

SYLLABUS

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty ¹ / Department ²	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES/MEO
1.3 Field of study (name/code ³)	ELECTRONIC ENGINEERING, TELECOMUNICATION AND INFORMATION TECHNOLOGIES
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	TST-ENG/20/20/10/100/10/TST-ENG

2. Information about the discipline

2.1 Name of discipline/ formative category ⁴	Measurements in Electronics and Telecommunications/ DD						
2.2 Coordinator (holder) of course activities	Conf. dr. ing. Andrei-Marius Silaghi						
2.3 Coordinator (holder) of applied activities ⁵	Conf. dr. ing. Andrei-Marius Silaghi / Păcurar Octavian						
2.4 Year of study ⁶	2	2.5 Semester	3	2.6 Type of evaluation	E	2.7 Regime of discipline ⁷	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted)⁸

3.1 Number of fully assisted hours / week	4 of which:	3.2 course	2	3.3 seminar / laboratory / project	1/1/0
3.1* Total number of fully assisted hours / semester	56 of which:	3.2* course	28	3.3* seminar / laboratory / project	14/14/0
3.4 Number of hours partially assisted / week	0 of which:	3.5 training	0	3.6 hours for diploma project elaboration	0
3.4* Total number of hours partially assisted / semester	0 of which:	3.5* training	0	3.6* hours for diploma project elaboration	0
3.7 Number of hours of unassisted activities / week	3.14 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1.14
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	44 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			16
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week ⁹	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

¹ The name of the faculty which manages the educational curriculum to which the discipline belongs

² The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.

³ The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.

⁴ 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).

⁵ Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁶ Year of studies in which the discipline is provided in the curriculum.

⁷ Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).

⁸ 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.

⁹ The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.1 Curriculum	<ul style="list-style-type: none"> Physics, 1st year 1st sem., Special Mathematics, 1st year 2nd sem., Electrical Circuits, 1st year 2nd sem
4.2 Competencies	<ul style="list-style-type: none"> Complex Analysis, General Electronics Practical Abilities

5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> The course is taking place in a room adequate for the number of students, which fulfills standard regulations concerning space. Presentation is sustained by video projector, while proofs and problems are solved on whiteboard. Conditions for interactivity are met
5.2 to conduct practical activities	<ul style="list-style-type: none"> The laboratory activities are taking place in a room adequate for the number of students, which fulfills standard regulations concerning space. The activity is relying on a practical part consisting of multimeters, generators, oscilloscopes etc. (four work groups are constituted)

6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> Calculation of measurement errors and uncertainties of an electrical quantity Knowledge of the methods and devices for measuring electrical quantities most often used in practice
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics Application of basic methods for signal acquisition and processing Selection, installation, configuration and operation of fixed and mobile equipment and equipping a site with common telecommunication networks
Transversal competencies ascribed to the specific competencies	<ul style="list-style-type: none"> Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment of professional tasks Adaptation to new technologies, professional and personal development through continuous training using printed documentation sources, specialized software and electronic resources in Romanian and at least one foreign language

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

7.1 The general objective of the discipline	<ul style="list-style-type: none"> Familiarization with means and measurement methods
7.2 Specific objectives	<ul style="list-style-type: none"> Use of measuring devices. Calculation of measurement errors and uncertainty. Numerical processing of measurement results

8. Content ¹⁰

8.1 Course	Number of hours	Teaching methods ¹¹
Basic knowledge on metrology	4	Lectures based on PowerPoint presentations sustained by whiteboard calculations
Measuring devices, measuring methods, characteristics of measuring instruments	4	
Measurement errors. Random errors. Confidence interval and level. Error propagation	6	

¹⁰ 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 "(*)".

¹¹ Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Electronic circuits in measuring instruments. Signal conditioning. Amplifiers. Digital to analog converts. Analog to digital converters	8	and interaction with auditory by Q&A sessions
Current and voltage measurement	6	
Bibliography ¹² Andrei-Marius Silaghi, Measurements in Electronics and Telecommunications, Lecture Notes available on Virtual Campus, 2021, cv.upt.ro (in English) Video recordings on Virtual Campus cv.upt.ro J. Webster – Measurement, instrumentation and sensors handbook, CRCnetBase, 1999. A. Ignea, D. Stoiciu – Măsurări electronice, senzori și traductoare, Editura Politehnica, 2003. International Vocabulary of Metrology – Basic and General Concepts and Associated Terms, ISO, 2007		
8.2 Applied activities ¹³	Number of hours	Teaching methods
Laboratory: Introduction to measuring methods and instruments, Voltcraft Digital Multimeter, Calibration of measuring instruments	6	Exercises and practical measurements
Introduction to LabView, Temperature measurement, AC DC Converters	6	
Final laboratory test	2	
Problem Solving: Signals and Spectrum, Tolerated Errors, RC Filters	6	
Metrological Verifications, Error Propagation, Exercises with DAC	6	
Final problem solving test	2	
Bibliography ¹⁴ Exercises, Laboratory works (text) and video presentations on the Virtual Campus (in English) cv.upt.ro, 2021		

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 knowledge acquired within the discipline- the use of measuring devices, the calculation of errors and uncertainties, that affect a measurement and the knowledge of measurement methods – are closely related to practice, and as a result, particularly useful to graduates for employment

10. Evaluation

Type of activity	10.1 Evaluation criteria ¹⁵	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Degree of understanding the basic knowledge in the field	Written Exam	50%
10.5 Applied activities	S: Quality of written tests	Written test with exercises	25%
	L: Quality of reports and experimental results	Written test with laboratory measurements	25%

¹² 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.

¹³ 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".

¹⁴ At least one title must belong to the discipline team.

¹⁵ 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.)

	P¹⁶:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified ¹⁷)			
<ul style="list-style-type: none"> • 5 for course exam and 5 for activity grade 			

Date of completion

21.06.2023

**Course coordinator
(signature)**

**Coordinator of applied activities
(signature)**

**Head of Department
(signature)**

Date of approval in the Faculty Council ¹⁸

14.09.2023

**Dean
(signature)**

¹⁶ 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.

¹⁷ It will not explain how the promotion mark is awarded.

¹⁸ The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.