SUBJECT

Name discipline:		**CONTROL SYSTEMS**			
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=ingineреşti; 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 Control Systems, underlying the analysis and synthesis using input- output or input- state-output formalism automatic control systems. For modern Control 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	**1. Knowledge and understanding:** • systemic terms and concepts including the relevant principles of Control 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). • exhaustive knowledge of a system of automatic adjustment (direct example case study).

Specific powers discipline	**2. Explanation and interpretation:** (explanation and interpretation of systemic concepts, automated multivariable system design, explaining the transfer matrix formalism): • explain the basic concepts of Control theory. • explain the systemic knowledge. • explaining and interpreting the structural approach. • explanation and interpretation of modeling the Control. • explanation and interpretation of dynamic simulation. • explanation and interpretation of multivariable Control programming.
	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: • Understands and appreciates the coincidence between theory and practice, because the systemic approach. • Adaptability and flexibility in addressing systemic. • Knowledge of the depths, saves time. • intrinsic motivation for creating the systemic approach and attitude of self-claim (systemic trust). • The self-concept that allows student awareness "phenomenon" category corresponding to the essence of dialectics, • 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. • Technical Approach successive system checks to general belief.

	TOPICS COURSES		
Course contents	Nr. curs	Denumirea temei	Nr. ore
	C1.	**The Concept of Control Systems**	**2**
	C2.	**Introduction to Continuous Control Systems forms**	**2**
	C3.	**Laplace Transforms**	**2**
	C4.	**Closed Loop System**	**2**
	C5.	**Transfer Function**	**2**
	C6.	**System abstract. Linear mathematical model input-output type (MM-II). Input-Output Relationships.**	**2**
	C7.	**Connections and Block Representation of Control Systems**	**2**
	C8.	**Programming Structure of MIMO Systems**	**4**

Lab. contents	**C9.**	**Multivariable systems-M.I.M.O. Functional characterization. Topological systems using State-Variable Analysis**	**4**
	C10.	**P.I.D. Control Systems**	**2**
	C11.	**Stability**	**2**
	C12.	**Design and Analysis of Control Systems**	**2**
		TOPICS LABORATORIES	
	L1.	**Symbolic representation of system**	**2**
	L2.	**Representation of a multivariable system, LTI models**	**4**
	L3.	**Pole-placement design.**	**2**
	L4.	**Relationship between system representations.**	**4**
	L5.	**Control system with state variable feed-back.**	**4**
	L6.	**Complex control system**	**4**
	L7.	**Symbolic representation of system**	**2**
	L8.	**Representation of a multivariable system, LTI models**	**4**
	L9.	**Pole-placement design.**	**2**
			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.

Minimum requirements for grade 5	Requirements for grade 10
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.	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** - ***Teoria Sistemelor*, Editura Univ. "Lucian Blaga", Sibiu, 2002.** 2 **C. Rentea** - ***Teoria Sistemelor*, Editura Univ. "Lucian Blaga", Sibiu, 2002.*MATLAB (îndrumar laborator-2vol)*, 2002.** 3 **Victor J.Bucek** - **Control Systems, Prentice Hall, 1999** **Additional:** 4 **D. Arnold, J. C. Polking** - ***Ordinary Differential Equations using MATLAB*, MathWorks (on line), 2008.** 5 **Matlab-Technical Computing** - **The MathWorks-Control System Toolbox (6)** 6 **IEEE** - **Transaction on Automatic Control (2000-2009)**
List of materials used in teaching: Computer system-Matlab-Simulink platform, an experimental platform for SRA, XY recorder in real time.	

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