BACHELOR 'S PROGRAMME
2nd YEAR OF STUDY, 2nd SEMESTER

COURSE TITLE	DATA ACQUISITION AND PROCESSING SYSTEMS
COURSE CODE	
COURSE TYPE	full attendance
COURSE LEVEL	1st cycle (bachelor's degree)
YEAR OF STUDY, SEMESTER	2nd year of study, 2nd semester
NUMBER OF ECTS CREDITS	5
NUMBER OF HOURS PER WEEK	5
NAME OF LECTURE HOLDER	Lect dr Radu TANASĂ
NAME OF SEMINAR HOLDER	Lect dr Radu TANASĂ
PREREQUISITES	Advanced level of English

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

- → laboration of a specialty or licence work, respecting the objectives, proposed deadlines and norms of professional ethics.
- → ealization of a project/ team activity and identification of specific professional roles.
- → Elaboration, drafting and presentation in Romanian and/ or in a language of international circulation of a specialty work on a current topic in the field.

Course-specific competences:

- → Correct application of methods of analysis and of criteria for choosing the appropriate solutions to achieve the specified performances.
- → Use of computers to control experiments or processes and data acquisition.
- → Explanation and interpretation of physical phenomena by formulating assumptions and operationalizing key concepts and proper use of laboratory equipment.
- → Implementation, improvement and extension of a physical model utilisation. Making experimental devices capable of validating a physical model.
- → Drafting and presenting scientific reports in the field of Physics by using of new media technologies for communication.

B LEARNING OUTCOMES

Upon successful completion of this discipline, students will be able to:

- Describe the data acquisition systems and identify the characteristic parameters;
- Use data acquisition systems to retrieve physical measurement information;
- Use specialized programs, such as LabView, for controlling and programming data acquisition systems;
- Describe specialized buses for data acquisition and transmission;
- Select the data acquisition system best suited to a practical situation, taking into account specific requirements, such as resolution, acquisition speed, etc ...

C LECTURE CONTENT

The main components of a data acquisition system
Sensors, transducers and actuators
Conditioning of analog signals. Amplification
Conditioning of analog signals. Isolation, Filtration
Conditioning of analog signals. Linearization, multiplexing, sample & hold. Conditioning systems
Representation of analog signals in digital format. Digital-analog converters
Analog signals sampling. Analog / digital converters
Data transmission. Hardware interfaces. Serial and parallel communications
Process control systems. The PID algorithm

D RECOMMENDED READING FOR LECTURES

1. http://stoner.phys.uaic.ro/moodle
2. Howard Austerlitz, Data Acquisition Techniques Using PCs, ACADEMIC PRESS, 2003
3. Karl Johan Astrom and Bjorn Wittenmark, Computer, Controlled Systems: Theory and Design, Prentice Hall; 3 edition (November 30, 1996)
4. Jacob Fraden, Handbook of Modern Sensors: Physics, Designs, and Applications, Springer; 3rd edition; 2003
5. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control. Newnes; 1 edition (August 24, 2000)
6. Mike Tooley, PC Based Instrumentation and Control, Newnes; 3 edition (May 12, 2005)
7. John Park and Steve Mackay, Practical Data Acquisition for Instrumentation and Control Systems, Newnes; 1 edition (August 11, 2003)

E	SEMINAR CONTENT
	LabView programming environment. Introduction Virtual instruments. Mathematical and logical operations Program structures. IF, FOR, WHILE, CASE, SEQUENCE Data Structures (Graphs, Charts, Tables, Records) Strings and files Automatic temperature monitoring system Project proposal and discussion of requirements Individual project work Project presentation
F	RECOMMENDED READING FOR SEMINARS
	LabView User Manual – National Instruments http://stoner.phys.uaic.ro/moodle
G	EDUCATION STYLE
LEARNING AND TEACHING METHODS	case study, lecture, exemplification, experimental activities, illustration, discussion
ASSESSMENT METHODS	• Written test • Individual project, active participation in the laboratory, involvement in group and individual tasks
LANGUAGE OF INSTRUCTION	English