Course Specification of: Advanced Digital signals processing

Course Code (CCE583)

I. General Information About the Course:

	Course Title:	**Advanced Digital signals processing**			
	Course Code and Number:	**CCE583 (ELEC)**			
	Credit Hours:	**Credit Hours**			**Total**
		Lecture	Practical	Seminar/Tutorial	
		3	-	-	*3*
	Study Level and Semester:	ELEC			
	Pre-requisites (if any):	-			
	Co-requisites (if any):	-			
	Program (s) in which the course is offered:	M. Sc. Program in Computer Engineering & Control			
	Language of teaching the course:	English			
	Study System:	Courses & Thesis			
	Prepared By:	Assoc. Prof. Dr. Radwan M. AL Bouthigy			
	Reviewed by:	Assoc. Prof. Dr. Farouk Al-Fahaidy			
	Date of Approval:				

II. Course Description:

This course provides advanced concepts on digital signals processing & systems as well as, advanced digital filters design and capabilities. With growth and advancements in the field of digital signal processing, devices around in real-time are able to communicate in a better way than one can imagine. Course covers; an overview on advanced digital signals processing systems, Digital Processing of Continuous-Time Signals, Advanced Digital signals processing Techniques, Efficient FIR Structures, Digital Filters and Multi-Rate

Digital Signal Processing. Throughout course projects & case study works, graduates develop their skills in DSP systems design and implementation.

II. Course Intended Learning Outcomes (CILOs):

Upon successful completion of the **Advanced Digital Signals Processing Course**, the graduates will be able to:

Demonstrate deep understanding of the theory and practice of digital signal processing system operation and design.

Explain in detail the different advanced digital signal processing techniques and the challenges of Reconstruction of an ideally sampled signal by ideal lowpass filtering and continuous-time signal using ideal interpolation**.**

Analyze a digital system both as whole and in its included parts, for understanding how these parts interact in performing the functionality and properties of the system.

Progress new ideas to improve the scientific literature in the digital filter system.

Develop an integrated development environment based on digital signal system using MATLAB Simulink tools.

Diagnose other areas of knowledge jointly with other professions to arrive at a solution for complex problem related to digital systems processing.

Establish leadership, analytical and problem-solving skills appropriate to the digital signal processing sector.

Balance professional and ethical responsibilities including contemporary issues and environmental awareness in the field of digital signal systems design and integration.

X. Alignment of Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs)

CILOs		PILOs
i. Knowledge and Understanding: Upon successful completion of **the Advanced Digital Signals Processing Course**, the graduates will be able to:		**J. Knowledge and Understanding:** Upon successful completion of the **M. Sc. In Computer Engineering & Control Program**, the graduates will be able to:
	Demonstrate deep understanding of the theory and practice of digital signal processing system operation and design.	Demonstrate deep understanding of computer engineering and control as well as knowledge of applied mathematics and engineering science to the field of computing and intelligent control.
	Explain in detail the different advanced digital signal processing techniques and the challenges of Reconstruction of an ideally sampled signal by ideal lowpass filtering and continuous-time signal using ideal interpolation.	**A3.** Explain in-depth the principles of sustainable design and development of computing products, standards and protocols and intelligent control systems.
. Cognitive/ Intellectual Skills: Upon successful completion of the **Advanced Digital Signals Processing Course,** the graduates will be able to:		**. Cognitive/ Intellectual Skills:** Upon successful completion of the **M. Sc. In Computer Engineering & Control Program,** the graduates will be able to:
	Analyze a digital system both as whole and in its included parts, for understanding how these parts interact in performing the functionality and properties of the system.	**1.** Evaluate, select and apply appropriate principles, methodologies, techniques, tools and packages to the analysis, specification, development and evaluation of computing and engineering systems.
	Progress new ideas to improve the scientific literature in the digital filter system.	**3.** Propose computing system, component, or process to meet desired needs within realistic constraints.
v.Professional and Practical Skills: Upon successful completion of the **Advanced Digital Signals Processing Course,** the graduates will be		**V. Professional and Practical Skills:** Upon successful completion of the **M. Sc. In Computer Engineering & Control**

