



University of Puerto Rico  
Mayagüez Campus  
College of Engineering  
Electrical and Computer Engineering  
Bachelor of Science in Computer Engineering  
**Course Syllabus**



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| <b>1. General Information:</b>  |
| Alpha-numeric codification: INEL 3105<br>Course Title: Electrical Systems Analysis I<br>Number of credits: 3<br>Contact Period: 3 hours of lecture per week<br>Contact Period: Required in INEL and ICOM<br>Course coordinator's name: Academic Affairs Committee   |
| <b>2. Course Description:</b>   |
| 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.  |
| <b>3. Pre/Co-requisites and other requirements:</b>   |
| <b>Pre-requisites</b><br>(MATE 3032 or MATE 3184) and INGE 3016.<br><b>Corequisites</b><br>(FISI3172 or FISI3162) and (MATE3063 or MATE3185)  |
| <b>4. Course Objectives:</b>  |
| The objective of this course is to introduce students to electric circuit analysis techniques, including the Kirchhoff's Laws. Basic circuits element such as, transformer, operational amplifiers, resistor, 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-ordered linear circuit analysis techniques are also presented   |
| <b>5. Instructional Strategies:</b><br><input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory<br><input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop<br><input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring<br><input type="checkbox"/> research <input type="checkbox"/> other, please specify: |
| <b>6. Minimum or Required Resources Available:</b>  |
| P-Spice, MATHLAB, and demonstration of Practical Drive Systems in Laboratory  |

| <b>7. Course time frame and thematic outline:</b>  |               |
|--|---------------|
| Outline  | Contact Hours |
| Circuit variables and units. Passive convention.   | 2.0           |
| Circuit elements, Kirchoff's laws. Power and energy in circuits.   | 5.0           |
| Analysis of resistive circuits: series-parallel circuits; Circuit simulation.  | 2.0           |
| Analysis of resistive circuits: Nodal and loop analysis; linearity and superposition.  | 6.0           |
| Analysis of resistive circuits: Thevenin and Norton equivalents and source transformation; Maximum power transfer theorem.   | 4.0           |
| Two-port networks: input/output representation of two-port networks using admittance, impedance and transmission parameters. Interconnection of two port networks.   | 3.0           |
| The ideal operational amplifier and its inverting and non-inverting configurations.  | 4.0           |
| Inductance (L), capacitance (C), mutual-inductance, and ideal transformer.   | 6.0           |
| 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. | 6.0           |
| Power in AC Circuits; instantaneous, average (P), reactive (Q), and complex (S); Power factor (pf); Maximum power transfer theorem for AC circuits   | 4.0           |
| Exams  | 3.0           |
| <b>8. Grading System</b>   |               |

Quantifiable (letters)  Not Quantifiable

### 9. Evaluation Strategies

|  | Quantity | Percent     |
|--|----------|-------------|
| <input checked="" type="checkbox"/> Exams                    | 3        | 60.00       |
| <input checked="" type="checkbox"/> Final Exam               | 1        | 30.00       |
| <input type="checkbox"/> Short Quizzes                       |          |             |
| <input type="checkbox"/> Oral Reports                        |          |             |
| <input type="checkbox"/> Monographies                        |          |             |
| <input type="checkbox"/> Portfolio                           |          |             |
| <input type="checkbox"/> Projects                            |          |             |
| <input type="checkbox"/> Journals                            |          |             |
| <input checked="" type="checkbox"/> Other, specify: Homework | 5        | 10.00       |
| <b>TOTAL:</b>  |          | <b>100%</b> |

## **10. Bibliography:**

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).

C. Alexander and M. Sadiku, Fundamentals of Electric Circuits, 5th edition, McGraw Hill (2012)

R.C. Dorf, and J.A. Svoboda, Engineering Circuit Analysis, 8th edition, Wiley (2010).

R.L. Boylestad, Introductory Circuit Analysis, 12th edition, Prentice Hall, (2010)

A.H. Robbins, W.C. Miller, Circuit Analysis: Theory and Practice, Delmar Cengage Learning, 5th edition, (2012)

W.H. Hayt, Jr., J.E. Kemmerly, and S.M. Durbin, Engineering Circuit Analysis, 7th edition, McGraw Hill, (2007)

## **11. Regulations:**

### **According to Law 51**

Law 51: The Comprehensive Educational Services Act for People with disabilities states that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations.

For more information contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

## **12. Academic Integrity:**

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.—

## **13. Policy Against Discrimination Based on Sex, Sexual Orientation, and Gender Identity:**

The University of Puerto Rico prohibits discrimination based on sex, sexual orientation, and gender identity in any of its forms, including that of sexual harassment. According to the Institutional Policy Against Sexual Harassment at the University of Puerto Rico, Certification Num. 130, 2014-2015 from the Board of Governors, any student subjected to acts constituting sexual harassment, may turn to the Office of the Student Ombudsperson, the Office of the Dean of Students, and/or the Coordinator of the Office of Compliance with Title IX for an orientation and/or formal complaint.

**14. Sexual Harassment: Certification 130-2014-2015 states:**

Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

**15. Certification 06-43 of the Academic Senate states, "The academic guidelines for offering online courses," defines:**

Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 16-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

**16. Contribution of Course to meeting the requirements of Criterion 5:**

Engineering Topic

**Specific goals for the course**

| # | Course Outcomes   | ABET Student Outcomes |
|---|---|-----------------------|
| 1 | Apply circuit analysis techniques to understand the physical operation of an electrical circuit system. | 1                     |
| 2 | Perform basic power calculations applying complex variable concepts.                                    | 1                     |
| 3 | Perform transient and steady state calculations in RC, RL and RLC circuits.                             | 1                     |
| 4 | Simulate electrical circuits using commercially available software for circuit analysis.                | 1, 2, 6               |

Description prepared by the Academic Affairs Committee on 3/21/2013.

Reviewed on 7/30/2019.

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

**Evaluation Strategies:**

|               |                            |
|---------------|----------------------------|
| Quizzes       | 10 pts                     |
| Assignments   | 50 pts                     |
| Partial Exams | 300 pts (3 @ 100 pts each) |
| Final Exam    | 100 pts                    |
| Total Points: | 460 pts                    |

**Partial Exams:** All during class period. [Sep 9](#), [Oct 11](#), [Nov 13](#).

**Instructor:** José M. Rosado Román, PhD

Phone: 787-832-4040 x5832 (VoIP)

Office Hours: MWF 7:30-9:20 in OF-327

E-mail: [jrosado@ece.uprm.edu](mailto:jrosado@ece.uprm.edu)

WWW: <http://ece.uprm.edu/~jrosado/>

**RULES IN CLASS:**

- Students are not allowed to leave the classroom during class except in exceptional circumstances.
- Exam attendance is required unless you have a medical excuse or equivalent documented emergency. The final exam will serve as reposition for any missed partial exams.
- 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 arises.
- 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.