

University of Technology
Computer Engineering Department
Academic Year 2023 - 2024
Fourth Year – (2nd) Semester – (IE) Branch



Code	Digital Communications	2 Hours/Week	2 Units
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Contents of Syllabus	Hours
<p>❖ 1. Introduction</p> <ul style="list-style-type: none"> ▪ Model of digital communication system ▪ Base band signal and Measure of information ▪ Bandwidth and Noise ▪ Power and Bandwidth efficiency ▪ Multi-level signaling (M-ary) and Channel capacity (for baseband signals) ▪ Additive white Gaussian Noise channel (AWGN) and Inter Symbol Interference (ISI) 	4
<p>❖ 2. Waveform coding techniques</p> <ul style="list-style-type: none"> ▪ Pules Code Modulation (PCM) and Log PCM (Non-uniform Quantization) ▪ Adaptive Pules Code Modulation (APCM) ▪ Differential Pulse Code Modulation (DPCM) and ADPCM ▪ Delta Modulation (DM) 	6
<p>❖ 3. Digital Modulation Techniques</p> <ul style="list-style-type: none"> ▪ Amplitude Shift keying (ASK) and BER performances of ASK ▪ Frequency Shift keying (FSK) and BER performances of FSK ▪ Phase Shift keying (PSK) and BER performances of PSK ▪ Vector modulator and Pulse shaping methods ▪ Quadrature Amplitude Modulation (QAM) 	6
<p>❖ 4. Channel Coding</p> <ul style="list-style-type: none"> ▪ Block coding and Galois Fields Algebra ▪ Minimal polynomial $M(x)$ and Two errors detection and correction algorithm ▪ Error locator polynomial ▪ Decoding and Encoding Algorithm 	6
<p>❖ 5. Spread Spectrum and Multi-User Modulation</p> <ul style="list-style-type: none"> ▪ Advantages of spread spectrum techniques ▪ Pseudo-noise (PN) generator ▪ Direct sequence (DS) ▪ Processing gain and Jamming margin ▪ Frequency Hopping (FH) and slow-fast hop ▪ FDMA, TDMA, and Cellular CDMA 	4
<p>❖ 6. Satellite communication Systems</p> <ul style="list-style-type: none"> ▪ SCS Fundamental, Services and Frequency bands ▪ Link budget analysis and Maximum data rate 	4

Textbooks:

- 1- *“Digital Communications”*, fifth edition, John Proakis, Masoud Salehi, McGraw-Hill.
- 2- *“Fundamentals of Digital Communications”*, Upamanyu Madhow, Cambridge University Press 2008.

References:

- 1- *“Analog and Digital Communications”*, second edition, Hwei Hsu, Schaum’s outlines [tutorial Book].
- 2- *“Contemporary Communication Systems using Matlab*, John Proakis, Masoud Salehi, PWS publishing company.