44. Digital Signal Processing (EE092IU)

Module designation	*This course is an introduction to the basic principles, methods, and applications of digital signal processing, emphasizing its algorithmic, computational, and programming aspects. In particular, the students will learn the conversion from analog to digital, the concepts of discrete time linear systems, filtering, spectral analysis of discrete time signals and filter design*
Semester(s) in which the module is taught	1, 2
Person responsible for the module	Dr. Huỳnh Võ Trung Dũng
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 37.5 Private study including examination preparation, specified in hours: 90
Credit points/ECTS	3 credits/4.62 ECTS
Required and recommended prerequisites for joining the module	Previous course: Introduction to Signals and Systems (PH032IU)

Module objectives/intended learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	**Course learning outcome (CLO)**
	Knowledge	CLO1. Apply knowledge of mathematics, science and engineering to solve digital signal processing problem.
	Skill	CLO2. Understand the sampling, quantization process as well as the basic discrete-time systems concepts. CLO3. Illustrate the design of digital filter by various methods to meet prescribed specifications
	Attitude	CLO4. Confidence and fluency in discussing digital signal processing in English

Content	The description of the contents should clearly indicate the weighting of the content and the level.
	Weight: lecture session (3 hours)
	Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Introduction. Sampling and reconstruction	1	T
Quantization	2	T, U
Discrete-time systems	1	T, U
FIR filtering and convolution	2	T, U
Z- transforms	1	T, U
Transfer function	1	T, U
Digital filter realization	2	T, U
DFT/FFT algorithms	1	T, U
Signal processing applications. Class project	2	T, U
Filter design techniques (FIR, IIR)	2	T, U

Examination forms	Written Exam
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.

Reading list	**Textbooks:**
	[1] S. J. Orfanidis, *Introduction to Signal Processing*, 2nd Ed, Prentice –Hall, 1996
	[2] Class notes
	Reference:
	[3] A. V. Oppenheim, R. W. Schafer, Discrete-time Signal Processing, 2nd Ed, Prentice Hall
	[4] V. K. Ingle and J. G. Proakis, Digital Signal Processing Using Matlab, PWS Publishing Company