SUBJECT

Name discipline:		**Adaptive System Theory**			
Discipline Code:		**EMBEDDED SYSTEMS**			
Study program:		**ADVANCED STUDIES MASTER**			
Department:		**Calculatoare si Automatizari**			
Faculty:		**Inginerie "Hermann Oberth"**			
University:		**"Lucian Blaga" din Sibiu**			
Year of study:	**1**	Semester	**1**	The type of final assessment	**E1**
Conditions of discipline (DI=obligatorie/ DO=opţională/DF=liber aleasă):			**DO**	Number of credits:	**10**
Category formative discipline (DF=fundamentală.; DI=inginereşti; DS=specialitate; DC=complementară)					**DF**
Total hours of curriculum		**28**		Total hours per semester:	**28**
The holder of the discipline:				**Conf.dr.ing. Cornel Rentea**	

Total hours (per semester) in the curricula					
Total hours / semester	**C**	**S**	**L**	**P**	**Total**
	2	**0**	**2**	**0**	**28(C)+28(L)=56**

Objectives of the course	The courses, in a I-semester presents the theoretical aspects and basic principles of Adaptive Systems, underlying the analysis and synthesis using input- output or input- state-output formalism automatic control systems. For modern Adaptive theory, matrix algebra is also required. The courses encourages thinking, as the control systems of tomorrow will have to be creative. The programs Matlab are easy to use and follow the text material.
Specific powers discipline	**<u>1. Knowledge and understanding:</u>** • systemic terms and concepts including the relevant principles of Adaptive Systems theory. • awareness of the notion of multivariable automatic (automated systems exist in different areas, etc.). • understanding the purpose of a systemic concept (by analytical calculation).
Specific powers discipline	**<u>2. Explanation and interpretation:</u>** (explanation and interpretation of systemic concepts, automated multivariable system design, explaining the transfer matrix formalism): • explain the basic concepts of Adaptive theory. • explain the systemic knowledge. • explaining and interpreting the structural approach. • explanation and interpretation of dynamic simulation.

	3. Instrumental - Application: (design, management and evaluation of specific practical activities) • use computer-aided theoretical methods • modeling and simulation of automated systems (modeling and simulation languages). • use case study experimental platforms (automated systems).
	4. Attitude: • Develop a critical appreciation of the natural and formalities of systems theory, including simultaneity "cause and effect". • Desire to use calculations to solve systemic problems "simple", in multivariate formalism.

Course contents	**TOPICS COURSES**		
	Nr. curs	Denumirea temei	Nr. ore
	C1.	What are Complex Adaptive Systems? Cause and Effect. Introduction to Adaptive System. Basic Concepts.	**4**
	C2.	Complex Adaptive Systems (pattern, feedback, agents). Properties.	**4**
	C3.	Non-linear control systems.	**4**
	C4.	Model Reference Adaptive Control.	**4**
	C5.	Adaptive identification of LTI plants - state variables accessible.	**2**
	C6.	Adaptive Control Methods.	**2**
	C7.	Control applications: system identification, self-tuning control, model-reference adaptive control	**2**
	C8.	Controller Design Methods.	**2**
	C9.	System compensation. Stabilization of unstable system.	**2**
	C10.	System Parameter Estimation.	**2**
Lab. contents	**TOPICS LABORATORIES**		
	L1.	Symbolic representation of adaptive linear system	**4**
	L2.	Representation of a multivariable system, LTI models	**4**
	L3.	Adaptive Control Methods.	**4**
	L4.	Control applications: system identification, self-tuning control, model-reference adaptive control	**4**
	L5.	Controller Design Methods.	**4**
	L6.	System compensation. Stabilization of unstable system.	**4**
	L7.	Adaptive Control Algorithms.	**4**
			28

Teaching methods	Main function of teaching methods: exposure, media exposure, demonstration of computer assisted, automated testing systems practice in parallel with their modeling and simulation. Methods occurring mainly directed discovery: conversation heuristic, case study, verification confidence obtained. Algorithmic methods based on operational sequences, stable, pre-built.

Setting note Final (percentages)	- Answers to exam / (final evaluation)	**50%**
	- Tests during the semester	**10%**
	- Final answers to practical laboratory work	**10%**
	- Activities gender issues / papers / essays / projects etc.	**5%**
	- Control issues	**25%**
	- **TOTAL**	**100%**

The final evaluation will include examining TYPE ORAL simultaneous group (in a unit time frame) on parallel topics individually customized without repeatability issues.	
<u>Minimum requirements for grade 5</u> Making the final note the percentage of content, excluding the test during the semester. Final classification percentage for grade 5 includes equivalent achievements during laboratory listed proportionally.	<u>Requirements for grade 10</u> Making content percentages of final grade. Self-Learning and its realization in each laboratory session on case studies of type design to the theme.
TOTAL hours self study (per semester) = 2 themes home / 20h 10 research topics curs/20h = 40h	

Bibliography	**Minimum:** 1. **C. Rentea** - ***Control Design Using Genetic Optimized Pole Placement***-6th-WSEAS International Conference on Automation and Information- Buenos Ayres, Argentina, March 1-2, 2005. 2. **C. Rentea** - ***Neoro-Controller Design Using Genetic Optimiyed Pole Placement Method*****,** 7 th-WSEAS Intern. Conference on Automatic Control, Modeling and Simulation, Prague, Czech Republic, March 13-15 2005, on-line Proceedings. 3. **C. Rentea** - ***Automatic Control Power Measurements In Non- Sinusoidal Condition: Periodic Current And Voltage By Signal Processing***- International Conference "Beyond 2000", 24-27 nov. 1999 Sibiu- vol. XXXVIII, pag. 101-106, E. Computer Science and Automatic Control- Acta Universitatis Cibiniensis. 4. **D. Arnold, J. C. Polking** - ***Ordinary Differential Equations using MATLAB*****, MathWorks (on line), 2003**. 5. **Cãlin S.,** - ***Sisteme automate adaptive si optimale***, Ed. Tehnicã, 1971. 6. **Karl J. Astrom**. - ***Adaptive Control***. Addison-Wesley, 1989.
List of materials used in teaching: Computer system-Matlab-Simulink platform, an experimental platform for SRA, XY recorder in real time.	

Coordinator Discipline	Academic degree, title, name:	Signature
	Conf.dr.ing.Cornel Rentea	