هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	Digital Signal Processing
Course Code:	503474-3
Program:	Bachelor in Computer Engineering
Department:	Department of Computer Engineering
College:	College of Computers and Information Technology
Institution:	Taif University

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A. Course Identification

1. Credit hours:3
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 7/4
4. Pre-requisites for this course (if any)**:** Signals and Systems (503371-3)
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	5	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	75

B. Course Objectives and Learning Outcomes

1. Course Description

This course gives detailed explanations of basic digital signal processing operations including sampling and reconstruction of continuous time signals, quantization, A/D, and D/A. Furthermore, transforms for discrete signals such Z-transform, Discrete Fourier Transform (DFT), and Fast-Fourier Transform (FFT) are studied. Topics also include; time and frequency domain techniques for designing and applying infinite impulse response (IIR) and finite impulse response (FIR) digital filters, and two-dimensional signal processing application.

2. Course Main Objective

1. Present and describe the basic concepts of digital signal processing through D/A and D/A operations.
2. Introduce the student to discrete signal transforms such DFT, FFT, and Z-transform.
3. Describe and design digital filters such as FIR and IIR filters.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Identify engineering problems by applying principles of sampling and quantization methods for A/D and D/A conversions, DTS and convolution	K1
1.2	Formulate engineering problems by applying principles of frequency representation for discrete time signals and systems using DFT and FFT	K1
1.3	Solve complex engineering programs by applying principles of Z transform and inverse Z transform using tables, Partial Fraction Expansion and power series expansion	K1
1...		
2	**Skills :**	
2.1	Apply engineering design to produce solutions that meet specific needs with consideration of FIR and IIR digital filters	S1
2.2		
2...		
3	**Values:**	
3.1		
3.2		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	An introduction to digital signal processing, A/D and D/A systems.	3
2	Sampling Theorem, Ideal Sampling, Signal Reconstruction.	3
3	Practical Sampling Natural Sampling, Flat Top Sampling, signal reconstruction.	2
4	Quantization Uniform and Non-Uniform Quantization	3
5	Time Domain analysis of discrete time systems Impulse response of a system, Convolution sum, graphical method, sliding tape method.	5
6	Discrete Fourier transform DFT	5
7	Fast Fourier transform FFT Theory and Application using Matlab	5
8	The z-transform and its properties	7
9	The inverse z-transform	7
10	Digital filters, Design of FIR and IIR filters	5
	Lab	30
Total		75

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**		
1.1	Identify engineering problems by applying principles of sampling and	Lecture Discussion	Written Exams Quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	quantization methods for A/D and D/A conversions, DTS and convolution	Problem Solving Labs	Assignments
1.2	Formulate engineering problems by applying principles of frequency representation for discrete time signals and systems using DFT and FFT	Lecture Discussion Problem Solving Labs	Written Exams Quizzes Assignments
1.3	Solve complex engineering programs by applying principles of Z transform and inverse Z transform using tables, Partial Fraction Expansion and power series expansion	Lecture Discussion Problem Solving Labs	Written Exams Quizzes Assignments
2.0	**Skills**		
2.1	Apply engineering design to produce solutions that meet specific needs with consideration of FIR and IIR digital filters	Lecture Discussion Problem Solving Labs	Written Exams Quizzes Assignments Projects
2.2			
…			
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2,4,6,8	10%
2	Quiz	8	10%
3	Midterm Exam	7	20%
4	Lab Exam	15	10%
5	Projects	10	10%
6	Final Exam	16	40%
7			
8			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

• Teaching staff provide at least 6 office hours for students to help them in the course as well as in any other academic issues.

• Consultation can also be done 24 hours/ 7days through university Edugate (Tawasol)

• Consultation can also be done through email which is available at blackboard system.

• academic advice can be done through blackboard system facilities.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Proakis and Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, fourth edition, Prentice Hall, 2007.
Essential References Materials	S. K. Mitra, Digital Signal Processing: A Computer-Based Approach, third edition, 2006, McGraw-Hill and Lab Manual.
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms, Laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Students	Indirect (Survey)
Effectiveness of teaching and assessment	Students	Indirect (Survey)
Extent of achievement of course learning outcomes	Faculty	Course Report

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Computer Engineering Council / Curriculum Committee
Reference No.	16
Date	4/3/2022