Course Description Form

1. Course Name:

Mobile Communication Systems I

2. Course Code:

CEM 4103

3. Semester / Year:

First Semester/ fourth Year

4. Description Preparation Date:

1/2/2024

5. Available Attendance Forms:

Face-to-face class attendance

6. Number of Credit Hours (Total) / Number of Units (Total)

4/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Jamal Mohammed Rasool
Email: 30189@uotechnology.edu.iq

8. Course Objectives

Course Objectives	• To gain knowledge about signal processing techniques as applied to signals and systems. • Understanding the principles and technologies of wireless communications and mobile phones. • Understand how these systems work and design. • A recent study in this field and its analysis of communications technology.

9. Teaching and Learning Strategies

Strategy	• Lecture presentation • Tutorials • Experimental learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**4**	Introduction of Mobile Communication	Fundamentals elements; Frequency reuse; Channel assignment strategies; Handoff; Interference Capacity; Planning Cellular system; Improve capacity; Tracking grade of service..	Le	**Examinations, Homework, and Reports**
2	**4**		Fundamentals elements; Frequency reuse;		

3	**4**	Cellular Concept- System Design Fundamentals	Channel assignment strategies; Handoff;Interference;		
4	**4**		Capacity; Planning Cellular system; Improve capacity;		
5	**4**		Tracking gradeof service.		
6	**4**	Propagation & Path Loss	Large-scale Path loss; free-space propagation model; reflection; Diffraction; Scattering; Line budget design;		
7	**4**		Long-distance path loss model; Long-normal shadowing; Small-scale multi-path propagation;		
8	**4**		Types of fading; Impulse responses model of multi-path; Mobile multipath channel.		
9	**4**	Mobile Networks	Introduction; Cellular networks (BT, BTC, MTSO, Registers,);		
10	**4**		Difference between mobile & fixed telephone networks; first gen.		
11	**4**		second gen., third gen		
12	**4**		third gen		
13	**4**	Mobile Standard	Digital cellular; AMPS;		
14	**4**		GSM; IS-95;		
15	**4**		Mobile to satellite		

11. Course Evaluation

1. Classroom activity: 2 Marks 2. Quizzes: 5 Marks 3. Homework: 3 Marks
4. Midterm: 30 Marks 5. Final exam: 60 Marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-
Main references (sources)	1. Wireless and Mobile Networks Architectures, Yi-Bing and I. Chlamtac, JohnWiley & Sons, 2001. 2. Simulation and Software Radio for Mobile Communications, H. Harada,Universal Personal Communications. 3. Fundamentals of Wireless Communication, Tse and Viswanath, Cambridge University Press
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	-

1. Course Name:
Optical Fiber Communications
2. Course Code:
CEM 4104
3. Semester / Year:
1/2023-2024
4. Description Preparation Date:
22-3-2024
5. Available Attendance Forms:
Actual attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: assist. Prof. Wail Y. Nassir Email: Wail.y.Nassir@uotechnology.edu.iq

8. Course Objectives	
-To study propagation or attenuation loss in optical fiber. -To study propagation loss in optical fiber us optical power.	-Demonstration and study of different types of Optical Fibers and connectors. -To establish and Study fiber optic analog link. -To establish and Study fiber optic digital link. -Study of Intensity Modulation Technique using digital Input signal.

9. Teaching and Learning Strategies

Strategy	1. explain the required terms 2. conducting experiments 3. to discuss ideas and share knowledge 4. methodology and use of text books

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
3	6	Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguide Ray theory, cylindrical fiber ,single mode fiber cutoff wave length, mod filed diameter. Optical Fibers: fiber materials, photonic crystal, fiber optic cables specialty fibers.	Overview of optical fiber communications	-explain the required terms -to discuss ideas and sha knowledge -methodology and use of text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Attenuation, absorption, scattering losses, bending loss, dispersion, Intra mo dispersion, Inter	Transmission of CHARACTERISTICS OF OPTICAL FIBERS	-explain the required ter -to discuss ideas and sha knowledge	Oral questions Attending lectures quiz exams Conducting reports,

		nodal dispersion.		methodology and use of t ooks	Monthly exams End-of semester exam Home works
3	6	ntroduction, LED's, LASER diodes, Photo detectors, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors.	Optical sources	-explain the required ter -to discuss ideas and sha knowledge -methodology and use of text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Introduction, LED's, LASER diodes, Photo detectors, Photo detecto noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors.	Detectors	-explain the required ter -to discuss ideas and sha knowledge -methodology and use of text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Introduction, fiber alignment and joint loss, single mode fiber joints fiber splices, fiber connectors and fiber couplers	Fiber coupler and connectors:	-explain the required ter -to discuss ideas and sha knowledge -methodology and use o text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works

11. Course Evaluation

Oral questions
Attending lectures
quiz exams
Conducting reports,
Monthly exams
End-of-semester exam
Home works

