<table>
<tr><td>Course Title</td><td colspan="5">Microwave and Optical Transmission</td></tr>
<tr><td>Course Code</td><td colspan="5">ECE435</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Level</td><td colspan="5">Bachelor (1st Cycle)</td></tr>
<tr><td>Year / Semester</td><td colspan="5">4th Year / 8th Semester</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">TBA</td></tr>
<tr><td>ECTS</td><td>6</td><td>Lectures / week</td><td>3 hours / 14 weeks</td><td>Laboratories / week</td><td>N/A</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="5">The objective of this course is to present participants the principles and propagation of microwave and optical waves. Students develop skills in electromagnetic wave theory which can be used to explain the behaviour of a wide variety of practical microwave and optical transmission systems (both mathematically and physically).</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">Upon successful completion of this course, students should be able to:
Describe the mathematical and physical development of Maxwell’s equations
Define the theory and practice of plane radio, microwave and optical waves in free space
Examine boundary conditions and plane waves principles such as reflection and refraction at metal and dielectric interfaces which are used in practical optical and microwave systems
Explain the use of radio waves, microwaves and optical waves in free space and through materials with losses, as well as the concept of microwave heating and safety levels
Analyse the physics and mathematics of guided waves and their applications in optical and microwave systems
Identify electromagnetic principles of optical waveguides</td></tr>
<tr><td>Prerequisites</td><td colspan="2">ECE225</td><td colspan="2">Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="5">Microwave and optical systems:

Introduction to microwave and optical systems. Waveguide structure. Formation of guided modes. Propagating power. Overview of practical examples and theory.

Transmission lines and microwave networks:

Transmission lines. Wave propagation on a transmission line. Lumped element model. Terminated transmission lines. VSWR and return loss. The Smith Chart. Basic operations of Smith Chart. Network analysis. The transmission (ABCD) Matrix.

Maxwell’s equations:</td></tr>
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	Introduction to static fields. Vector equations and mathematics associated with electromagnetic theory. Overview of Maxwell's equations. Displacement current. Wave equations: Radio and optical waves in free space. Plane waves: Travelling waves, impedance of media, polarisation, standing waves and energy relations. Waves in dissipative media and practical examples. Microwave heating and safety levels Reflection and refraction of plane waves: Boundary conditions. Normal and oblique incidence. Total internal reflection. Brewster angle. Applications in optics and lasers. Principles of microwave waveguides: Parallel plate waveguides. Microstrip description. Rectangular waveguides and coaxial lines. Principles of optical waveguides: Planar dielectric waveguides. Optical fibres. Optical fibre transmission systems.
Teaching Methodology	Face- to- face
Bibliography	D.M. Pozar, Microwave Engineering, Wiley Z.B. Popovic and B.D. Popovic, Introductory Electromagnetics, Prentice Hall S. Harsany, Principles of Microwave Technology, Prentice Hall K. Okamoto, Fundamentals of Optical Waveguides, Academic Press
Assessment	Examinations: 70% Assignments/Lab: 20% Class Participation and Attendance: 10% 100%
Language	English