SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

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

2. Information about the discipline

2.1 Name of discipline/ formative category[5]			DIGITAL ELECTRONIC/DD				
2.2 Coordinator (holder) of course activities			Conf. dr.ing. Alin Argeseanu				
2.3 Coordinator (holder) of applied activities[6]			Conf. dr.ing. Alin Argeseanu				
2.4 Year of study[7]	2	**2.5** Semester	1	**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	28 of which:	**3.2*** course		**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			1
		training seminars / laboratories, homework and papers, portfolios and essays			2
3.7* Number of hours of unassisted activities / semester	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			14
		training seminars / laboratories, homework and papers, portfolios and essays			48
3.8 Total hours / week [10]	8				
3.8* Total hours /semester	112				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

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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.

4.1 Curriculum	• Basic of algebra
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Projector/laptop
5.2 to conduct practical activities	• Desktop/Matlab-simulink

6. Specific competencies acquired through this discipline

Specific competencies	• C1: Adequate application of basic knowledge of mathematics, physics and chemistry in the field of electrical engineering • C2: Operating with fundamental concepts in computer science and information technology • C3: Operation with fundamental concepts in electrical engineering • C4: Analysis, modeling and simulation of electrical systems • C5: Use of techniques for measuring electrical and non-electrical quantities and data acquisition systems in electrical systems ;
Professional competencies ascribed to the specific competencies	• C1: Adequate application of basic knowledge of mathematics, physics and chemistry in the field of electrical engineering = 20%; • C2: Operating with fundamental concepts in computer science and information technology = 25%; • C3: Operation with fundamental concepts in electrical engineering = 20%; • •C4: Analysis, modeling and simulation of electrical systems = 25%; • C5: Use of techniques for measuring electrical and non-electrical quantities and data acquisition systems in electrical systems 10%
Transversal competencies ascribed to the specific competencies	• CT1: Identification of objectives to be achieved, available resources, conditions for their completion, working stages, working times, deadlines and related risks ; • CT2: Identification of roles and responsibilities in a multidisciplinary team and application of relationship techniques and efficient work within the team • CT3: Efficient use of information sources and resources of communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation

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

7.1 The general objective of the discipline	• The general objective of the discipline is to familiarize students with the fundamental elements regarding the analysis, synthesis of numerical structures of combinational and sequential type.
7.2 Specific objectives	• Are presented main elements regarding numbering systems, numerical codes, binary, octal and hexadecimal arithmetic, together with the basics of binary algebra and the theory of binary automata. The importance of minimization techniques for binary functions are analyzed. The design stages with LSI, MSI, LSI circuits are exposed. The important classes of sequential circuits with typical applications are presented, including the way of achieving the transition from the wired type logic variant to the programmed logic.

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
Numeral systems. Decimal, binary, octal, hexa. Fast conversion algorithms. Basic binary arithmetics.	2	Projector/laptop
Basic of binary algebra. Binary functions BF. BF representation. Minimization techniques.	4	
Combinatorial numerical circuits. Problems of analysis and synthesis. Design with LSI circuits (logic gates). MSI circuits (encoders,	4	

[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.).

code converters, decoders, MUX / DMUX, adders, numeric comparators, parity detectors) and design with MSI		
LSI / VLSI circuits (memory circuits, programmed logic areas) and LSI / VLSI design	2	
Sequential digital circuits. Sequential automaton model. Types of automata, specific signals, tabular and graph representations.	2	
Flip-flop circuits. Counting circuits. Register circuits.	2	
Analysis of sequential Moore and Mealy type circuits made with RS, JK flip-flops.	2	
Elements regarding the synthesis of sequential circuits.	2	
Practical applications in the field of electrical engineering: power sequence generation for MPP, numerical equipment for synchronous generation of sin / cos functions at MED, precision solar transducers for solar collector tracking systems, multi-level coding systems for a new system absolute position translators	4	
Bibliography [13] 1. M Balch, ''Complete Digital design'', Mc Grow Hill, 2003 2.A.K.Maini "Digital Electronics. Principles, Devices and Applications", 2007Wiley 3.K.J.Breeding, "Digital Design Fundamentals, 2rd 1992,Pretince Hall" 4.T.L. Floyd "Digital Fundamentals" 2007,Pretince Hall		
8.2 Applied activities [14]	Number of hours	Teaching methods
Project. Design a digital circuit with logic gates, MSI(MUX circuits) and LSI (memory circuits), for displaying alphanumeric characters using a 7x5 type display cell	14	Desktop/simulators/ Develop board
L1. Analysis of a logic circuit that realizes few coding circuits	2	
L2.Encoding circuit binary 7 segments desig	2	
L3. Expending MUX/DMUX structures	2	
L4. Function of flip-flop circuits –RS, JK, T and T flip-flop	2	
L5. Universal counter (up/down, presetable	2	
L6. Universal registers analyse	2	
Bibliography [15] 1. M Balch, ''Complete Digital design'', Mc Grow Hill, 2003 2.A.K.Maini "Digital Electronics. Principles, Devices and Applications", 2007Wiley 3.K.J.Breeding, "Digital Design Fundamentals, 2rd 1992,Pretince Hall" 4.T.L. Floyd "Digital Fundamentals" 2007,Pretince Ha		

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

- Digital circuits have fundamentally changed our technologies and our daily lives. In the training of an electrical engineer they occupy an increasingly important segment. Even if a good part of the applications are software, the way of thinking, the basic theory, the functional structures used or implemented are identical. The greatest proximity is in the area of programmable automata where not only the problem is of numerical type but also the way of writing the programs imitates the graphics of the logigramms within the digital circuits. In addition, the classic areas of electrical engineering, electrical installations, lighting, through their current smart variants, include equipment for the use of which the elements of digital circuits are fundamental. In this conditions, we can no longer imagine today the profession of electrical engineer without considering the elements that support and develop from the concepts presented in this discipline.

10. Evaluation

[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.

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	The exam is of the practical applications of the presented concepts in the form of personalized problems on 4-6 rows of subjects.	write	50%
10.5 Applied activities	**S:**		
	L: discussing the studied concepts		25%
	P[17]**:**		
	Pr: discussing the studied concepts		25%
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [18])			
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Date of completion

29.11.2020

Course coordinator (signature)

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Coordinator of applied activities (signature)

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Head of Department (signature)

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Date of approval in the Faculty Council [19]

Dean (signature)

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[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.

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