12. Learning and Teaching Resources

Required textbooks (curricular books any)	Gerd Keiser, 4th Ed., MGH, 2008
Main references (sources)	John M. Senior, Pearson Education. 3 rd Impression, 2007.
Recommended books and references (scientific journals, reports…)	Joseph C Palais: 4th Edition, Pearson Education
Electronic References, Websites	https://electrobian.files.wordpress.com/2016/07/ece-vii-optica fiber-communication-10ec72-notes_1449128210314_1449181382135_1449205363661.pdf

Course Description Form

1. Course Name: Digital Signal Processing I
2. Course Code: CE 4106
3. Semester / Year: Semester
4. Description Preparation Date: 18/3/2024
5. Available Attendance Forms: Attending
6. Number of Credit Hours (Total) / Number of Units (Total): 3 / 2
7. Course administrator's name (mention all, if more than one name)
Name: Shayma Wail Nourildean Email: shayma.w.nourildean@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **To teach the student the Discrete time signals and systems.** • **To teach the student the Sampling of continuous–time signals.** • **To teach the student DFT, Fast Fourier transform.** • **To teach the student the Z – transform.**

9. Teaching and Learning Strategies

Strategy	• Lecture method: By clarifying and explaining subjects that are difficult for the student to understand such as proves the laws, • Discussion Allow the student to participate in the group dialogue. • Tutorial: By giving the students examples to clarify various problems. • Practical presentations by using the video to present the lesson, and thi method contributes to make the student master the lesson quickly and the consolidation of information in the mind of the student.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Motivation, advantages digital over analog.	Introduction	Lectures	Quiz+ Exam+ H.W
2	3	The ability to understand Basic sequences (exponential, sinusodial, unit sample, unit step) and their properties	Discrete time signals and systems	Lectures	Quiz+ Exam+ H.W.
3	3	The ability to understand Systems: memoryless, linear, time invariant, causal, stable, dynamic, LTI, Discrete linear convolution	Discrete time signals and systems	Lectures	Quiz+ Exam+ H.W.
4	3	The ability to understand Ideal (periodic) sampling, frequency domain representation of sampling, nonideal sampling, aliasing,	Sampling of continuous-time signals	Lectures	Quiz+ Exam+ H.W.
5	3	The ability to understand yquist (sampling) theorem,	Sampling of continuous-time signals	Lectures	Quiz+ Exam+ H.W.

		Reconstruction, sinc-interpolation, Discrete-time processing of continuous-time signals, Antialiasing filtering			
6	3	The ability to understand A/D conversion, sample & hold, Quantization, quantization errors, coding, D/A conversion, sample & hold.	Sampling of continuous-time signals	Lectures	Quiz+ Exam+ H.W.
7	3	The ability to understand Discrete Time Fourier Transform (DTFT), symmetry properties, Fourier analysis of periodic signals.	Discrete Fourier Transform and realization	Lectures	Quiz+ Exam+ H.W.
8	3	Studying the Definition DFT, inverse DFT, Properties: shift, linear/circular convolution with DFT,	Discrete Fourier Transform and realization	Lectures	Quiz+ Exam+ H.W.
9	3	Studying the using of the DFT in linear filtering, Spectral analysis of sinusoidal signals, leakage effect	Discrete Fourier Transform and realization	Lectures	Quiz+ Exam+ H.W.
10	3	Developing skills in windows (Hamming, Hanning, Blackman, Kaiser), mainlobe width, sidelobe level	Discrete Fourier Transform and realization	Lectures	Quiz+ Exam+ H.W.
11	3	Studying Fast Fourier Transform (FFT) Algorithm	Fast Fourier Transform FFT	Lectures	Quiz+ Exam+ H.W.
12	3	Studying Decimation in time (DIT), Decimation in Frequency (DIF),.	Fast Fourier Transform FFT	Lectures	Quiz+ Exam+ H.W.
13	3	Studying Definition, region of convergence (ROC), Right-sided, left-sided, two-sided z-transform	Z-Transform	Lectures	Quiz+ Exam+ H.W.
14	3	Studying Transfer function, Inverse z-transform: definition,	Z-Transform	Lectures	Quiz+ Exam+ H.W.

		residue theorem, partial fraction expansion			
15	3	Properties: linearity, time shift, multiplication by an exponential sequence, differentiation, conjugation of a complex sequence, convolution	Z-Transform	Lectures	Quiz+ Exam+ H.W.

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- -Pall A. Lynn, Digital signal processing with Computer applications, 2nd edition, 1998. 2-Emmanuel C. Ifeachor, Digital Signal Processing, 1993.
Main references (sources)	Digital Signal Processing Fundamentals and Applications, Li Tan and Jean Jiang, second edition
Recommended books and references (scientific journals, reports…)	3- Advanced Engineering Mathematics, by O'Neil 4- Robert J. Schilling and Sandra L. Harris, Digital Signal Processing Using MATLAB, 3rd Edition, 2015. 5-Joan C. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications.
Electronic References, Websites	Lecture Notes and videos.

