, connecting voltmeter and ammeter, dependent sources, transducer, switches.	5
KCL, KVL, series resistor, voltage divider, parallel resistor, current divider	4
Techniques of circuit analysis: resistance equivalence, node voltage analysis, mesh analysis, superposition, Thevenin's theorem, and Norton's equivalent circuit	12
The ideal operational amplifier and applications	3
Inductance (L), Capacitance (C) and first order systems	4
AC, sinusoidal sources, phasors, impedance and admittance	6
Power; instantaneous, average (P), reactive (Q), complex (S) and power factor (pf). Maximum power transfer.	3
Coupled inductors, ideal transformer.	2
Three phase voltages, sequence, Y-Y circuit, analysis of Y-Y balanced circuit	1
Exams	3
Total hours: (equivalent to contact period)	45

8. Grading System

☒Quantifiable (letters) ☐ 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
☒ **Exams**	3	20
☒ **Final Exam**	1	20
☒ **Short Quizzes**	Varies	10
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☐ **Projects**		
☐ **Journals**		
☒ **Other, specify: Assignments**	Varies	10
TOTAL:		**100%**

10. Bibliography:

R. Dorf and J. A. Svoboda, Introduction to Electric Circuits, 7th Edition, John Wiley, 2006

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.

Contribution of Course to meeting the requirements of Criterion 5:

Math	Basic Science	General	Engineering Topic
			√

Person(s) who prepared this description and date of preparation: Raúl E. Torres – June 2008. Submitted by Raúl E. Torres, June 17, 2008.