able to:		**Program,** the graduates will be able to:
	Develop an integrated development environment based on digital signal system using MATLAB Simulink tools.	**1.** Develop, configure, upgrade, and/or write computer software/program to solve computing and control problems.
	Diagnose other areas of knowledge jointly with other professions to arrive at a solution for complex problem related to digital systems processing.	**2.** Use advanced methodology and skills to the formulation and practice of computer science, engineering and control systems.
. Transferable Skills: Upon successful completion of the **Advanced Digital Signals Processing Course,** the graduates will be able to:		**X. Transferable Skills:** Upon successful completion of the **M. Sc. In Computer Engineering & Control Program,** the graduates will be able to:
	Establish leadership, analytical and problem-solving skills appropriate to the digital signal processing sector.	**1.** Prepare complete thesis and reports, present ideas clearly and defend them.
	Balance professional and ethical responsibilities including contemporary issues and environmental awareness in the field of digital signal processing systems design and integration.	Balance professional and ethical responsibilities including contemporary issues and environmental awareness.

I. Alignment of CILOs to Teaching and Assessment Strategies

Alignment of Knowledge and Understanding CILOs:

Knowledge and Understanding CILOs		Teaching Strategies	Assessment Strategies
a1.	Demonstrate deep understanding of the theory and practice of digital signal processing system operation and design.	Lectures, Self-Learning Problems/Studies,	Written Exam, Assignments.
	Explain in detail the different advanced digital signal processing techniques and the challenges of Reconstruction of an ideally sampled	Lectures, Active learning.	Written Exam, Assignments

	signal by ideal lowpass filtering and continuous-time signal using ideal interpolation.		

Alignment of Intellectual Skills CILOs:

Intellectual Skills CILOs		Teaching Strategies	Assessment Strategies
b1.	Analyze a digital system both as whole and in its included parts, for understanding how these parts interact in performing the functionality and properties of the system.	Lectures, Independent Study, Brainstorming.	Survey, Written Exam, Assignments
b2.	Progress new ideas to improve the scientific literature in the digital filter system.	Lectures, Project Supervision, Self-Learning, Brainstorming,	Written Exam, Assignments.

Alignment of Professional and Practical Skills CILOs:

Professional and Practical Skills CILOs		Teaching Strategies	Assessment Strategies
	Develop an integrated development environment based on digital signal system using MATLAB Simulink tools.	Case Study, Simulation Exercises, Brainstorming, Presentations,	Written Research Proposal, Thesis and Publication.
	Diagnose other areas of knowledge jointly with other professions to arrive at a solution for complex problem related to digital systems processing.	Self-Learning, Case Study, Simulation Exercises, Brainstorming, Presentations,	Written Research Proposal, Thesis and Publication.

Alignment of Transferable (General) Skills CILOs:

Transferable (General) Skills CILOs		Teaching Strategies	Assessment Strategies
	ıblish leadership, analytical and problem-solving skills appropriate to the digital signal processing sector.	Independent Study, Presentation, Publish Research Papers.	Written Exam, Written Report.
	ance professional and ethical responsibilities including contemporary issues and environmental awareness in	Dissertation Defenses and Presentation, Independent Study,	Written Exam, Assignments, Written Report.

	the field of digital signal processing systems design and integration.	Presentation, Brainstorming, Publish Research Papers.	

