MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering

Course Syllabus
Study Plan 2017: Communication Track

Course Code	Course Name	Credits	Contact Hours
0401526	Data Transmission	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	Data Transmission: Analysis, Design, Applications
Author/Year/Edition	Dogan A. Tugal, Osman Tugal
Other Supplemental Materials	
Title	Data Communications and Transmission Principles
Author/Year/Edition	Andrew Simmonds

SPECIFIC COURSE INFORMATION

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

This course introduces an understanding of data transmission concept in communications. Basic concepts of information theory and its measurement, modeling of information sources are presented. The course presents the concept of amount of information, measure of information, entropy, information rate and signal space representation, as well as the baseband and bandpass representation of digitally modulated signals. In source coding, Shannon's fundamental theorem on coding, discrete memory less channel and zero-memory information source is discussed. Furthermore, the channel coding includes, Cyclic Redundancy Checking, Hamming distance, and Hamming codes, BCH codes, Reed-Solomon codes, Error detection, Burst error detecting and correcting codes, Introduction to Turbo coding. In addition, the Convolution Coding, Code tree, state diagram, Trellis state diagram, Maximum-Likelihood decoding – Viterbi's algorithm is introduced. An introduction to computer networks developed an understanding of the seven layers of the OSI model and the basic concepts of LAN and WAN technologies and topologies.

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

Digital Communications (0401521) **(P)**
C. Course Type : Elective
Required
A. Course Learning Outcomes (CLOs)
By the end of this course, the student should be able to: **CLO1:** Demonstrate understanding of the definition of communication and the basic communication sub-systems as well as the main parameters of the communication systems in addition to understanding the fundamental concepts of data communications [7]. **CLO2:** Understand the channel environment representation and its effect on the communication system. [1]. **CLO3:** Demonstrate understanding of the information theory, entropy, source coding and channel capacity [7]. **CLO4:** Demonstrate understanding of error detection channel coding such as odd and even parity check [2]. **CLO5:** Demonstrate understanding of Forward Error Correction (FEC) coding including techniques such as: Hamming (7, 4) encoding technique and the Convolutional encoder with trellis and Viterbi algorithms [1]. **CLO6:** Understand the concept of Public Carrier Circuits, signal space representation of the constellation of digital modulation techniques in addition to multiplexing methods [1]. **CLO7:** Develop understanding of the seven layers of the OSI model and the basic concepts of LAN and WAN technologies and topologies [1].
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: An Introduction to Communication: What is Communication?, Types of Communication and Transmission modes, Communication Channels (Transmission Media), Mathematical Models for Communication Channels	2	6
Chapter 2: Information and Data Transmission, Introduction, Baseband and Passband Transmission, Communications and Information, Bits and Bytes, Bandwidth, bps, Bps and Baud, Character Codes, Information Theory, Data Communications Channels, Entropy, Source Coding Theorem, Channel Capacity (Shannon's Theorem), Parallel Transmission, Serial Transmission Asynchronous Transmission, Synchronous Transmission	3	9
Chapter 3: Channel Coding, Error Detection and Correction, Channel Coding Theorem, Error Detection Methods, Parity Check, Hamming Distance, Forward Error Correction (FEC), Convolutional Codes,	3	9

Generator Representation, Trellis Diagram Representation, Maximum likelihood decoding		
Chapter 4: Public Carrier Circuits, Modulation and Multiplexing, Analogue PSTN Circuits, Digital Leased Circuits, Signal Spaces and Basis Functions, The Concept of I and Q Channels, Digital Modulation, Amplitude Shift Keying, Frequency Shift Keying, Multilevel Modulation Methods	3	9
Chapter 5; Data Communication Networks, Data Transmission & Data Communication Networks, Communication Techniques, Switched Communication Networks, Data Communication Networks, Local Area Network, LAN Topologies, LAN Technologies, LAN Extensions, Layered Network Architecture, International Standards Organization (ISO), OSI Reference Model.	3	9
Total	*14*	*42*

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.