



MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering



Course Syllabus

Course Code	Course Name	Credits	Contact Hours
0401522	Communication Systems	3	3 T

INSTRUCTOR/COORDINATOR

Name	Dr. Khalid G Samarah Al Zoubi
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Office Hours	9:30-11:00 (Mon, Wed)

TEXTBOOK

Title	Wireless Communications
Author/Year/Edition	A.F. Molisch, Wiley, 2011
Other Supplemental Materials	
Title	The Mobile Radio Propagation Channel
Author/Year/Edition	J.D. Parsons, Second Edition, Wiley, 2000

SPECIFIC COURSE INFORMATION

A. Brief Description of the Content of the Course (Catalog Description)

The course is designed to deliver knowledge on transmission channels used in radio communication systems and the methodology of its measurements and modelling. The goal of the course is to familiarize students to radio signal propagation mechanisms and to the characteristics of mobile radio channels, which both are needed in the designing of modern wireless communication systems and networks. The course presents detailed description of the different transmission media, followed with analysis of the wireless radio propagation channel. Line-of-Sight Propagation including Optical and Radio Line of Sight and Free Space Loss are discussed along with the Non Line-of-Sight (nLoS) Propagation. The Propagation Impairments and the Atmospheric Propagation are presented. For mobile radio propagation channel a deep look at the multipath propagation channel including the propagation channel types, the classification of channels and realistic time varying channels are reviewed. A satellite communication system analysis with link budget characteristics is presented.

B. Pre-requisites (P) or Co-requisites (C)

Digital Communications (0401521) (P)

C. Course Type (Required or Elective)						
Required						
SPECIFIC GOALS						
A. Course Learning Outcomes (CLOs)						
By the end of this course, the student should be able to:						
CLO1: Understand the wireless communication propagation channel types and characteristics [1].						
CLO2: Understand the classifications of the multipath radio propagation channel and the atmospheric effect [1].						
CLO3: Demonstrate the effect of the different channel impairments on the radio propagation signal, i.e. the scattering, refraction, diffraction, etc. [1].						
CLO4: Acquire a physical and mathematical understanding of the basic properties of multipath wireless channels in terms of their temporal, spatial and spectral properties and be able of applying them to the analyzing and modeling of realistic propagation channels [3].						
CLO5: Present a particular scenario in communication systems [7].						
B. Student Learning Outcomes (SOs) Addressed by the Course						
1	2	3	4	5	6	7
✓		✓				✓

BRIEF LIST OF TOPICS TO BE COVERED		
List of Topics	No. of Weeks	Contact Hours
Chapter 1: Transmission Media, Types of Communication and Transmission modes, Communication Systems Parameters, Introduction to Transmission Media, Guided Transmission Media includes Twisted Pair, Coaxial Cable and Optical Fiber, Wireless (Unguided) Transmission Media includes, Antennas, Terrestrial Radio Communication Systems, Satellite Microwave, and Infrared. Transmission Media Considerations	3	9
Chapter 2: Wireless Radio Propagation Channels, Line-of-Sight Propagation includes Optical and Radio Line of Sight and Free Space Loss, Non Line-of-Sight (nLoS) Propagation, Propagation Impairments, Atmospheric Propagation includes Reflection, Refraction and Fresnel Zones and Diffraction, Radio Wave Transmission includes Ground Waves and Sky Waves, Ionospheric Propagation, Refraction in the Ionosphere includes Density of Layer, Frequency and Angle of Incidence, Tropospheric Propagation, Link Budget Analysis	4	12
Chapter 3: Multipath Propagation Channel, Propagation Channel Types includes Gaussian Channel, Rayleigh Fading Channel, Rician Channel and Wideband Channel, Classification of Propagation Channels, Time Dispersion and Frequency Selective Fading and Frequency Dispersion and Time Selective Fading, The Wideband Time Varying Channel	3	9

Environments includes Macrocells (Urban, Suburban, Rural Channels), Microcells (Dense Urban Linear Street Channel and Town Squares (LoS) Channel), Picocells (Indoor Environment, Office & Residential Buildings, Corridors Channel and Large Room Channel)		
Chapter 4: Satellite Communication Systems, Applications of Satellites, Characteristics Features of Communication Satellites, Satellites Orbits includes Geometric Coverage Area and Geometric Consideration, Architecture of Satellite Communication System includes Space segment and Ground segment, Network Architecture of Mobile Satellite Systems includes The User Segment, The Ground Segment and The Space segment, Operational Frequency, Geostationary Satellite Systems includes Inmarsat, Eutelsat, Asia Cellular Satellite and THURAYA, Link Budget Analysis includes Transmission and Reception and Thermal and Background Noise.	4	12
Total	14	42

EVALUATION		
Assessment Tool	Due Date	Weight (%)
Mid Exam		30
Course Work (Homeworks, Quizzes, Projects, ...etc.)		20
Final Exam	According to the university calendar	50

ABET's Students Learning Outcomes (Criterion # 3)		
Relationship to program outcomes		
ABET 1-7		Engineering Student Outcomes
1	√	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2		an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	√	an ability to communicate effectively with a range of audiences.
4		an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5		an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6		an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	√	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

