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 / MEASUREMENTS ND OPTICAL ELECTRONICS DEPARTMENT
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]			Electronic Instrumentation for measurements/DD				
2.2 Coordinator (holder) of course activities			MÂȚIU-IOVAN Liliana				
2.3 Coordinator (holder) of applied activities[5]			MÂȚIU-IOVAN Liliana				
2.4 Year of study[6]	3	**2.5** Semester	5	**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	0/2/0
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	0/28/0
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	3,14 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			1,14
		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			14
		hours of individual study after manual, course support, bibliography and notes			16
		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)

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[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	• Measurements in Electronics and Telecommunications
4.2 Competencies	• basic knowledge of electronic circuits and measurements

5. Conditions (where applicable)

5.1 of the course	• Medium size hall. Support materials: laptop, projector, whiteboard
5.2 to conduct practical activities	• Specific laboratory for electronic measurements, equipped with measuring devices, oscilloscopes, signal generators, pulse generators, digital multimeters, spectrum analyzer, data acquisition systems, computers

6. Specific competencies acquired through this discipline

Specific competencies	• Knowledge of the methods and devices for measuring electrical quantities and testing most often used in practice at the level of internal circuits and their functions in order to make accurate measurements.
Professional competencies ascribed to the specific competencies	• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. • Application of basic methods for signal acquisition and processing.
Transversal competencies ascribed to the specific competencies	• 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	• Basic knowledge on electronic measuring instrumentation, aimed to provide the skills and abilities for appropriate use in conducting experimental work
7.2 Specific objectives	• Acquiring an overview of the types of measuring devices and specifically how to use them • Obtaining the skills for the correct use of the measuring and testing equipment • Acquiring the correct style of approach and execution of experiments using specific devices and results interpretation

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. Oscilloscopes. The general purpose analog oscilloscope. Description and use. Vertical and horizontal deflexion	10	PPT lecture

[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.).

blocks. Time base. Synchronization. Probes. Digital oscilloscope. Oscilloscope performance specifications Sampling techniques. DSO features		presentations, conversations, explanations, examples, videos
2. Signal generators. Pulse generators. Sine wave generators: low frequency, radio frequency. Function generators. Arbitrary wave generators	6	
3. Digital voltmeters and multimeters. Measurement techniques and errors. DC digital voltmeters. Digital multimeters. Analog to digital converters. Current to voltage converter, AC-DC converters, Resistance to voltage converters.	4	
4. Universal counters. Universal counters – functions**.** Frequency and period mesurements. Microprocessor-based counters. Errors.	2	
5. Spectrum analyzers. Filter bank analyzers. FFT analyzers. Heterodyne analyzers.	2	
6. PC-based measuring instrumentation, virtual instrumentation. Basic concepts. Data acquisition systems. Examples.	4	

Bibliography [12]

1. L. Mâțiu-Iovan – Electronic Instrumentation – Campus Virtual

2. J. G. Webster (Editor in chief) – Measurement, instrumentation and sensors handbook, CRCnetBase, 1999
3. W. Boyes (Editor in chief) – Instrumentation reference book, Butterworth-Heinemann, 2003
4. H. S. Kalsi – Electronic instrumentation, Tata McGraw-Hill Publishing Company Limited, 2009
5. T. Jurca, D. Stoiciu, S. Mischie – Aparate electronice de măsurat, Ed. Orizonturi Universitare, Timişoara, 2001

6. XYZ of Oscilloscopes – www.tektronix.com

8.2 Applied activities [13]	Number of hours	Teaching methods
Introduction	2	Topics exposure, discussions, questions, solving problems. identification of devices and instrumentation, experimental achieve, use specific functions, noting the measurements, processing results
Analog oscilloscope. Digital oscilloscope. PC oscilloscope.	8	
Function generator	2	
Pulse generator	2	
Digital multimeter	2	
Universal counter	2	

[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".

Spectrum analyzer	2	
Practical test	4	
Exercises, solving problems	4	
Bibliography [14] 1. L. Mâțiu-Iovan – Electronic Instrumentation – Campus Virtual		

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

- Knowledge concerning the construction and especially the functioning of the measuring and testing instruments are needed in all technical areas

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Knowledge of the concepts and methods handed over Solving problems of small, medium and large complexity	Written exam Written exam	25% 25%
10.5 Applied activities	**S:**		
	L: Solving Problems corresponding laboratory work Practical test	Presentation of the solutions, answers to questions Practical solving of some specific problems	25% 25%
	P[16]**:**		
	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])			
• Course work and laboratory activity are assessed by a grade between 1 and 10. The minimum standard of performance involves obtaining a grade of 5 minimum to the written exam and for applied activities. • Knowledge of course is assessed by written examination. For the laboratory, the assessment is made at each lab session and a practical test at the end of the semester			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
11.06.2023		
Head of Department (signature)	**Date of approval in the Faculty Council** [18]	**Dean (signature)**
	14.09.2023	

[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.)
[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.