Course Description Form of Communications II

1. Course Name:
Communications II
2. Course Code:
WBM-42-03
3. Semester / Year:
Semester
4. Description Preparation Date:
2025−03−19
5. Available Attendance Forms:
presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
60 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed Mohammed Merza Email: ahmed.merza@uowa.edu.iq

8. Course Objectives	
Course Objectives	■ clearly understand the meaning of terms like: 'Band-limited Signals', Nyquist rate, Aliasing, etc., derive the low pass sampling theorem and explain its implication. ■ explain the basic concept of time-division-multiplexing, ■ understand the way the amplitude of each sample of a continuous-time band-limited signal, is represented in PAM, PDM and PPM, ■understand the need for and the effect of quantization, different types of quantizers, and the need for companding of speech signals in PCM systems, ■explain the relationship between Q , the number of quantization levels; n, the bits per codeword; r, the bit-rate and B_T , the transmission bandwidth of a pulse-code modulated signal, ■determine the signal-to-quantization noise ratio as well as signal-to-noise ratio for PCM systems ■explain the operation of DM, ADM, DPCM, systems using the block diagrams of their transmitters and receivers, ■view information as removal of uncertainty, is familiar with the 'measure' of information and can determine the average rate at which a Discrete Memory Source (DMS) is giving information, ■understand the need for source coding' and can encode the output from a discrete memoryless source using Fano coding, Huffman coding. ■relate the concept of 'Mutual information' of a channel to information transfer through the channel and understands that Shannon's Information capacity theorem sets a fundamental limit on the rate at which error-free transmission can be achieved over power-limited, band-limited Gaussian channels.

9. Teaching and Learning Strategies	
Strategy	**1.Theoretical Lectures:** Instructors provide lectures on fundamental concep theories, and principles of communication engineering. This helps stude

	understand the theoretical underpinnings of different communication systems a technologies. **2. Practical Demonstrations:** Instructors demonstrate the practical applications of communication engineering concepts using real-world examples, simulations, and case studies. This helps students visualize how theoretical concepts are applied in practice. **3. Assessments**: Students are assessed through a combination of quizzes, exams, assignments, and practical assessments to evaluate their understanding of communication engineering concepts. Feedback from assessments helps students identify areas for improvement.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	**Basics of digital communication**	**Introduction to digital communication:** General block diagram of digital communication, Advantage and disadvantage of digital communication, digital coding, Sampling theorem	Lectures presented in PDF format	Daily exams + homework assignments + monthly exams
2 + 3	4	**Analog Pulse Modulation techniques**	**Analog Pulse Modulation:** Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM), Pulse width and Pulse Positi Modulation (PWM & PPM), S/N in analog pulse modulat	Lectures presented in PDF format	Daily exams homework assignments monthly exams
4 + 5	4	**Digital Pulse Modulation techniques**	**Digital Pulse Modulation:** Pulse Code Modulation PCM: quantization, Transmission Bandwidth in PCM, PCM Receiver, Noise Consideration in PCM, PCM TDM System, Limitation and Modifications of PCM, Information Capacity of PCM.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
6	2	**Delta Modulation operation**	**Delta Modulation (DM):** Delta Modulation Transmitter, Delta Modulation Receiver, Advantages and disadvantages of Delta Modulation, Line Coding.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
7 + 8	4	**Digital Modulation techniques**	**Digital Modulation:** Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK).	Lectures presented in PDF format	Daily exams homework assignments monthly
9	2	**Information Theory definition**	**Information Theory:** Review of related probability and statistics related topics, Information Contain of a Discrete Memoryless Source, Average Information or Entropy.	Lectures presented in PDF format	Daily exams homework assignments monthly

10 + 11	4	**Information Theory**	**Information theory**, random variable, source entropy, marginal entropies, channel capacity, channel efficiency, redundancy, entropy of continues signals, symmetric channel, non-symmetric channel.	Lectures presented in PDF format	Daily exams homework assignments monthly
12+13	4	**Information Theory**	**Information Theory**: channel efficiency, redundancy, entropy of continues signals, symmetric channel, non-symmetric channel.	Lectures presented in PDF format	Daily exams homework assignments monthly
14	2	Data compression	**Source coding** of discrete source, Shannon, Shannon Fano, Huffman.	Lectures presented in PDF format	Daily exams homework assignments monthly
15	2	Review of modern systems of digital comm.	**Selected topics in digital communication,** satellite communications, optical fiber communications.	Lectures presented in PDF format	Daily exams homework assignments monthly

11. Course Evaluation

- Daily exams with practical and scientific questions.
- Participation scores for difficult competition questions among students
- Establishing grades for environmental duties and the reports assigned to them
- Semester exams for the curriculum, in addition to the mid-year exam and final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if a	-(McGraw) Schaum's Outlines of Signals & Systems. -(Communications Engineering) Michael Fitz-Fundament of Communications Systems-McGraw-Hill Professio (2007)
Main references (sources)	Theory and Problems of Analog and Dig Communications_2nd_Ed_Schaum's Outline Series.
Recommended books and references (scientific journals, reports…)	All reputable scientific journals that are related to the bro concept of mathematical theories and their results