SYLLABUS [1]

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty[2]/ Department [3]	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES/MATHEMATICS
1.3 Field of study (name/code[4])	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[5]	Special Mathematics/DF						
2.2 Coordinator (holder) of course activities	Conf. dr. Bogdan Caruntu						
2.3 Coordinator (holder) of applied activities[6]	Conf. dr. Bogdan Caruntu						
2.4 Year of study[7]	1	**2.5** Semester	2	**2.6** Type of evaluation	D	**2.7** Regime of discipline[8]	DOb

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	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	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
		training seminars / laboratories, homework and papers, portfolios and essays			1.14
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			14
		training seminars / laboratories, homework and papers, portfolios and essays			16
3.8 Total hours / week [10]	7.14				

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.

3.8* Total hours /semester	100
3.9 Number of credits	4

4. Prerequisites (where applicable)

4.1 Curriculum	• Calculus I, Algebra and Geometry
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Internet, laptop, large classroom, projector, blackboard
5.2 to conduct practical activities	• Internet, classroom for 20-30 students, laptop, projector, blackboard/whiteboard

6. Specific competencies acquired through this discipline

Specific competencies	Ability to solve exactly and/or approximately several types of basic mathematical problems such as integrals, algebraic equations and differential equations. • Ability to compute complex derivatives and integrals. • Ability to use differential transforms: the Laplace transform, the Z transform and the Fourier transform. • Ability to employ basic instruments of the probability and statistics theory.
Professional competencies ascribed to the specific competencies	• 1. Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. 2. Application of basic methods for signal acquisition and processing. 3. Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrollers, programming languages and techniques. 4. Design, implementation and service operation of data, voice, video multimedia, based on understanding and applying fundamental concepts in communications and information transmission. 5. Solving technological problems in fields of applied electronics.
Transversal competencies ascribed to the specific competencies	• 1. Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment of professional tasks. 2. Definition of activity stages and their distribution to subordinates in terms of responsibilities, providing effective exchange of information and interpersonal communication. 3. 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	• The general objective of the discipline is to provide the students with a strong background on numerical approximation methods, equation-solving techniques and probability and statistics essentials
7.2 Specific objectives	• Numerical approximation skills: approximation of functions, approximation of integrals • Equation-solving skills: numerical solutions of nonlinear algebraic equations, exact and numerical solutions for differential equations, exact solutions for particular cases of partial differential equations, solutions of certain variational problems • Probability and statistics-related skills: application of classical probability schemes, computation of random variables, applications of descriptive statistics

8. Content [11]

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

8.1 Course	Number of hours	Teaching methods [12]
1. Interpolation, least squares approximation, numerical integration	4	Face-to face lectures, blackboard/whiteboard presentation, overhead projector presentation.
2. Numerical solutions for algebraic and differential equations	4	
3. Complex numbers	4	
4. Laplace transform	4	
5. Z transform	4	
6. Fourier transform	4	
7. Elements of probability theory and statistics	4	

Bibliography [13]

Năslău P., Negrea R., Cădariu L., Căruntu B., Popescu D., Balmez M., Dumitrascu C., Matematici asistate de calculator, Ed. Politehnica, Timisoara, 2005

Negrea R., Căruntu B., Hedrea C., Advanced calculus in engineering, Ed. Politehnica, Timisoara, 2009

8.2 Applied activities [14]	Number of hours	Teaching methods
Seminar		
1. Interpolation and approximation: Lagrange interpolation polynomial, Least squares approximation polynomial, numerical integration using the trapeze and Simpson methods 2. Approximate solutions of algebraic equations using Newton's method 3. Complex numbers, holomorphic functions, the complex integral. 4. Solutions of linear differential equations using the Laplace transform 5. Solutions of recurrence equations using the Z transform, applications of the Fourier transform 6. Elements of probability and statistics: classical probability schemes , random variables, descriptive statistics.	14	Examples and exercises illustrating the notions introduced during the course.
Laboratory		
1. Introduction to the Matlab software. 2. Interpolation and approximation: Lagrange interpolation polynomial, Least squares approximation polynomial, numerical integration using the trapeze and Simpson methods 3. Approximate solutions of algebraic equations using Newton's method 4. Numerical solutions of differential equations using Euler's and Runge-Kutta methods 5. Solutions of linear differential equations using the Laplace transform 6. Elements of probability and statistics: classical schemes of probability, random variables, descriptive statistics.	14	Implementation in Matlab of the methods introduced during the course.

"(*)".

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

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".

Bibliography [15]

Năslău P., Negrea R., Cădariu L., Căruntu B., Popescu D., Balmez M., Dumitrascu C., Matematici asistate de calculator, Ed. Politehnica, Timisoara, 2005

Negrea R., Căruntu B., Hedrea C., Advanced calculus in engineering, Ed. Politehnica, Timisoara, 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 mathematical topics included in the Special Mathematics course are taught in most universities around the world to students in Electronics and Telecomunnications and the teaching methods combine classic presentation techniques with modern ones, through mathematical software (Matlab, Mathematica).

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course		Written examination	50%
10.5 Applied activities	**S:**	Written evaluation test	25%
	L:	Computer-based evaluation test	25%
	P[17]**:**		
	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])			
●			

Date of completion	**Course coordinator**	**Coordinator of applied activities**
19.06.2023	**(signature)**	**(signature)**

Director de departament	**Data avizării în Consiliul Facultății**	**Decan**
(semnătura)	**14.09.2023**	**(semnătura)**

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.