

Course Title:	Digital Transmission
Course Code:	CSE241
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	DR. Wajdi SAADAoui
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. Credit hours: 3 (1.5-0.5-1)	
2. Course type	
a.	College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Fundamental <input checked="" type="checkbox"/> Transversal <input type="checkbox"/> Optional <input type="checkbox"/>
3. Level/year at which this course is offered: 1.2/3	
4. Pre-requisites for this course (if any): Digital circuits (CSE122), Analog electronics(CSE121), Fundamentals of Signals	

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	Traditional classroom	33	78
2	Blended	30		
3	E-learning		
4	Distance learning		
5	Other (Project)	15		

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	15
3	Tutorial	10
4	Others (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

Course Description

This course covers the fundamentals of digital signal processing and digital communication systems, focusing on analog-to-digital conversion, baseband transmission, and digital modulation techniques.

Students will learn how signals are converted from analog to digital, transmitted through different communication channels, and modulated using various techniques such as Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), and Frequency Shift Keying (FSK).

The course includes theoretical lessons, tutorials, and hands-on practical work using MATLAB Simulink, allowing students to simulate and analyze digital transmission, baseband modulation, and fiber optic communication.

Course Main Objective

- ✓ Digital conversion of analog information.
- ✓ Analyze the advantages and disadvantages of the different modes of transmission.
- ✓ Acquire the fundamental and theoretical knowledge allowing the functionally specify.
- ✓ Learning the different faults of transmission medium
- ✓ design and analyze an entire chain of digital communications
- ✓ Master the techniques of digital modulation.

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	✓ Master the basic elements used in signal processing, particularly in the technique of data transmission.	PLO.K1
2	Skills	
2.1	✓ Apply the fundamental and theoretical knowledge allowing to functionally specify, design and analyze an entire chain of digital communication.	PLO.S1
3.1	✓ The ability to use the acquired skills in digital transmission to solve real problems related to telecommunication and to use them in the development of this field	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	Chapter 1: Analog/Digital Converters 1. Introduction 2. The analog and digital domains 3. Applications of analog-to-digital converters (ADC) 4. Steps of digitization: Sampling, Quantization, and Coding	6

No	List of Topics	Contact Hours
	5. Characteristics and types of ADCs (Successive Approximation, Sigma-Delta, etc.)	
2	Chapter 2: Digital Communication Chain 1. Introduction 2. Communication channels and modules 3. Messages and signals in digital communication 4. Transmission rate and signal processing	4
3	Chapter 3: Baseband Transmission 1. Introduction 2. Digital transmission architecture 3. Data flow and source coding 4. Transmission channel disturbances 5. Transmission media and data recovery	5
5	Chapter 4: Digital Modulation Techniques 1. Introduction 2. Amplitude Shift Keying (ASK) 3. Phase Shift Keying (PSK) 4. Amplitude and Phase Shift Modulations (APSK) 5. Frequency Shift Keying (FSK) and Minimum Shift Keying (MSK)	5
6	Tutorial1: Digital Transmission with Error Correction Tutorial2: Optical Fiber Transmission with Correction	6
7	Lab 1: MATLAB Simulink Initialization Lab 2: Simulink for Digital Transmission Lab 3: Baseband Modulation Lab 4: Digital Modulation Techniques	14
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
PLOK.1	Master the basic elements used in signal processing, particularly in the technique of data transmission.	-Lecturing - Class discussions	Exams,
2.0	Skills		
PLO.S1	Apply the fundamental and theoretical knowledge allowing to functionally specify design and analyze an entire chain of digital communication.	-Lecturing - Class discussions	Assignments, Report, Exams,

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
PLO.S5	The ability to use the acquired skills in digital transmission to solve real problems related to telecommunication and to use them in the development of this field	<ul style="list-style-type: none"> - Lectures - Class discussions - Assignments - projects 	Assignments, Report, Exams

2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Monthly	15%
2	Quizzes, Homework assignments	Random	10%
3	First mid Term	8	25%
4	Final Exam	16	50%

E. Student Academic Counselling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:
<ul style="list-style-type: none"> - Office hours - Blackboard interface - Academic advisor - Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol style="list-style-type: none"> 1. Sklar, Bernard, and Pabitra Kumar Ray. Digital Communications : Fundamentals and Applications. Pearson, 2021 2. Lathi, B. P., and Roger Green. Modern Digital and Analog Communication Systems. Oxford University Press, 2017 3. Pujolle, Guy. Les Réseaux. 2003, Eyrolles. 4. Pujolle, Guy. Cours Réseaux Télécoms : Avec Exercices Corrigés. 3rd ed., Eyrolles.
Essential References Materials	MATLAB
Electronic Materials	<ol style="list-style-type: none"> 1. MATLAB & Simulink Online Courses – MathWorks <ul style="list-style-type: none"> • https://www.mathworks.com/learn/tutorials/matlab-onramp.html 2. MIT OpenCourseWare – Digital Signal Processing & Communications 3. DSP Guide – The Scientist and Engineer's Guide to Digital Signal Processing
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	Classroom board Computer lab with the necessary software Internet access
Technology Resources	Data projector

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students, course coordinator, Alumni, Employers	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, quality department	Direct
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	07/02/2024

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