



## Course Syllabus

<b>Course ID</b>	0902514
<b>Course Title</b>	<b>Wave Propagation</b>
<b>Prerequisite</b>	0902306 (2) <b>Electromagnetic</b>
<b>Time &amp; Date</b>	
<b>Coordinator</b>	-
<b>Instructor</b>	Dr. Faculty of Engineering E-mail: Telephone: ext.
<b>Office hours</b>	
<b>Course Description</b>	Electromagnetic spectrum. Reflection. Refraction., and scattering of waves. Ground waves. Basic physics of ionosphere. Propagation of waves in the ionosphere. Troposphere waves. Line of sight propagation of waves
<b>Course Objectives</b>	<ol style="list-style-type: none"><li>1. Realize the importance and applications of radiowaves in modern life.</li><li>2. Understand and apply the various propagation schemes to solve engineering problems.</li><li>3. Ability to evaluate the effect of buildings and other obstacles on wave propagation.</li><li>4. Provide skills of designing radiocommunication systems including noise effects.</li><li>5. Understand the interaction of waves with human body.</li></ol>
<b>Course Outcomes</b>	
<b>Course Topics</b>	Introduction. Radio-frequency spectrum and its uses in communications Friis transmission formula and radar equation Noise in communications systems, thermal noise, noise figure and equivalent noise temperature calculations, antenna-noise temperature. Propagation over flat earth Propagation over spherical earth and coverage diagrams Effects of diffraction on wave propagation Surface-wave propagation Propagation using the ionosphere Microwave and millimeter-wave propagation: Attenuation by rain, fog, snow and ice, and atmospheric gases. Propagation using tropospheric scattering ELF and VLF propagation Propagation in urban and sub-urban areas: theoretical models, statistical

	models. Communication using earth-orbiting satellites: types of orbits, satellite systems, path loss in satellite links, polarization effects and Faraday's rotation. Propagation inside buildings. Radio-communication system design Biological effects of radiation, RF exposure standards
<b>Course Text Book</b>	R. E. Collin, <i>Antennas and Radiowave Propagation</i> , McGraw-Hill, 1985
<b>Course References</b>	1- K. Siwiak, "Radiowave Propagation and Antennas for Personal Communications", 2nd Ed., Artech House, 1998. 2- J. C. Whitaker, "Radio Frequency Transmission Systems: Design and Operation," McGraw-Hill, Inc., 1991. 3- Les Barclay, " Propagation of Radiowaves", IEE, UK, 2003 4- Simon R. Saunders and A. A. Zavala , "Antennas and Propagation for Wireless Communication Systems", John whily, 2nd Edition, UK, 2006 2- L. Felsen, "Radiation and Scattering of Waves," IEEE Press
<b>Course delivery</b>	Lectures Tutorial Lab Homework Project Computer Internet Industrial Visit
<b>Course Assessment</b>	Assignments & short reports..... 10% 2 exams @ 20% each ..... 40% Final exam ..... 50%
<b>Updated</b>	<b>Dr. Takiialddin AL-Smadi 10/2009</b>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12
CO1											
CO2											
CO3											
CO4											
CO5											
CO6											
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CO1											
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CO5											
CO6											

CO7											
CO8											
CO9											

### **ABET a-k Engineering and Technology program outcome**

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (b) An ability to design and conduct experiments, to analyze and interpret data
- (c) An ability to design a system, component, or process to meet desired needs
- (d) An ability to function on multi-disciplinary teams
- (e) An ability to identify, formulate, and solve engineering problems
- (f) An understanding of professional and ethical responsibility
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) A recognition of the need for, and an ability to engage in life-long learning
- (j) A knowledge of contemporary issues
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

### **Plagiarism**

Deliberate plagiarism is a serious act of academic misconduct. Students may be suspended from the University if they are found to have plagiarized their course work. Whether inadvertent or deliberate, plagiarism includes the following:

- (a) word-for-word copying of sentences or whole paragraphs or presenting of substantial extracts from either paper-based or electronic sources the work or data of others that are published or unpublished (such as books, internal reports, and lecture notes or tapes) without clearly indicating their origin;
- (b) using very close paraphrasing of sentences or whole paragraphs without due acknowledgement in the form of reference to the original work;
- (c) submitting another student's work in whole or in part;
- (d) using of another person's ideas, work or research data without acknowledgement;
- (e) copying computer files, algorithms or computer code without clearly indicating their origin;
- (f) submitting work that has been written by someone else on the student's behalf; and
- (g) submitting work that has been derived, in whole or in part, from another student's work by a process of mechanical transformation (e.g., changing variable names in computer programs).