I. Course Content

. Theoretical Aspect

Order	Topic List / Units	Sub -Topics List	Number of Weeks	Contact Hours	Course ILOs
1	Introduction	Signals, Systems and Signal Processing Basic Elements of a Digital Signal Processing System Analog signal processing Digital signal processing Advantages and disadvantages of digital processing	1	3	a1, a2

		compared to analog processing **Application** **A simple smoothing filter** **Vector norm computation**			
2	**Digital Processing of Continuous-Time Signals**	**Refined digital signal processing system** **Generation of discrete-time signals from continuous-time signals** **Ideal sampling** **Non-ideal sampling** **Sampling performed by a sample-and-hold (S/H)**	**3**	**9**	a2, b1, b2, c2, d1

		Reconstruction of an ideally sampled signal by ideal lowpass filtering **Reconstruction of a continuous-time signal using ideal interpolation** **Reconstruction with Sample-and-Hold Circuits** **Signal reconstruction Analysis** **Spectral interpretation of the reconstruction process**			
		Quantization **Basics** **Quantization characteristic for a midtread quantizer with L=8** **Coding** **Commonly used bipolar codes** **Quantization error** **Analog-to-Digital Converter Realizations** **Flash AD converters**			

		Serial AD converters **Possible realization** **Circuit analysis**			
3	**Advanced Digital Signal Processing Techniques**	**The DFT & FFT** **Digital Signals Processing Technique: Definition & Comparison based on Computation Complexity** **Linear and Circular Convolution** **Basic definitions of both types of convolutions** **The DFT and it's relation to circular convolution** **Linear Filtering in the DFT Domain** **DFT and linear**	3	**9**	a1, b1, b2

		convolution for finite-length sequences DFT and linear convolution for infinite or long sequences Frequency analysis of stationary signals – Leakage effect Frequency analysis of stationary signals – Windowing Frequency analysis of stationary signals – Comparison of window sequence			
		Fast Computation of the DFT: The FFT The Goertzel Algorithm Radix-2 approach (decimation in time) Radix-2-decimation-in-time FFT algorithms FFT alternatives Convolution of a finite and an infinite sequence Transformation of			

		Real-Valued Sequences **DFT of two real sequences** **DFT of a 2M-point real sequence**			
		The Application of the 2-d & 3-d DFT/FFT Digital Signals Processing of multi-dimensional objects like images, sounds and videos, **The Discrete Cosine Transformation (DCT) version of DFT and the Discrete Sine Transformation (DST) version of DFT,** **The Wavelet Processing: definition and properties of Wavelet processing,**			

		Fine & Details components of Wavelet and its Applications & Performance.			
4	**Mid – term Exam**	**All Previous Topics**	1	**3**	a1, a2, b1, b2
5	**Efficient FIR Structures**	**Derivation of** **Single output of an FIR filter** **Two outputs of an FIR filter (block processing)** **"Even" and "odd" signal and filter vectors** **Basic structure** **Efficient structure** **Reduction in computational complexity (for**	1	**3**	a1, b1, b2

		large filter orders).			
6	Digital Filters (FIR & IIR) Structures and Design	Fixed-Point DSP Hardware General Remarks Structures for FIR systems Direct form structure: Tapped-delay or transversal filter Cascade-form structures Structures for IIR systems: Direct, Cascade, Parallel and Cascade-Parallel Forms.	3	9	a1,a2,b1,b2,d1
		Coefficient Quantization and Rounding Effects. Errors resulting from rounding and truncation Numerical overflow Coefficient quantization errors Effect of			

		quantization of coefficients **Coefficient quantization errors** **Zero-input limit cycles** **Design of FIR Filters** **General remarks (IIR and FIR filters)** **Linear-phase filters.**			
		Design of IIR Filters **Basics of IIR-Filter Design** **Filter design by impulse invariance** **Bilinear transform** **Characteristics of commonly used analog filters**			

