



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING

TELECOMMUNICATIONS ENGINEERING PROGRAM

EE524 – ELECTROMAGNETIC PROPAGATION AND RADIATION II

I. GENERAL INFORMATION

CODE	: EE524 – Electromagnetic propagation and radiation II
SEMESTER	: 8
CREDITS	: 04
HOURS PER WEEK	: 05 (Theory – Practice)
PREREQUISITES	: EE521 – Electromagnetic propagation and radiation I
CONDITION	: Mandatory

II. COURSE DESCRIPTION

Propagation of flat electromagnetic waves; normal incidence in multimedia; normal and oblique incidence in two media; propagation of electromagnetic waves in cylindrical structures. Resonant cavities, Electromagnetic radiation, electromagnetic radiation for far zone. Parameters of the antennas. Linear antennas and current distributions. Arrangement of antennas. Antennas in front of perfect conductive ground plane. Arrangements of antennas and typical arrangements. Opening antennas.

III. COURSE OUTCOMES

At the end of the course the student will:

- Ability to identify, formulate and solve problems of electromagnetic waves in a harmonic regime.

IV. LEARNING UNITS

1. PROPAGATION OF FLAT ELECTROMAGNETIC WAVES

Review of the propagation of flat waves in harmonic regimen and its parameters. Characterization of propagation media for electrodynamic processes. Pattern of standing waves. Polarization of a wave. Reflection in two or more media with normal incidence. Refraction. Diffraction. Application for: TEM wave shielding; channel TEM waves in guided structures: transmission lines; for transmission with line of sight (LOS) and without line of sight (NLOS); limit the distortion of transmitting in dispersive media.

V. METHODOLOGY

4 qualified practices; It is removed 1. The evaluation, from 0 to 20, is about concepts and definitions, about 50% and the rest is questions of parameter calculations. The evaluations are without notes or books; a relevant form is added to each test. Participations are also considered to answer the questions asked in class.

VI. EVALUATION FORMULA

The learning will be evaluated through the "G" system.

- Partial Exam (PE): Weight 1
- Final Exam (FE): Weight 1
- Average of Practices (P): Weight 1.

$$FA = \frac{PE + FE + P}{3}$$

VII. BIBLIOGRAPHY

- Constantine A. Balanis. Advanced Engineering Electromagnetics, 2nd Edition. Publisher: Wiley, 2012.
- Constantine A. Balanis. Antenna Theory: Analysis and Design. Publisher: Wiley, 2016.
- Robert E. Collin. Foundations for Microwave Engineering - 2nd edition. Publisher: Wiley-IEEE Press, 2001.