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

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL 5305
Course Title: ANTENNA THEORY AND DESIGN
Number of credits: 3
Contact Period: 3 hours of lecture per week
Elective in INEL

2. Course Description:

English: Radiation mechanisms, radiation patterns. Impedance concepts. Wire antennas. Antenna arrays. Frequency independent antennas. Aperture antennas. Antenna measurements and design.

Spanish: Mecanismos de radiación, patrones de radiación, concepto de impedancia; antenas de alambre, arreglos de antenas, antenas independientes de frecuencia, antenas de abertura, medidas y diseño de antenas.

3. Pre/Co-requisites and other requirements:

Prerequisite INEL 4301 & INEL 4152

4. Course Objectives:

After completing the course, the student should be able to describe the radiation mechanisms and the fundamental antenna principles and parameters and use them to understand different types of antennas and to analyze antenna systems. The students should also be able to choose the best type of antenna for different situations and to design antenna systems given a set of specifications.

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:

C.A. Balanis, Antenna Theory, Analysis and Design. 3rd Edition. NY, NY: John Wiley and Sons, 2005.

7. Course time frame and thematic outline

Outline	**Contact Hours**
Introduction, radiation mechanisms	3
Fundamental parameters	5
Radiation integrals and vector potentials	1
Linear dipoles	5
Loop antennas	5
Antenna arrays and mutual impedance	8
Impedance matching	5
Broadband antennas, frequency independent antennas	4
Aperture, Horn and Reflector antennas	5
Microstrip patches	2
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**	**0-100%**
☒ **Final Exam**	**1**	**0-100%**
☒ **Short Quizzes**		**0-100%**
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**1**	**0-100%**
☐ **Journals**		
☒ **Other, specify: dependent on the instructor**		
TOTAL:		**100%**

10. Bibliography:

Antenna Theory: Analysis and Design, Blanis, Constantine A. Third Edition, Wiley Interscience.

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

Math	Basic Science	General	Engineering Topic
			√

13. Course Outcomes	**Map to Program Outcomes**
1. Apply vectorial algebra and calculus with Maxwell equations to calculate the fields radiated from antenna	a
2. Explain how an antenna radiates	a
3. Compute antenna radiated electromagnetic fields	a
4. Design a network to match the antenna impedance to a transmission line	c,e
5. Select the appropriate antenna to be used for an application according to their beam width, radiation pattern, etc	b,c
6. Determine and calculate the antenna fundamental parameters	a
7. Design different types of antennas to comply with given requirements	c,e
8. Design antennas and antenna arrays using simulation tools	c,k
9. Properly model wire antennas using antenna simulation tools	k

Person who prepared this description and date of preparation: Electromagnetic Committee, March, 12, 2008. Submitted by: Dr. Rafael Rodríguez, Committee Coordinator, March, 12, 2008