7	**Multi-Rate Digital Signal Processing**	**Basic Ideas** **Basic Multi-Rate Operation** **Sampling rate reduction** **Spectrum after downsampling** **Frequency response after downsampling** **Decimation and aliasing** **More general approach: sampling rate reduction with phase offset** **Sampling rate increase** **Interpolation** **Polyphase decomposition** **Nyquist-Filters** **Structures for Decimation and Interpolation** **FIR direct form realization for decimation** **FIR direct form realization for**	**2**	**6**	**b1,b2,c1,c2,d1,d2**

		interpolation			
		Decimation and Interpolation with Polyphase Filters **Decimation** **Interpolation** **Non-Integer Sampling Rate Conversion**			
8	**Case Studies**	**Students Presents in an individual and in Groups their course Projects, Simulink Implementation and Paper Presentations works.**	**1**	**3**	**a1,a2,b1,b2,c1,c2,d1,d2**
	Final Exam	**All Topics**	**1**	**3**	**a1,a2,b1,b2**

Number of Weeks /and Contact Hours Per Semester	**16**	**48**	

. Practical Aspect	**NA**			
Order	**Practical / Tutorials topics**	**Number of Weeks**	**Contact Hours**	**Course ILOs**
1	**None**			
Number of Weeks /and Contact Hours Per Semester				

. Tutorial Aspect:				
No.	**Tutorial**	**Number of Weeks**	**Contact Hours**	**Learning Outcomes (CILOs)**
1	None			
Number of Weeks /and Units Per Semester				

II. Teaching Strategies:

ctures,

lf-Learning,

se Study,

mulation Exercises,

ainstorming,

esentations,

roup/Individual Projects and Studies,

II. Assessment Methods of the Course:

ritten Exam,

ssignments, including reports and presentations

ritten Research Proposal.

V. Tasks and Assignments:

No	Assignments/ Tasks	Individual/ Group	Mark	Week Due	CILOs (symbols)
1	**Assignments:** **)esign and implementation of the DFT/FFT realization using MATLAB tools** **)esign and implementation of robust" filter using MATLAB tools** **ndividual search assignments with following presentations**	**Individual**	**14**	**5th, 10th, & 12th**	**a1, a2, b1, b2, c1, c2, d1, d2**
2	**Mini/Major Project:** **Students works and submit their individual & group Projects using Web searching, High-Level Programming and simulation to design and implement DSP applications.**	**Individual/ Group**	**16**	**From the 4th to 14th**	**a1, a2, b1, b2, c1, c2, d1, d2**
3	**Project presentation & Case studies**	**Individual/ Group**	**10**	**Work from the 4th**	**a2, b1, b2, c1, c2, d1, d2**

				to 14th weeks	
	Total Score		**40**	==	===

V. Learning Assessment:

No.	Assessment Tasks	Week due	Mark	Proportion of Final Assessment	CILOs
1	Assignments	4th to 14th	40	40%	a1, a2, b1, b2, c1, c2,
3	Midterm Exam	8th	20	20%	a1, a2, b1, b2
4	Final Exam (Theoretical)	16th	40	40%	a1, a2, b1, b2
	Total		100	100%	===

VI. Learning Resources:

6.Required Textbook(s):

. J. G. Proakis, D. G. Manolakis, 2006, Digital Signal Processing: Principles, Algorithms, and Applications, Pearson, 4th edition

. Saeed V. Vaseghi, 2009, Advanced Digital Signal Processing and noise reduction, Algorithms, and Applications, Willy, 4th edition

7.Essential References:

. S. K. Mitra, 2000, Digital Signal Processing: A Computer-Based Approach, McGraw Hill Higher Education, 2nd edition

. A. V. Oppenheim, R. W. Schafer, 1999, Discrete-Time Signal Processing, Prentice Hall, 2nd edition

. M. H. Hayes, 1996, Statistical Signal Processing and Modeling, John Wiley and Sons.