Course Description Form

1. Course Name:	
Data Transmission	
2. Course Code:	
CEM 4107	
3. Semester / Year:	
First Semester/ Fourth Year	
4. Description Preparation Date:	
1/2/2024	
5. Available Attendance Forms:	
Face-to-face class attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. thamer Mohammed jamel Email: **thamer.m.jamel@uotechnology.edu.iq**	
8. Course Objectives	
Course Objectives	• The student is provided with an introduction to a data transmission network. • Give the student information related to networks (types and methods of formation) • Teach the student the laws of networks with an explanation of two examples of them and data routing protocols. • Teaching the student the architecture of a wired and wireless local area network space. • Give the student information related to the data transmission network
9. Teaching and Learning Strategies	
Strategy	• Lecture presentation • Tutorials • Experimental learning
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	4	Introduction	Defines the basic concepts of data transmission and computer networks, their objectives, components and applications	Lectures	Quick + Semester Exams
3,4	4	Data Transmission	Describes the technical aspects and how to send and secure data on the Internet and communication networks Mobile	Lectures	Quick + Semester Exams
5,6	4	Transmission Media	Identifies the different algorithms used in the data link layer and networks	Lectures	Quick + Semester Exams
7,8	4	Data Encoding	Develop skills in data encryption and message authentication.	Lectures	Quick + Semester Exams
9,10	4	Data Communication Interface	Analyzes the basic technologies of wired and wired computer networks and their applications to find appropriate solutions.	Lectures	Quick + Semester Exams
11,12	4	Data Link Control	uses network software technologies to improve network performance	Lectures	Quick + Semester Exams
13,14,15	6	Error Detection and Correction Multiplexing	Developing skills in the types and methods of forming the network	Lectures	Quick + Semester Exams

11. Course Evaluation

1. Classroom activity: 2 Marks 2. Quizzes: 5 Marks 3. Homework: 3 Marks
4. Midterm: 30 Marks 5. Final exam: 60 Marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-
Main references (sources)	1- William Stallings, Data and Computer communications. 2- Behrouz A. Forouzan, Data Communication and Networking. 3- Lecture Notes and videos
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	-

Course Description Form

1. Course Name:
Information theory and coding
2. Course Code:
CE4108
3. Semester / Year:
1 / 2023-2024
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
٤٥ hours / 30 units
7. Course administrator's name (mention all, if more than one name)
Name: Mustafa Dheyaa Hassib Email: mustafa.d.hassib@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Study the basic principles of the error probability in communications systems. • Study the basic principles of the coding theory in communications systems. • Providing the student with knowledge in the theoretical and analytical aspect of how to design efficient communication system.
9. Teaching and Learning Strategies	
Strategy	1. Lectures 2. Exercises 3. Homework 4. Reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Overview of Probability Theory	Introduction to Probability	Lectures, Tutorials	Quiz + Exam + HW
2	3	significance of “element” with respect to Information Theory	Sample space and Random Variables	Lectures, Tutorials	Quiz + Exam + HW
3	3	Relation between Random Variables and probability	Conditional and Joint probability	Lectures, Tutorials	Quiz + Exam + HW

4	3	Measure the Information	Modeling of Information Sources and Self Information	Lectures, Tutorials	Quiz + Exam + HW
5	3	Derive equations for entropy and mutual information	Entropy and Mutual Information	Lectures, Tutorials	Quiz + Exam + HW
6	3	Overview of Source Coding Theory	Source Coding Theory	Lectures, Tutorials	Quiz + Exam + HW
7	3	Analyses the performance of Shannon and Huffman algorithm	Shannon and Huffman algorithm	Lectures, Tutorials	Quiz + Exam + HW
8	3	Analyses the performance of Fano and Lempel Ziv. algorithm	Fano and Lempel Ziv. algorithm	Lectures, Tutorials	Quiz + Exam + HW
9	3	Overview of Binary Communication channels	Modeling of Communication channels	Lectures, Tutorials	Quiz + Exam + HW
10	3	Derive equations for capacity	Binary symmetric channel and Binary Erasure channel	Lectures, Tutorials	Quiz + Exam + HW
11	3	Overview of Channel coding Theory	Channel coding theorem	Lectures, Tutorials	Quiz + Exam + HW
12	3	Design Binary repetition code (encoding and decoding)	Binary repetition code	Lectures, Tutorials	Quiz + Exam + HW
13	3	Design linear block codes (encoding and decoding)	linear block codes for error correction	Lectures, Tutorials	Quiz + Exam + HW
14	3	Design cyclic codes (encoding and decoding)	Cyclic Codes	Lectures, Tutorials	Quiz + Exam + HW
15	3	Derive equations for capacity of coding system	Channel capacity of coding system	Lectures, Tutorials	Quiz + Exam + HW

11.Course Evaluation

Term Exam	Quizzes + HW	Final Exam
As(30%)	As(10%)	As(60%)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Richard B. Wells, “Applied Coding and Information Theory for Engineers” Pearson Education, LPE 2004.
Main references (sources)	Thomas M Cover, Joy Thomas, “Elements of Information Theory”, MGH 2006.
Recommended books and references (scientific journals, reports...)	P.S. Satyanarayana, “Concepts of Information Theory and Coding”, Dynaram Publication, 2005
Electronic References, Websites	N/A