



**INTER AMERICAN UNIVERSITY OF PUERTO RICO  
BAYAMON CAMPUS  
SCHOOL OF ENGINEERING  
ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT**

**ELEN 3312 – Electronics II  
Required**

**Catalog Description:** Analysis of the frequency response of amplifiers. Study of the feedback effect in amplifiers. Design of feedback amplifiers and oscillators. Analysis and design of active filters. Study of digital logic circuits. Use of specialized software applications in the analysis and design of electronic circuits.

**Pre-requisite(s):** ELEN 3311 – Electronics I

**Textbook:** Neamen D. A., *Microelectronics Circuit Analysis and Design*, 3<sup>rd</sup> Ed., McGraw-Hill, 2007.

**Laboratory:** Bogart T., *Experiments in Electronic Devices and Circuits*, 6<sup>th</sup> Ed., Prentice Hall, 2004.

**References:** Hambley A. R., *Electronics*, 2<sup>nd</sup> Ed., Prentice Hall, 2003.  
Spencer R. ., *Introduction to Electronic Circuit Design*, 1<sup>st</sup> Ed., Prentice Hall, 2003.  
Neamen D. A., *Electronic Circuit Analysis*, 2<sup>nd</sup> Ed., Mc-Graw Hill, 2001.  
Boylestad R. R., *Electronic Devices and Circuits Theory*, 8<sup>th</sup> Ed., Prentice Hall, 2002.  
Jaeger R. C., *Microelectronics Circuit Design*, 2<sup>nd</sup> Ed., Mc-Graw Hill, 2004.  
Electronic references on Electronics from  
<http://www.engnetbase.com/>

**Course Learning Outcomes<sup>i</sup>:**

Upon successful completion of the course, the student will be able to:

1. Demonstrate a basic understanding of the frequency response of amplifiers. **(Outcome A)**
2. Determine the high- and low-frequency response of transistor circuit configurations. **(Outcome A)**
3. Design amplifiers with a given frequency response and gain specifications. **(Outcome C and E)**
4. Explain the advantages and disadvantages of using feedback in electronic circuits.
5. Analyze and obtain the transfer function of the ideal feedback system. **(Outcome A)**
6. Calculate the input and output resistance characteristics of feedback systems. **(Outcome A)**
7. Determine the stability criteria of feedback circuits. **(Outcome A)**
8. Analyze and design active and resonant filters that attenuate undesired frequency components of an input signal. **(Outcome C and E)**
9. Analyze and design oscillators that provide sinusoidal, triangular and square-waves at specified frequencies. **(Outcome C and E)**
10. Define the various classes of power amplifiers and determine their maximum power efficiency. **(Outcome A)**
11. Analyze digital logic circuits. **(Outcome A)**
12. Use specialized computer software in the analysis and design of electronic systems. **(Outcome K)**
13. Operate test equipment for the analysis and design of electronic devices. **(Outcome K)**
14. Design electronic devices to meet specific specifications and constraints. **(Outcomes C and E)**
15. Browse the web or any other source of information to acquire information about the assigned project. **(Outcome I)**
16. Demonstrate effective communication through writing or oral proficiency at the level expected for a junior engineering student. **(Outcome G)**
17. Work in teams during the course laboratory and design components. **(Outcome D)**
18. Exhibit ethical behavior during the laboratory and design components. **(Outcome F)**
19. Identify the benefits of professional engineering societies as a resource of information for life-long learning. **(Outcome I)**
20. Ability to conduct and design experiments, as well as analyze and interpret data generated by those experiments. **(Outcome B)**

**Topics Covered<sup>ii</sup>**

Lecture Topics*	Hours
1. Frequency response	12
2. Feedback and oscillators	12
3. Active filters and tuned circuits	9

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|---------------------------------------|---|
| 4. Output stages and power amplifiers | 3 |
| 5. Digital logic circuits             | 3 |
| 6. Exams                              | 6 |

Laboratory Topic*	Hours
1. Upper cutoff Frequency	3
2. Lower cutoff frequency	3
3. Frequency response of RC coupled amplifiers	3
4. Feedback amplifiers	3
5. Oscillators	3
6. Active amplifiers	3
7. Power amplifiers	3
8. Digital logic circuits	3
9. Design project	14

\*Schedule is subject to change

**Class/Lab Schedule:** Four credit hours. Forty-five hour of lecture and forty-five hours of laboratory per term.

**Suggested Evaluation Strategies**

- Exams (60%): Two partial exams and a final exam will be scheduled early in the semester. You are expected to take the exams at the times and dates specified. All calculations must be done clearly, stating units and showing a coherent procedure to arrive to the results.
- Laboratory (18%): Laboratory reports must be submitted by each group, one week after the experiment is done. The report must be written in a professional format.
- Project (17%) A team open design project is required at the end of the course. Partial and final written reports will be submitted. A presentation is required at the end of the semester.
- Homeworks (5%): Homeworks will be made weekly and are due at the first meeting class of the next week. Solutions will be available to provide immediate feedback. Each student must work individually but team work is also encouraged for challenging problems.

**Contribution of Course to Meeting Professional Component**

Four credit hours of engineering science and design.

**Relationship of Course to Program Outcomes\*\***

a	b	c	d	e	f	g	h	i	j	k
√	√	√	√	√	√	√		√		√

**Accommodations for Students with Disabilities**

Students who require special services or assistance in carrying out academic duties must notify the Coordinator of Students with Disabilities at the Dean of Students Office at the beginning of the semester, or as soon as they become aware of their need(s).

**Academic fraud**

Dishonest conduct, fraud, plagiarism, or any other inadequate behavior regarding academic work is considered major infractions according to the Student Regulations Manual (Reglamento General de Estudiantes). Penalties for major infractions, according to the Manual, may include suspension from the University for set period of more than a year or permanent expulsion, among other disciplinary measures.

**Prepared by:** Prof. Caroline González

**Revised:** February 2009

<sup>i</sup> These letters correspond to the Program Outcomes of electrical engineering, respectively. The program outcomes can be found in the ECE department website at <http://bc.inter.edu/ingeelectrica>.

<sup>ii</sup> Schedule is subject to change.