8. Electronic Materials and Web Sites *etc.*
www.sussex.com/ **www.ep.jhu.edu./** **http://www.handbook.unsw.edu.au.com/** **http://med.neduet.edu.pk** **Journal :** **IEEE Publisher** **https://www.ieee.org** **Elsevier Publisher** **https://www.elsevier.org** **Science Direct Publisher** **https://www.Sciencedirect.com**

Course Policies الضوابط والسياسات المتبعة في المقرر	
بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:	
Class Attendance: سياسة حضور الفعاليات التعليمية - يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك. - يقدم أستاذ المقرر تقريرا بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم اقرار الحرمان من مجلس القسم.	1
Tardy: الحضور المتأخر - يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات يحذر شفويا من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.	2
Exam Attendance/Punctuality: ضوابط الامتحان - لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان - إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.	3
Assignments & Projects: التعيينات والمشاريع - يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكليفات وتسليمها. - إذا تأخر الطالب في تسليم التكليفات عن الموعد المحدد يحرم من درجة التكليف الذي تأخر في تسليمه.	4
Cheating: الغش - في حال ثبوت قيام الطالب بالغش في الامتحان النصفي أو النهائي تطبق عليه لائحة شؤون الطلاب. - في حال ثبوت قيام الطالب بالغش او النقل في التكليفات والمشاريع يحرم من الدرجة المخصصة للتكليف.	5
Plagiarism: الانتحال - في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك	6
Other policies: سياسات أخرى - أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكليفات ..... الخ	7

Academic Year: ……....

Course Plan (Syllabus): Advanced Digital signals processing

Information about Faculty Member Responsible for the Course:								
Name	**Assoc. Prof. Dr. Radwan M. AL Bouthigy**	**Office Hours**						
Location &Telephone No.	775284933	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**	
E-mail	radwan006@yahoo.com							

General information about the course:					
.	**Course Title**	**Advanced Digital signals processing**			
.	**Course Code and Number**	**CCE583 (ELEC)**			
.	**Credit Hours**	**Credit Hours**			**Total**
		Lecture	**Practical**	**Seminar/Tutorial**	
		3	**-**	**-**	**3**
.	**Study Level and Semester**	**ELEC**			
.	**Pre-requisites**				
.	**Co –requisite**	**-**			
.	**Program (s) in which the course is offered**	MSc. in Program in Computer Engineering & Control			
.	**Language of teaching the course**	English			
.	**Location of teaching the course**	**Faculty of Engineering**			

Course Description:

This course provides advanced concepts on digital signals processing & systems as well as, advanced digital filters design and capabilities. With growth and advancements in the field of digital signal processing, devices around in real-time are able to communicate in a better way than one can imagine. Course covers; an overview on advanced digital signals processing systems, Digital Processing of Continuous-Time Signals, Advanced Digital signals processing Techniques, Efficient FIR Structures, Digital Filters and Multi-Rate Digital Signal Processing. Throughout course projects & case study works, graduates develop their skills in DSP systems design and implementation.

. Course Intended Learning Outcomes (CILOs):

Upon successful completion of the **Advanced Digital Signals Processing Course**, the graduate students will be able to:

Demonstrate deep understanding of the theory and practice of digital signal processing system operation and design.

Explain in detail the different advanced digital signal processing techniques and the challenges of Reconstruction of an ideally sampled signal by ideal lowpass filtering and continuous-time signal using ideal interpolation.

Analyze a digital system both as whole and in its included parts, for understanding how these parts interact in performing the functionality and properties of the system.

Progress new ideas to improve the scientific literature in the digital filter system.

Develop an integrated development environment based on digital signal system using MATLAB Simulink tools.

Diagnose other areas of knowledge jointly with other professions to arrive at a solution for complex problem related to digital systems processing.

Establish leadership, analytical and problem-solving skills appropriate to the digital signal

processing sector.

d2. Balance professional and ethical responsibilities including contemporary issues and environmental awareness in the field of digital signal systems design and integration.

