Module (Course Syllabus) Catalogue

2021-2022

College/ Institute	**College of Erbil Technical Engineering**	
Department	**Department of Information System Engineering**	
Module Name	**Applications of Data Communication**	
Module Code	**ADC605**	
Degree	**Technical Diploma** ☐ **Bachler** ■ **High Diploma** ☐ **Master** ☐ **PhD** ☐	
Semester	**6**	
Qualification	**Ph.D.**	
Scientific Title	**Lecturer**	
ECTS (Credits)	**6**	
Module type	**Prerequisite** ☐ **Core** ■ **Assist.** ☐	
Weekly hours	**4**	**Total Workload=(162) hrs**
Weekly hours (Theory)	**(2)hr Class**	**(81)Total hrs Workload**
Weekly hours (Practical)	**(2)hr Class**	**(81)Total hrs Workload**
Number of Weeks	**12**	
Lecturer (Theory)	**Dr. Salar Kheder Shaikhah**	
E-Mail & Mobile NO.	salar.shaikhah@epu.edu.iq / **07504550017**	
Lecturer (Practical)	**Ms. Diana Hayder Hussein/ Dr. Salar Kheder Shaikhah**	
E-Mail & Mobile NO.	diana.hussein@epu.edu.iq / 07504062524	
Websites		

Course Book

<table>
<tr><td>Course Description</td><td colspan="5">This course provides following:
1- Bandwidth utilization methodologies and technics such as TDM, FDM, CDM, WDM
2- Transmission Media ways including wire and wireless
3- Wireless and mobile communication concepts and backgrounds
4- GSM System
5- WCDMA System
6- LTE System</td></tr>
<tr><td>Course objectives</td><td colspan="5">The course makes students to be ready in most of the fields of Data communication, Telecommunication, and Mobile communication. Giving them enough information to be ready for working in the companies of; Internet providing, Telecom, Networking, with helping them to be understand their nature works as IT Engineer by:
1- Giving a strong background to telecommunication networks and preparation for the networking in 4th stage.
2- Build background for students in data communication, telecommunication and all related aspects to them.
3- Introduce students to advance subjects and preparing them to work in design field in data communication systems
4- Giving enough information for different mediums (wire and wireless) in order, they can treat with them in work environments.
5- Studying many telecommunication systems like; FM, AM, GSM, WCDMA, etc.</td></tr>
<tr><td>Student's obligation</td><td colspan="5">• Lectures attendance
• Class participation in knowledge sharing and answering questions
• Follow up the lessons with the lecture and studying related references
• Doing and participating in exams
• Responding request from the lecture about seminars and surveys related to subjects.
• Doing assignments</td></tr>
<tr><td>Required Learning Materials</td><td colspan="5">1- Lectures that are provided by the lecturer
2- references and text books of the lesson:
Data Communication and Networking by Behrouz A. Forouzan 4th Ed
Wireless Communications and Networks 3G and Beyond by Iti Saha Misra</td></tr>
<tr><td rowspan="3">Evaluation</td><td colspan="2">Task</td><td>Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td colspan="2">Paper Review</td><td></td><td></td><td></td></tr>
<tr><td>A</td><td>Homework</td><td>5%</td><td></td><td></td></tr>
</table>

		Class Activity	2%		
		Report	5%		
		Seminar	5%		
		Essay	NA		
		Project			
	Lab Report & Activity		10%		
	Quiz		8%		
	Lab Quiz		NA		
	Midterm Exam		10%		
	Lab Midterm Exam		15%		
	Final Exam		20%		
	Lab Final Exam		20%		
	Total		100%		
Specific learning outcome:	The course will give the fundamental, and advance knowledge and practical abilities in the following: 1- Bandwidth utilization methodologies and technics such as TDM, FDM, CDM, WDM 2- Transmission Media ways including wire and wireless 3- Wireless and mobile communication concepts and backgrounds 4- GSM System 5- WCDMA System 6- LTE System				
Course References:	Data Communication and Networking by Behrouz A. Forouzan 4th Ed Wireless Communications and Networks 3G and Beyond by Iti Saha Misra				

Course topics (Theory)	Week	Learning Outcome
Chapter One, Bandwidth utilization	1-2	Understanding BW utilization technics
Chapter Two, Transmission media	3-4	What are the transmission types and how can be used
Chapter Three, Introduction to wireless and mobile communication	5-6	Understanding background of wireless and mobile communication
Chapter Four, GSM System	7-8	Understanding GSM system

Chapter Five, WCDMA System	9-10	Understanding 3G system
Chapter Six, LTE System	11-12	Understanding 4G system
Practical Topics	**Week**	**Learning Outcome**
Programing and testing Data rate	1-2	Understanding How to treat with data rate in MATLAB
Programing and testing effect of noise on a signal	3-4	Understanding How to simulate channel and calculate its effect
Programing and testing ASK Modulation, building Transmitter	5-6	Understanding the modulation types and how to simulate them
Programing and testing QAM Modulation, building Transmitter	7-8	Understanding simulation of QAM and simulation of a system
Programing and testing Tx, channel and Rx with BER Calculating	9-10	Calculating BER over a system
Programing and testing effect of multipath channel on BER	11	Understanding effect of multipath on BER
Programing and testing complete modeling for a communication sys.	12	Understanding system modelling

Questions Example Design

Q1/ Five channels, each with 150 kHz bandwidth are multiplexed together. Calculate the minimum bandwidth of the link for the following cases:

a. No guard band among sub-bands.
b. Guard band between each two sub-bands is 15 kHz

Specify, transmission over which link, guard band or without guard band is better? Explain briefly.

Q2/ Answer the following:

A. Which one is better; high sampling rate or low sampling rate? Explain briefly.
B. What is the best shape for the cell coverage representation? Explain briefly.
C. What is the root cause of using TMSI instead of IMSI after call setup?

Q1/ Write a MATLAB program to show sampling theorem conditions as shown in the following figure. All the figure detail should be considered. Consider signal frequency is 4 Hz.

Extra notes:

External Evaluator

I confirm that the syllabus and content of this course book is sufficient and fulfilment for the lesson of "Data Communication" for the third stage of department "Information System Engineering" students, and it covers the requirements of students to have enough knowledge in this field.

Signature