COURSE SYLLABUS AND COURSE REQUIREMENTS
2024/2025 SEMESTER II.

Course title	*Signals and Systems*
Course Code	IVM181ANMI
Hours/Week: le/pr/lab	3/1/0
Credits	4
Degree Programme	Computer Science Eng. (BSc)
Study Mode	full-time
Requirements	term grade
Teaching Period	spring
Prerequisites	-
Department(s)	Dept. of Technical Informatics
Course Director	Dr. Sári Zoltán
Teaching Staff	Dr. Sári Zoltán

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).
Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

The course provides an introduction into the fundamental theory, techniques and methods of signal processing and system analysis. The main topics covered are: mathematical representation of signals and systems, fundamentals of time-, frequency-, and complex-frequency domain analysis, the Fourier-transform and spectral analysis of signals and systems, the Laplace-, and the z-transform, basics of filtering, FIR and IIR type architectures, fundamentals of filter design

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Goals, student learning outcome.
Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

The course provides the theoretical background and tools of signal processing and systems analysis. The main objective of the course is to equip the students with the tools and techniques required for the analysis of systems commonly found in control, signal processing and communication, and to provide an introduction into the implementation possibilities and practical applications of these techniques.

2. COURSE CONTENT

Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content

	TOPICS
LECTURE	1. *Mathematical representation of signals, Properties of signals* 2. *Characterization and mathematical representation of systems, Properties of systems* 3. *Interpretation and applications of Convolution sum and Convolution integral* 4. *Representation of LTI systems, Analysis, Applications* 5. *The Fourier-transform, spectral analysis of signals and systems, DFT, FFT* 6. *Sampling and reconstruction, sampling theorem in time and frequency domain* 7. *Frequency response, applications* 8. *The Laplace-transform, system analysis in the complex frequency domain* 9. *The z-transform and its applications, Filtering, FIR and IIR architectures, Applications*
PRACTICE	1. *Mathematical representation of signals, Properties of signals* 2. *Characterization and mathematical representation of systems, Properties of systems* 3. *Interpretation and applications of Convolution sum and Convolution integral* 4. *Representation of LTI systems, Analysis, Applications*

5. *The Fourier-transform, spectral analysis of signals and systems, DFT, FFT*
6. *Sampling and reconstruction, sampling theorem in time and frequency domain*
7. *Frequency response, applications*
8. *The Laplace-transform, system analysis in the complex frequency domain*
9. *The z-transform and its applications, Filtering, FIR and IIR architectures, Applications*

DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

LECTURE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Mathematical representation of signals, Properties of signals	[1]: 1-38	see. Moodle	see. Moodle
2.	Mathematical representation of signals, Properties of signals	[1]: 1-38	see. Moodle	see. Moodle
3.	Characterization and mathematical representation of systems, Properties of systems	[1]: 38-56	see. Moodle	see. Moodle
4.	Characterization and mathematical representation of systems, Properties of systems	[1]: 38-56	see. Moodle	see. Moodle
5.	Interpretation and applications of Convolution sum and Convolution integral	[1]: 74-116	see. Moodle	see. Moodle
6.	Representation of LTI systems, Analysis, Applications	[1]: 116-137	see. Moodle	see. Moodle
7.	The Fourier-transform, spectral analysis of signals and systems	[1]: 177-231, 284-334	see. Moodle	see. Moodle
8.			*Midterm test 1.*	
9.	Frequency response, applications, sampling, and reconstruction,	[1]: 423-439, 448-460, 512-534,	see. Moodle	see. Moodle
10.	The Laplace-transform, system analysis in the complex frequency domain	[1]: 654-720		
11.	The z-transform and its applications, Filtering, FIR and IIR architectures, Applications	[1]:741-796	see. Moodle	see. Moodle
12.	**Spring brake**			
13.			*Midterm test 2.*	
14.			**Retakes**	
15.				

PRACTICE, LABORATORY PRACTICE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Mathematical representation of signals, Properties of signals	[1]: 1-38	see. Moodle	see. Moodle
2.	Mathematical representation of signals, Properties of signals	[1]: 1-38	see. Moodle	see. Moodle
3.	Characterization and mathematical representation of systems, Properties of systems	[1]: 38-56	see. Moodle	see. Moodle
4.	Characterization and mathematical representation of systems, Properties of systems	[1]: 38-56	see. Moodle	see. Moodle
5.	Interpretation and applications of Convolution sum and Convolution integral	[1]: 74-116	see. Moodle	see. Moodle

6.	Representation of LTI systems, Analysis, Applications	[1]: 116-137	see. Moodle	see. Moodle
7.	The Fourier-transform, spectral analysis of signals and systems	[1]: 177-231, 284-334	see. Moodle	see. Moodle
8.			*Midterm test 1.*	
9.	Frequency response, applications, sampling, and reconstruction,	[1]: 423-439, 448-460, 512-534,	see. Moodle	see. Moodle
10.	The Laplace-transform, system analysis in the complex frequency domain	[1]: 654-720		
11.	The z-transform and its applications, Filtering, FIR and IIR architectures, Applications	[1]:741-796	see. Moodle	see. Moodle
12.	**Spring brake**			
13.			*Midterm test 2.*	
14.			**Retakes**	
15.				

3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

Method for monitoring attendance *(e.g.: attendance sheet / online test/ register, etc.)*

Attendance sheet on practice sessions. Maximum allowed absence: 30% of practice classes.

ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

Course resulting in mid-term grade *(PTE TVSz 40§(3))*

Mid-term assessments, performance evaluation and their ratio in the final grade *(The samples in the table to be deleted.)*

Type	Assessment	Ratio in the final grade
Midterm Test 1	*max. 100%*	*50%*
Midterm Test 2	*max. 100%*	*50%*

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

Each midterm test can be retaken one time during the semester.

Grade calculation as a percentage

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

4. SPECIFIED LITERATURE

In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[1.] A. V. Oppenheim, A. S. Willsky: Signals and systems, Prentice-Hall, 1997

RECOMMENDED LITERATURE AND AVAILABILITY

[2.] S. Haykin, B. Van Veen: Signals and Systems, John Wiley and Sons, 1999