Course Content

. Theoretical Aspect

Order	Topic List / Units	Sub -Topics List	Number of Weeks	Contact Hours
1	Introduction	Signals, Systems and Signal Processing Basic Elements of a Digital Signal Processing System Analog signal processing Digital signal processing Advantages and disadvantages of digital processing compared to analog processing Application A simple smoothing filter Vector norm computation	1	3
2	Digital Processing of Continuous-Time Signals	Refined digital signal processing system Generation of discrete-time signals from continuous-time signals Ideal sampling Non-ideal sampling Sampling performed by a sample-	3	9

		and-hold (S/H)		
		Reconstruction of an ideally sampled signal by ideal lowpass filtering **Reconstruction of a continuous-time signal using ideal interpolation** **Reconstruction with Sample-and-Hold Circuits** **Signal reconstruction** **Analysis** **Spectral interpretation of the reconstruction process**		
		Quantization **Basics** **Quantization characteristic for a midtread quantizer with L=8** **Coding** **Commonly used bipolar codes** **Quantization error** **Analog-to-Digital Converter Realizations** **Flash AD converters** **Serial AD converters** **Possible realization** **Circuit analysis**		

3	Advanced Digital Signal Processing Techniques	The DFT & FFT Digital Signals Processing Technique: Definition & Comparison based on Computation Complexity Linear and Circular Convolution Basic definitions of both types of convolutions The DFT and it's relation to circular convolution Linear Filtering in the DFT Domain DFT and linear convolution for finite-length sequences DFT and linear convolution for infinite or long sequences Frequency analysis of stationary signals – Leakage effect Frequency analysis of stationary signals – Windowing Frequency analysis of stationary signals – Comparison of window sequence	3	9
		Fast Computation of the DFT: The FFT The Goertzel Algorithm Radix-2 approach (decimation in time) Radix-2-decimation-in-time FFT algorithms FFT alternatives Convolution of a finite and an infinite		

		sequence **Transformation of Real-Valued Sequences** **DFT of two real sequences** **DFT of a 2M-point real sequence**		
		The Application of the 2-d & 3-d DFT/FFT Digital Signals Processing of multi-dimensional objects like images, sounds and videos, **The Discrete Cosine Transformation (DCT) version of DFT and the Discrete Sine Transformation (DST) version of DFT,** **The Wavelet Processing: definition and properties of Wavelet processing, Fine & Details components of Wavelet and its Applications & Performance.**		
4	**Mid – term Exam**	**All Previous Topics**	1	**3**
5	**Efficient FIR Structures**	**Derivation of** **Single output of an FIR filter** **Two outputs of an FIR filter (block processing)** **"Even" and "odd" signal and filter vectors** **Basic structure** **Efficient structure**	1	**3**

		Reduction in computational complexity (for large filter orders).		
6	Digital Filters (FIR & IIR) Structures and Design	Fixed-Point DSP Hardware General Remarks Structures for FIR systems Direct form structure: Tapped-delay or transversal filter Cascade-form structures Structures for IIR systems: Direct, Cascade, Parallel and Cascade-Parallel Forms.	3	9
		Coefficient Quantization and Rounding Effects. Errors resulting from rounding and truncation Numerical overflow Coefficient quantization errors Effect of quantization of coefficients Coefficient quantization errors Zero-input limit cycles Design of FIR Filters General remarks (IIR and FIR filters) Linear-phase filters.		
		Design of IIR Filters Basics of IIR-Filter Design		

		Filter design by impulse invariance Bilinear transform Characteristics of commonly used analog filters		
7	Multi-Rate Digital Signal Processing	Basic Ideas Basic Multi-Rate Operation Sampling rate reduction Spectrum after downsampling Frequency response after downsampling Decimation and aliasing More general approach: sampling rate reduction with phase offset Sampling rate increase Interpolation Polyphase decomposition Nyquist-Filters Structures for Decimation and Interpolation FIR direct form realization for decimation FIR direct form realization for interpolation	2	6
		Decimation and Interpolation with Polyphase Filters Decimation Interpolation		

