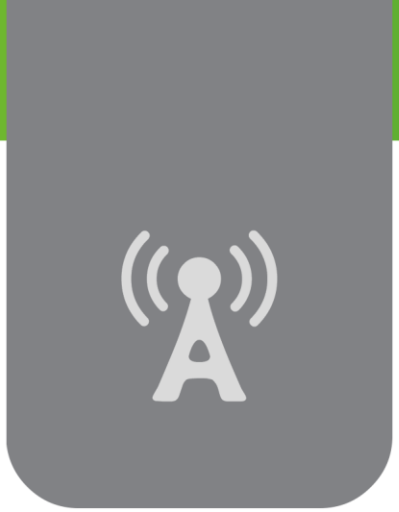

Signals and Systems Course Definition Form

Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالـــــي
Syrian Virtual University		الجامعة الافتراضية السورية

1. Basic Information:

Course Name	Signals and systems
Course ID	CEE203
Contact Hours (Registered Sessions)	30
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	None
Exam	1.5
Registered Sessions Work Load	30
Synchronized Session Work Load	18
Credit Hours	5

2. Pre-Requisites:

Course	ID
Electrical Circuits	CEE101
Mathematical Analysis	GMA102

3. Course General Objectives:

This course aims to introduce the basic concepts and techniques used in signal processing domain which plays an important role in a wide variety of engineering systems. Mainly, we focus on the study of Linear Time-Invariant systems (LTI) in the continuous-time domain as well as in the discrete-time domain. Moreover, we explain the transition between the continuous-time domain and the discrete-time domain through the sampling theory. We introduce the basic tools used in signal processing such as Fourier Transform, Laplace Transform, and Z-Transform. Although these tools have mathematical nature, however, we are more concerned about physical interpretation of results obtained by using these tools.

4. Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Understand the representation of signals and systems and their classifications.
ILO2	Describe the linear time-invariant systems and their properties and the input-output relation.
ILO3	Apply Fourier Transform for continuous signals and its properties.
ILO4	Apply Laplace transform and its use in the study of continuous LTI systems.
ILO5	Describe frequency response of continuous LTI systems using Bode Diagrams.
ILO6	Understand the concepts of Sampling and related theorem, and continuous signal recovery from sampled signal.
ILO7	Describe discrete-time signals and systems and the input-output relation.
ILO8	Identify Fourier Transform for discrete and its relation to continuous Fourier Transform.
ILO9	Identify Z-Transform and its properties.
ILO10	Apply Z-Transform for discrete time LTI systems.
ILO11	Understand the Discrete Fourier Transform and its relation to Fourier Transform of discrete signals.
ILO12	Describe some practical filters using Fourier and Laplace Transforms.

5. Course Syllabus (18 hours of total synchronized sessions)

- RS: Recorded Sessions; SS: Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	Signal and systems, classification and representation. • Basic continuous signals. • Classification of signals and its representation. • Basic operations on signals. • Some properties of signals. • Classifications and representation of systems. • Properties of systems.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO2	Continuous signals and systems • Basic continuous signals. • Impulse response of LTI system. • Properties of LTI systems.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO3	Fourier Transform: • Fourier series. • Fourier Transform. • Inverse Fourier Transform. • Properties of Fourier Transform. • Perseval theorem.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	

	• Fourier Transform of some basic signals. • Fourier Transform of periodic signals.				
ILO4	Laplace Transform • Laplace Transform definition. • Inverse Laplace Transform. • Laplace Transform properties. • Transfer Function of LTI system. • Unilateral Laplace Transform. • Relation between Laplace Transform and Fourier Transform.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO5	Linear Filters • Interconnected systems. • Systems given by differential equations. • Bode Diagram of frequency response. • Filters Examples.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO6	Sampling • Sampling theorem • Signal reconstruction. • Shannon criterion.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects	

	• Aliasing.			☐ Practices ☐ Others	
ILO7	Discrete signals and systems • Basic discrete signals • Discrete systems and its properties. • Step response.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO8	Fourier transform for discrete signals • Definition of FT and its inverse for discrete signals. • Properties of FT for discrete signals. • Some examples.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO9	Z–Transform • Definition of Z–Transform • Inverse Z–Transform • Properties of Z–Transform • Relation between Fourier Transform and Z–Transform.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO10	Study of discrete systems • Discrete linear filters • Unilateral Z–Transform • Frequency response of discrete linear filters • Converting continuous	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	

	systems to discrete systems				
ILO1 1	Discrete Fourier Transform • Definition of DFT. • Inverse DFT. • Filtering using DFT. • Fast Fourier Transform.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
ILO1 2	Practical filters • Types of filters. • Practical filters. • Filter transformations.	2.5	1.5	☒ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	

6. Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration		Ex	Exams		Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments		PW	Practice Work			

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Understand the representation of signals and systems and their classifications.		X		X		
ILO2	Describe the linear time-invariant systems and their properties and the input-output relation.		X		X		
ILO3	Apply Fourier Transform for continuous signals and its properties.		X		X		
ILO4	Apply Laplace transform and its use in the study of continuous LTI systems.		X		X		
ILO5	Describe frequency response of continuous LTI systems using Bode Diagrams.		X		X		
ILO6	Understand the concepts of Sampling and related theorem, and continuous signal recovery from sampled signal.		X		X		
ILO7	Describe discrete-time signals and systems and the input-output		X		X		

	relation.						
ILO8	Identify Fourier Transform for discrete and its relation to continuous Fourier Transform.		X		X		
ILO9	Identify Z-Transform and its properties.		X		X		
ILO10	Apply Z-Transform for discrete time LTI systems.		X		X		
ILO11	Understand the Discrete Fourier Transform and its relation to Fourier Transform of discrete signals.		X		X		
ILO12	Describe some practical filters using Fourier and Laplace Transforms.		X		X		

7. Practice Tools:

Tool Name	Description

8. Main References

أ- DrBassemAshkar, "Signals and Systems", Damascus University Publication, Informatic Faculty, 2005.

ب- Alan V. Oppenheim, Alan S. willsky, S. Hamid Nawab, Signals & systems, Second Edition, Prentice Hall,New Jersey, 1997.

9. Additional References