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 3105
Course Title: ELECTRICAL SYSTEMS ANALYSIS I
Number of credits: 3
Contact Period: 3 hours of lecture per week
Required in INEL and ICOM

2. Course Description:

English: Analysis of direct current and alternating current linear electric circuits; laws and concepts that characterize their behavior.

Spanish: Análisis de circuitos eléctricos lineales de corriente continua y de corriente alterna; leyes y conceptos que caracterizan su comportamiento.

3. Pre/Co-requisites and other requirements:

MATE 3032 or MATE 3184. Co-requisites: (FISI 3172 or FISI 3162) and (MATE 3063 or MATE 3185).

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. Passive convention.	2
Circuit elements, Kirchhoff's laws. Power and energy in circuits.	5
Analysis of resistive circuits: series-parallel circuits; Circuit simulation.	2
Analysis of resistive circuits: Nodal and loop analysis; linearity and superposition.	6
Analysis of resistive circuits: Thevenin and Norton equivalents and source transformation; Maximum power transfer theorem.	4
Two-port networks: input/output representation of two-port networks using admittance, impedance and transmission parameters. Interconnection of two port networks. Using two-port representations to solve circuit problems involving two-port networks.	3
The ideal operational amplifier and its inverting and non-inverting configurations.	4
Inductance (L), capacitance (C), mutual-inductance, and ideal transformer.	6
AC Circuit Analysis: analysis of linear circuits in sinusoidal steady state: phasor concept, impedance concept, circuit representation in the phasor domain, circuit analysis and network theorems in the phasor domain.	6
Power in AC Circuits; instantaneous, average (P), reactive (Q), and complex (S); Power factor (pf); Maximum power transfer theorem for AC circuits.	4
Exams	3
Total hours: (equivalent to contact period)	45

8. Grading System

☒Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**3**	**60**
☒ **Final Exam**	**1**	**30**
☐ **Short Quizzes**		
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☐ **Projects**		
☐ **Journals**		
☒ **Other, specify: Assignments and Quizes**	**N**	**10**
TOTAL:		**100%**

10. Bibliography:

Textbook:
James W. Nilsson and Susan Riedel, **Electric Circuits**, 9th Edition, Prentice Hall (2010).

References:
J. David Irwin and R. Mark Nelms, **Basic Engineering Circuit Analysis**, 9th Edition, John Wiley (2008).
R.A. DeCarlo and P.Lin, **Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approaches**, 2nd edition, Oxford University Press (2001).
W.H. Hayt, Jr., J.E. Kemmerly, and S.M. Durbin, **Engineering Circuit Analysis**, 7th edition, McGraw Hill (2007).

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. Course Outcomes All outcomes should be sampled every semester. Passing students should be separated from non-passing students in the tabulation.	Map to Program Outcomes	Max. Level To Achieve
1. Apply circuit analysis techniques to understand the physical operation of a electrical circuit system.	(a)	3
2. Perform basic power calculations applying complex variable concepts.	(a)	3
3. Perform steady state calculations in RC, RL and RLC circuits.	(a)	3
4. Simulate electrical circuits using commercially available software for circuit analysis.	(k)	3

Person(s) who prepared this description and date of preparation: Comité Asuntos Académicos – February 16, 2012, Submitted: Miguel Vélez-Reyes, Committee Coordinator