		Non-Integer Sampling Rate Conversion		
8	Case Studies	Students Presents in an individual and in Groups their course Projects, Simulink Implementation and Paper Presentations works.	1	3
	Final Exam	All Topics	1	3
Number of Weeks /and Contact Hours Per Semester			16	48

Practical Aspect

Order	Practical / Tutorials topics	Number of Weeks	Contact Hours	Course ILOs
1	None			
Number of Weeks /and Contact Hours Per Semester				

Training/ Tutorials/ Exercises Aspects:

Order	Tutorials/ Exercises	Week Due	Contact Hours
1	None		
Number of Weeks /and Contact Hours Per Semester			

. Teaching Strategies:

ctures,

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ainstorming,

esentations,

oup/Individual Projects and Studies,

I.Assessment Methods of the Course:

ritten Exam,

ssignments, including reports and presentations

ritten Research Proposal.

I.Tasks and Assignments:

No	Assignments	Individual /Groups	Mark	Week Due
1	**Assignments:** **Design and implementation of the DFT/FFT**	**Individual**	**14**	**5th, 10th, & 12th**

	realization using MATLAB tools)esign and implementation of robust" filter using MATLAB tools Assignment 3: Individual search assignments with following presentations			
2	Mini/Major Project: Students works and submit their individual & group Projects using Web searching, High-Level Programming and simulation to design and implement DSP applications.	Individual/ Group	16	From the 4th to 14th
3	Project presentation & Case studies	Individual/ Group	10	Work from the 4th to 14th weeks
	Total Score		40	

Learning Assessment:

No	Assessment Method	Week Due	Mark	Proportion of Final Assessment %
1	Assignments	4th to 14th	40	40%
3	Midterm Exam	8th	20	20%
4	Final Exam (Theoretical)	16th	40	40%
	Total		100	100 %

Learning Resources:

. Required Textbook(s):

J. G. Proakis, D. G. Manolakis, 2006, Digital Signal Processing: Principles, Algorithms, and Applications, Pearson, 4th edition

Saeed V. Vaseghi, Advanced Digital Signal Processing and noise reduction, Algorithms, and

Applications, Willy, 2009, 4th edition
7. Essential References:
S. K. Mitra: Digital Signal Processing: A Computer-Based Approach, McGraw Hill Higher Education, 2000, 2nd edition A. V. Oppenheim, R. W. Schafer: Discrete-Time Signal Processing, Prentice Hall, 1999, 2nd edition M. H. Hayes: Statistical Signal Processing and Modeling, John Wiley and Sons, 1996
8. Electronic Materials and Web Sites etc.
www.sussex.com/ www.ep.jhu.edu./ http://www.handbook.unsw.edu.au.com/ http://med.neduet.edu.pk **Journal :** IEEE Publisher https://www.ieee.org Elsevier Publisher https://www.elsevier.org Science Direct Publisher https://www.Sciencedirect.com

Course Policies الضوابط والسياسات المتبعة في المقرر	
بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:	
Class Attendance: سياسة حضور الفعاليات التعليمية - يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك. - يقدم أستاذ المقرر تقريرا بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم اقرار الحرمان من مجلس القسم.	1
Tardy: الحضور المتأخر - يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات	2

يحذر شفويا من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.	
Exam Attendance/Punctuality: ضوابط الامتحان - لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان - إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.	3
Assignments & Projects: التعيينات والمشاريع - يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكليفات وتسليمها. - إذا تأخر الطالب في تسليم التكليفات عن الموعد المحدد يحرم من درجة التكليف الذي تأخر في تسليمه.	4
Cheating: الغش - في حال ثبوت قيام الطالب بالغش في الامتحان النصفي أو النهائي تطبق عليه لائحة شؤون الطلاب. - في حال ثبوت قيام الطالب بالغش او النقل في التكليفات والمشاريع يحرم من الدرجة المخصصة للتكليف.	5
Plagiarism: الانتحال - في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك	6
Other policies: سياسات أخرى - أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكليفات ..... الخ	7