University of Puerto Rico
Mayagüez Campus
College of Engineering
Electrical and Computer Engineering

1. General Information:

INEL 4078 Fundamentals of Circuits and Electronics
Number of credits: 4 Contact Period: 3 hours of lecture per week, 2 hours of laboratory per week

2. Course Description:

Laws and fundamental concepts that govern the behavior of electric and magnetic circuits; ideal models of resistors, voltage and current sources, capacitors and inductors; fundamentals of analog and digital electronics; applications of semiconductor diodes, transistors and logic circuits.

3. Pre-requisites : MATE3063 (or MATE3185) and FISI 3172 (or FISI 3162)

4. The objective of this course is to introduce students to the fundamentals of electric and electronic circuit analysis techniques, as well as digital electronics. Circuit topics include Kirchhoff's Laws and basic circuit elements such as 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. Electronic circuits with semiconductor devices such as diodes and transistors will be analyzed. An introduction to digital electronics will be presented. The course will be complemented with a two hour weekly laboratory.

5. Course time frame and thematic outline

Outline	Contact Hours
1. Electric circuits, current, voltage, power, energy, active and passive circuits, resistors, Ohm's law, voltage and current sources, capacitors and inductors. Kirchhoff's laws. Superposition and homogeneity	5.0
2. Reduction and transformation methods for resistive circuits, Voltage and current dividers. Nodal and mesh methods. Applications of Thevenin and Norton equivalent circuits. Power Transfer theorem.	9.0
3. Operational amplifier: theory and applications	4.0
4. Inductance (L), Capacitance (C) and first order systems	4.0
5. AC, sinusoidal sources, phasors, impedance and admittance	5.0
6. Diodes: basic models and rectifiers.	2.0
7. Transistors: Models and basic applications, interface examples using relays and sensors	4.0
8. Introduction to digital systems: binary numbers and Boolean Algebra operations	1.0
9. Combinatorial gates, design and analysis basic techniques. Combinatorial subsystems	4.0
10. Sequential elements: latches and flip-flops. Basic sequential subsystems: counters, registers and memory.	4.0
Exams	3.0
Total hours: (equivalent to contact period)	**45**

9. Grading System: A:100-90, B:89-80, C:79-70, D:69-60, F:59-0.

Evaluation Strategies:
Assignments 45 pts
Partial Exams 300 pts (3@ 100 pts each)
Final Exam 100 pnts
Total Points: 445 pnts

Partial Exams: All during class period. Sep 11, Oct 11, Nov 18.

Textbook: Hambley, Allan R., Electrical Engineering Principles and Applications, 6th Edition, Prentice Hall, 2014.

Instructor: José M. Rosado Román, PhD

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Office Hours: MWV 8:30-10:30 in OF-327

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RULES IN CLASS:
• Students are not allowed to leave the classroom during class except in exceptional circumstances.
• Exams are required and will be given online at online.upr.edu.

• Class attendance is required. You are expected to arrive on time to class. I reserve the

right to lock the door after 5 minutes of class start for the benefits of the other students. • Dishonest behavior, as commonly understood, which includes exam cheating or plagiarism, will result in at least a zero for the item, and for an aggravated incident, failure in the course and initiation of University disciplinary action. In research, you expect to build on others' work, but it should be very clear what is yours and what is theirs, clearly referenced or acknowledged.

• If there is a conflict with my Office Hours => schedule by appointment.
• No beepers and/or cellular phones are allowed during exams, and their use during classes should be limited to emergencies. Leave the room if the need to use it arrives.
• No baseball caps allowed during quizzes or exams.
• No "special" projects will be given to anyone to improve grades or for any other reason. • Disabilities: Reasonable accommodations will be coordinated in accordance with the needs of the student.
• Read your email frequently: I communicate announcements like quiz cancellation and changes by email.