

SYLLABUS¹

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA TIMISOARA
1.2 Faculty ² / Department ³	ELECTRICAL AND POWER ENGINEERING
1.3 Chair	—
1.4 Field of study (name/code ⁴)	ELECTRICAL ENGINEERING / 90
1.5 Study cycle	LICENSE
1.6 Study program (name/code/qualification)	ELECTRICAL ENGINEERING / 30

2. Information about the discipline

2.1 Name of discipline/ formative category ⁵			MEASUREMENT TECHNIQUES AND SENSORS				
2.2 Coordinator (holder) of course activities			Assoc.Prof. Ciprian Sorandaru				
2.3 Coordinator (holder) of applied activities ⁶			Assist. Prof. Antheia Raicov				
2.4 Year of study ⁷	2	2.5 Semester	4	2.6 Type of evaluation	E	2.7 Type of discipline ⁸	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted)⁹

3.1 Number of fully assisted hours / week	4 of which:	3.2 course	2	3.3 seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	56 of which:	3.2* course	28	3.3* seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	of which:	3.5 training		3.6 hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	3.5* training		3.6* hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	4 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			3
		training seminars / laboratories, homework and papers, portfolios and essays			
3.7* Number of hours of unassisted activities / semester	56 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			42
		training seminars / laboratories, homework and papers, portfolios and essays			
3.8 Total hours / week ¹⁰	8				
3.8* Total hours /semester	112				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	•
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¹ The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.

² The name of the faculty which manages the educational curriculum to which the discipline belongs

³ The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.

⁴ The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.

⁵ Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).

⁶ Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁷ Year of studies in which the discipline is provided in the curriculum.

⁸ Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).

⁹ The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.

¹⁰ The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.2 Competencies	•
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5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> CS1: Basic knowledge in the field of measurements CS2: Ability to work with measuring devices and instruments
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> C1: Adequate application of basic knowledge of mathematics, physics and chemistry in the field of electrical engineering = 10%; C2: Operating with fundamental concepts in computer science and information technology = %; C3: Operation with fundamental concepts in electrical engineering = 10%; C4: Analysis, modeling and simulation of electrical systems = 5%; C5: Use of techniques for measuring electrical and non-electrical quantities and data acquisition systems in electrical systems = 60%; C6: Design of automatic adjustment systems = %
Transversal competencies ascribed to the specific competencies	<ul style="list-style-type: none"> CT1: Identification of the objectives to be achieved, of the available resources, the conditions for their completion, the working stages, the working times, the accomplishment terms and the afferent risks = 5%; CT2: Identifying roles and responsibilities in a multidisciplinary team and applying effective relationship and work techniques within the team = 5%; CT3: Efficient use of information sources and resources for communication and assisted training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation = 5%.

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Acquiring the basic elements of the measurement technique
7.2 Specific objectives	•

8. Content¹¹

8.1 Course	Number of hours	Teaching methods ¹²
Measurement errors and uncertainties	2	Interactive teaching using the video projector, combining the presentation with practical examples of applications
Static and dynamic characteristics of devices measured	2	
Components of measuring equipment	2	
Analog indicating devices	2	
Current and voltage measurement	2	
Resistance measurement	2	
Impedance measurement	2	
Electric power measurement	2	
Magnetic measurements	2	
Measuring transducers	2	
Numerical measurement systems	2	
Signal conditioning	2	

¹¹ It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".

¹² Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Analog-to-digital signal conversion, Data acquisition systems	4	
Bibliography ¹³ 1. M. Sărăcin, T. Jurca, C. Sorandaru, Sisteme de măsurare și achiziții de date, Editura Academiei Oamenilor de Știință din România 2011 2. William C. Dunn, Introduction to instrumentation, sensors and process control, Artech House 2006 3. Daniel Belega, Tehnici de masurare, senzori si traductoare : aplicatii practice, Editura Politehnica 2010 4. Jon Wilson, Test and measurement, Elsevier 2009		
8.2 Applied activities ¹⁴	Number of hours	Teaching methods
Chains of dimensions. Deviations and tolerances. Errors	4	Realization by students on the computer of the proposed practical applications related to the laboratory topic. Practical testing applications
Multiples and submultiples in and for non-electrical quantities and electrical quantities	4	
Use of the ammeter in direct current circuits	4	
Extension of the current measuring range in d.c (shunt). Power measurement in d.c	4	
Measuring electrical quantities in a.c.	4	Practical testing applications
The oscilloscope	4	Practical testing applications
Sensors and data acquisition	4	Practical testing applications
Bibliography ¹⁵ 1. M. Sărăcin, T. Jurca, C. Sorandaru, Sisteme de măsurare și achiziții de date, Editura Academiei Oamenilor de Știință din România 2011 2. William C. Dunn, Introduction to instrumentation, sensors and process control, Artech House 2006 3. Daniel Belega, Tehnici de masurare, senzori si traductoare : aplicatii practice, Editura Politehnica 2010 4. Jon Wilson, Test and measurement, Elsevier 2009		

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- The presented notions are necessary in the testing applications used by the main companies in the field existing on the Romanian market

10. Evaluation

Type of activity	10.1 Evaluation criteria ¹⁶	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Assessment of the theoretical knowledge necessary to achieve practical applications	Written exam	50%
10.5 Applied activities	S:		
	L: Ability to perform a measurement	Laboratory tests	50%
	P¹⁷:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified ¹⁸)			
<ul style="list-style-type: none"> • Minimum 40% of the subjects from the written exam, minimum 40% of the practical applications 			

¹³ At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.

¹⁴ Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

¹⁵ At least one title must belong to the discipline team.

¹⁶ Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

¹⁷ In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

¹⁸ It will not explain how the promotion mark is awarded.

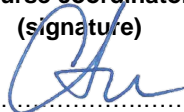
Date of completion

01.12.2020

**Head of Department
(signature)**

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**Course coordinator
(signature)**



**Date of approval in the Faculty
Council ¹⁹**

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**Coordinator of applied activities
(signature)**

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**Dean
(signature)**

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¹⁹ The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.