

FIȘA DISCIPLINEI

Denumirea disciplinei :		Neuroprocessing			
Codul disciplinei:					
Programul de studii:		Advanced Computing Systems			
Catedra:		Computer Science and Automatic Control			
Facultatea:		"Hermann Oberth" Faculty of Engineering			
Universitatea:		„Lucian Blaga” University of Sibiu			
Anul de studiu:	1	Semestrul	2	Tipul de evaluare finală	Exam
Regimul disciplinei (DI=obligatorie/ DO=opțională/DF=liber aleasă):			DI	Numărul de credite:	10
Categorhia formativă a disciplinei (DF=fundamentală.; DI=ingineresti; DS=specialitate; DC=complementară)					DS
Total ore din planul de învățământ	70			Total ore pe semestru:	70
Titularul disciplinei: Conf. dr. ing. Ioan Z. MIHU					

Numărul total de ore (pe semestru) din planul de învățământ					
Total ore/ semestru	C	S	L	P	Total
	42	-	14	14	70

Obiective:	The goal of this course is studying of the Artificial Neural Network (ANN) Architectures, Algorithms and Applications. The strategies of designing the ANN Based Systems are presented and the most important ANN Applications are described.
Competențe specifice disciplinei	<p>1. Knowledge and understanding:</p> <ul style="list-style-type: none"> • knowledge and understanding the general principles for the subject • knowledge and proper operation of discipline-specific advanced concepts • ability to integrate knowledge gained from other areas • ability to integrate specific sources of information <p>2. Explication and interpretation:</p> <ul style="list-style-type: none"> • critical analysis of theoretical models, ideas and traditional approaches • skills to develop a project and complete a report on it • improving teamwork <p>3. Instrumental – applicative</p> <ul style="list-style-type: none"> • knowledge of and proficiency in state-of-the-art tools • application design on different levels • usage of a variety of strategies, methods, techniques for design, implementation and evaluation <p>4. Attitudinal:</p> <ul style="list-style-type: none"> • developing of a positive attitude towards research • appreciation of teamwork, responsibility for the team’s results • developing of a positive attitude towards (the need for validation of the theoretical aspects by) a practical application • awareness of the need to participate in their own professional and scientific development

Conținutul tematic (descriptori)	Analytical program of the course		
	No.	Subject	Time
	1.	Artificial Neural Systems. Preliminaries.	3 hours
	2.	Fundamental Concepts and Models of Artificial Neural Systems	6 hours
	3.	Single-Layer Perceptron Classifiers	3 hours
	4.	Multilayer Feedforward Networks. The Backpropagation Algorithm	6 hours
	5.	Multilayer Feedforward Networks Applications	3 hours
	6.	Single-Layer Feedback Networks. The Hopfield Model	3 hours
	7.	Feedback Networks Applications	3 hours
	8.	Associative Networks	3 hours
	9.	Stochastic Networks	3 hours
	10.	Self-Organizing Networks	3 hours
	11.	Self-Organizing Networks Applications	3 hours
	12.	Neural Networks Implementation	3 hours
	Analytical program of the laboratory		
	1.	Pattern Recognition using Feedforward Neural Networks.	5 hours
	2.	Pattern Recognition using Feedback Neural Networks.	4 hours
	3.	Clustering using Self-Organizing Networks.	5 hours
	Project: Neural System for Pattern Recognition		
	1.	Pattern coding and NN input vectors	2 hours
2.	NN Architecture and Learning Algorithm.	2 hours	
3.	NN Software Implementation.	4 hours	
4.	Network Training and System Evaluation.	4 hours	
5.	Results, Conclusions and Future Work	2 hours	

Metode de predare / seminarizare	Lectures, explanations, conversations, demonstrations, case studies, exercises, debates.
----------------------------------	--

Stabilirea notei finale (procentaje)	- Final exam	40%
	- Evaluations during the semester	-
	- Activity developed at laboratory	30%
	- Activity developed at project	30%
	- Homework	-
	- Other activities	-
	- TOTAL	100%

Final evaluation will consist in written exam (descriptive subjects and problems).

Requirement for note 5:

- Knowing based notions from Neural Systems.
- Understanding elementary Neural Networks theory.
- Minimum grade 5.00 at labs
- Minimum grade 5.00 at project

Cerințe pentru nota 10

- Capacity to demonstrate deepens knowledge at final exam.
- Capacity to perform an excellent activity at labs.
- Capacity to build an excellent project.

TOTAL ore studiu individual (pe semestru) = 65

Bibliografia	<p>Minimală obligatorie:</p> <ul style="list-style-type: none"> • S. Haykin, <i>Neural Networks. A Comprehensive Foundation</i>, Prentice Hall, 1999 • M Akay (editor), <i>Handbook of Neural Engineering</i>, IEEE Press, 2007 • R. Rojas, <i>Neural Networks. A systematic Introduction</i>, Springer, 1996 • T. M. Mitchell, <i>Machine Learning</i>, McGraw-Hill, 1997 • J. R. Rabunal, J. Dorado, <i>Artificial Neural Networks in Real-Life Applications</i>, Idea Group Publishing, 2006. <p>Complementară:</p> <ul style="list-style-type: none"> • J. M. Zurada, <i>Introduction to Artificial Neural Systems</i>, West Publishing Company, 1992. • A. R. Omondi, J. C. Rajapakse, <i>FPGA Implementations of Neural Networks</i>, Springer, 2006 • I. Z. Mihiu, “<i>NEUROPROCESOARE SISTOLICE. Analiză, Proiectare, Evaluaare</i>”, Editura Universității “Lucian Blaga” din Sibiu, 2001.
	<p>List of didactical material used in teaching process:</p> <ul style="list-style-type: none"> • Curse notes, bibliographic list, video projector, computer network

Coordonator de Disciplină	Grad didactic, titlul, prenume, numele	Semnătura
	Conf. dr. ing. Ioan Z. MIHU	