MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering
Course Syllabus

Course Code	Course Name	Credits	Contact Hours
0401595	Digital Broadcasting Technology	3	3 T

INSTRUCTOR/COORDINATOR	
Name	Dr. Khalid G Samarah
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TEXTBOOK	
Title	Digital Video and Audio Broadcasting Technology, A Practical Engineering Guide
Author/Year/Edition	Walter Fischer, Third Edition
Other Supplemental Materials	
Title	Digital video broadcasting (DVB): the international standard for digital television
Author/Year/Edition	U. Reimers, Berlin; London: Springer, 2001

SPECIFIC COURSE INFORMATION

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

Our course presents an introduction to DVB by introducing the standardizations of analogue audio and video broadcasting. Analogue TV shows the mechanism of picture scanning in black and white TV through adding monochrome colors to the TV signal. The digital TV signals are generated by converting the RGB signal to digital form by analogue to digital conversion process producing the backbone of the digital video signal, the MPEG stream. The shape of the MPEG stream and the packetized elementary streams are presented with an explanation of the frame structure and its data rate as well as the high definition TV standards that represent a revolution in reality screening and receiving digital videos. As the MPEG stream is ready to be transmitted, several DVB systems can handle this; DVB-S that transmits and receives signals via satellite links. In addition, DVB-T handle transmitting via terrestrial media are involved in this course.

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

Digital Communications (0401521) (P)

C. Course Type (Required or Elective)

Elective

SPECIFIC GOALS

A. Course Learning Outcomes (CLOs)

By the end of this course, the student should be able to:

CLO 1: Demonstrate understanding of the TV system standards and methods and the Requirements for analogue and digital TV systems [7]

CLO 2: Understanding the MPEG data stream that includes the packetized elementary stream (PES) and the MPEG-2 transport stream packet and the Digital Video and Audio Signals including the High Definition Television (HDTV) and the Digital Audio Source Signal. [1]

CLO 3: Understand the Digital Video Broadcasting via satellite (DVB-S) and its Parameters as well as the Digital Terrestrial Video Broadcasting, standard and its air interface the OFDM System [1]

CLO 4: Demonstrate understanding of the OFDM Basic Principles, Calculating the OFDM System Parameters, understanding the advantages of OFDM and the disadvantages of OFDM [1]

B. Student Learning Outcomes (SLOs) 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: Television Systems: Standards and Methods, Requirements for TV Systems, Analogue TV Systems and Standards, Black and White Transmission, Scanning an Original Black/White Picture, Adding the Color Information	2	6
Chapter 2: The MPEG Data Stream: The Packetized Elementary Stream (PES), The MPEG-2 Transport Stream Packet, Information for the Receiver	2	6
Chapter 3: Digital Video and Audio Signals: Digital Video signal, High Definition Television (HDTV), Digital Audio Source Signal, Psychoacoustic Model of the Human Ear, Basic Principles of Audio Coding	2	6
Chapter 4: Digital Video Broadcasting, DVB: Digital Video Broadcasting via satellite, DVB-S, Satellites Orbits, Geostationary (GEO) Satellites, Geometric Consideration, The DVB-S System Parameters, The DVB-S Modulator, Part 1 including Synchronization, Energy Dispersion, FEC: Reed-Solomon (RS) Block Code, FEC: Interleaving, FEC: Convolutional Encoding, FEC: Puncturing, The DVB-S Modulator, Part 2, Signal Processing in the Satellite, The DVB-S Receiver, Influences Affecting the Satellite Transmission Link, Link Budget Analysis	3	9

Chapter 5; Digital Terrestrial Video Broadcasting, DVB-T: Benefits of Digital TV (DTV) over ATV, Baseband Signal for DTV, DTV Standards, The Need for DVB-T, Baseline system, DVB-T Channel Adapter including Inner Interleaving, Signal Constellations and Mapping, Orthogonal Frequency Division Multiplexing (OFDM) Transmission	2	6
Chapter 6: OFDM System: Multiplexing Techniques, Frequency Division Multiplexing (FDM), Introduction to OFDM System, OFDM Basic Principles including Mapping the Data Sub-Carriers, De-Mapping the Data Sub-Carriers, Serial to Parallel Conversion, Zero Padding, Generating the Time Domain OFDM Symbol, Orthogonality Conditions and Protection Against ICI, CP and Protection against ISI. Calculating the OFDM System Parameters, Advantages and Disadvantages of OFDM, The DVB-T Standard, OFDM Frame Structure	3	9
	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.