

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department of Computer Science
1.4 Field of study	Computers and Information Technology
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Information Engineering

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	Signals and systems Semnale și sisteme						
2.2 Course coordinator	Assoc. Prof. PhD. Eng. Cristian P. CHIONCEL						
2.3 Seminar / Laboratory coordinator	Assoc. Prof. PhD. Eng. Cristian P. CHIONCEL						
2.4. Year of study	III	2.5 Semester	5	2.6. Type of evaluation	E	2.7 Type of discipline	Compulsory DS
2.8 Code of the discipline	MLE7030						

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	3	3.3 seminar/laboratory	1 LP
3.4 Total hours in the curriculum	56	Of which: 3.5 course	42	3.6 seminar/laboratory	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					14
Additional documentation (in libraries, on electronic platforms, field documentation)					14
Preparation for seminars/labs, homework, papers, portfolios and essays					11
Tutorship					3
Evaluations					2
Other activities:					-
3.7 Total individual study hours	44				
3.8 Total hours per semester	100				
3.9 Number of ECTS credits	4				

4. Prerequisites (if necessary)

4.1. curriculum	<ul style="list-style-type: none"> Basic knowledge in mathematics, physics, manipulation of mathematical expressions
4.2. competencies	<ul style="list-style-type: none"> Basic computer skills & math

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> theoretical aspects presented in the course
5.2. for the seminar /lab activities	<ul style="list-style-type: none"> knowledge of the laboratory work

6. Specific competencies acquired

Professional competencies	<p>Designing hardware, software and communication components (C2)</p> <p>Use of signal processing methods and artificial intelligence techniques to solve real-world problems (C6)</p>
Transversal competencies	<p>Honorable, responsible, ethical behavior, in the spirit of the law, to ensure the professional reputation (CT 1)</p> <p>Demonstrating initiative and pro-active behavior for updating professional, economical and organizational culture knowledge (CT 3)</p>

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	<ul style="list-style-type: none"> Familiarizing students with basic knowledge of deterministic signals and linear systems
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> Development of the ability to solve problems related to signals and systems in the activity of design, production and engineering

8. Content

8.1 Course	Teaching methods	Remarks
1. Signal. Definitions. Important signals in the field of engineering. Description & properties of continuous time and discrete time: continuous time sinusoidal signal, discrete time sinusoidal signal, continuous time unit stage signal, discrete unit stage signal.	Exposure, problematization, conversation, explanations	3 hours
2. Continuous pulse signal in continuous time (Dirac pulse): filtering property, the connection between the unit pulse and the unit stage; the unit pulse signal in discrete time; the signal ramps in continuous time; the signal ramps in discrete time		3 hours
3. The exponential signal defined in continuous time; the exponential signal defined in discrete time. Continuous time exponential tire oscillation. Discrete exponential tire oscillation.		3 hours

4. Complex signals. Phasor		3 hours
5. Simple signal transformations: multiplying a continuous signal and a discrete signal by a constant, moving a continuous signal and a discrete signal over time, reflecting, and moving the reflected signal. Illustrations		3 hours
6. Simple signal transformations: time scaling for analog signals, time scaling for discrete signals, combination of simple transformations. Illustrations		3 hours
7. The odd component and the even component of a signal. Their construction. Illustrations		3 hours
8. Energy and signal strength. Examples. Notions about distributions. The operator.		3 hours
9. Systems. Examples of analog and digital systems. Feature of an analog-to-digital converter (ADC). Modeling an analog system / modeling a discrete system.		3 hours
10. Linear system. Linear incremental system. Invariant systems in time translation. Systems stability		3 hours
11. Causality of systems. Examples of systems: the ideal proportional system, the ideal derivation system, the ideal integrative system.		3 hours
12. Convolution. Convolution in discrete time. LTIS analysis using the convolution operation. The convolution if the signal is of infinite duration.		3 hours
13. Properties of convolution (commutativity, distributivity, associativity, neutral element). Illustrations		3 hours
14. Observations on the impulse response of discrete, linear, and time-invariant systems: impulse response of a causal LTIS, stability of an LTIS, system equivalent to series-connected LTISs.		3 hours

Bibliography

1. Adelaida Mateescu, N. Dumitru, L. Stanciu *Semnale și sisteme*, Ed. Teora, București, 2001
2. Nafornta I, *Semnale, circuite și sisteme*, Ed. Politehnica, Timișoara, 2006
3. Chioncel P. Cristian, *Prelucrarea numerică a semnalelor*, Ed. Eftimie Murgu, 2009

8.2. Laboratory

	Teaching methods	Remarks
1. Health and safety in laboratory.	Explanation	2 hours
2. Study of periodic signals	Laboratory experiment, discussion and debate	4 hours
3. LTIS analysis		4 hours
4. Convolution of signals		2 hours
5. Evaluation, debt remaining hours.		2 hours

Bibliography

1. Adelaida Mateescu, N. Dumitru, L. Stanciu *Semnale și sisteme*, Ed. Teora, București, 2001
2. Nafornta I, *Semnale, circuite și sisteme*, Ed. Politehnica, Timișoara, 2006

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations, and representative employers within the field of the program

- They have been established with the main employers by previous discussions at the study programme substantiation.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Involvement	Number of interventions	10 %
	Accumulated knowledge	Exam (on paper)	60 %
10.5.2 Lab activities	Involvement	Number of interventions	10 %
	Accumulated knowledge	Practical test	20 %
10.6 Minimum performance standards			
<ul style="list-style-type: none">➤ Completion of Applicative Activities (laboratory work accomplishment and project approval by the minimum grade of 5).➤ Completion of each exams subject by the minimum grade of 5.			

Date

Signature of course coordinator

Signature of laborator coordinator

Mai 2022

Assoc. Prof. PhD. Eng. Cristian

Assoc. Prof. PhD. Eng. Cristian

P. CHIONCEL

P. CHIONCEL

Date of approval

Signature of the head of department

24.05.2022

Prof. dr. Laura Dioşan