



DISCIPLINE ACADEMIC SHEET
ACADEMIC YEAR 2025 – 2026

1. PROGRAMME DATA

1.1. Higher Education Institution	UNIVERSITY OF CRAIOVA
1.2. Faculty	Automation, Computers and Electronics
1.3. Department	Computers and Information Technology
1.4. Field of Study	Computers and Information Technology
1.5. Study level	L(License / Undergraduate)
1.6. Organizational form	IF
1.7. Study Program (name/code) /Qualification	Computers / L2060101010

2. DISCIPLINE DATA

2.1 Discipline Name				Special Mathematics			
2.2 Course Activities Holder				Prof. dr. Cristian VLADIMIRESCU			
2.3. Practical Activities Holder				Asist. dr. Andrei GRECU			
2.4. Study Year	1	2.5. Semester	2	2.6. Evaluation type	E	2.7. Discipline regime	DOB

3. ESTIMATED TOTAL TIME (hours per semester of teaching activities)

3.1. Number of hours per week	5	in which: 3.2 course	3	3.3. seminar	2
3.4. Total hours of curriculum	70	in which: 3.5 course	42	3.6. seminar	28
3.7. Time distribution - hours/week					hours
Study after manual, course support, bibliography and notes					28
Additional documentation in library, on specialized electronic platforms and field					7
Training seminars, homework, portfolios and essays					14
Tutorial					2
Examinations					2
Other activities: consultations, student meetings					2
Total hours per individual activities					55
3.8. Total hours per semester					125
3.9. Number of credits					5

4. PRECONDITIONS (where appropriate)

4.1. of curriculum	The students should have mathematical notions learned during the high school and those from the following disciplines: Mathematical Analysis, Linear Algebra, Analytical and Differential Geometry.
4.2. of competence	There are not necessary.

5. CONDITIONS (where appropriate)

5.1. of the course	The course is taught explanatory and interactively with the students. Course support is provided in electronic format on the Google Classroom platform, and access to updated documentation is ensured. The teaching process has the following structure: -80% theoretical presentation, based on the course support; -20% interactive activity with the students.
5.2. of seminar	The seminar is taught interactively with the students. Seminar support is provided in electronic format on the Google Classroom platform.

6. COURSE OBJECTIVES – expected learning outcomes that are supported by completing and passing the course

Knowledge	Student/Graduate: - Identifies and describes basic concepts, principles, and methods in mathematics. - Explains and interprets theoretical and experimental results in mathematics.
Skills (Abilities)	Student/Graduate: - Operates with basic concepts, principles, and methods in mathematics. - Solves mathematical problems applicable in engineering and validates the solution obtained. - Applies evaluation criteria and methods to identify, model, experiment, analyze, and qualitatively and quantitatively assess phenomena and processes specific to the fundamental field, including the use of digital technologies.
Responsibility and autonomy	Student/Graduate: - Applies the values of ethics and professional conduct in the engineering profession. - Practices logical reasoning, evaluation, and self-evaluation in decision-making. - Promotes dialogue, cooperation, respect for others, and interculturalism.

7. CONTENT

7.1. Course	The method of implementation	Teaching methods	Allocated time (hours)
1. Complex Analysis 1.1. Complex numbers. Algebraic properties. The Euclidean distance, the modulus, the conjugate. Inequalities. Geometric representation 1.2. Sequences of complex numbers. Complex functions of complex variables. Continuity, differentiability, Cauchy-Riemann equations, analytic functions 1.3. Power series with complex coefficients, convergence, the fundamental theorems of Abel, Cauchy-Hadamard, differentiability, expansion in Taylor series	Face to face	Exposition The course is taught explanatory and interactively with the students. Course support is provided in electronic format on the Google Classroom platform, and access to updated documentation is ensured. The teaching process has the following structure: -80% theoretical presentation, based on the course support; -20% interactive activity with the students.	12

1.4. Elementary functions defined as power series. The exponential, sin, cos, argument, logarithm, the power function, the root function. Solving simple equations 1.5. Paths in the complex plane. The integral of a complex function: definition, properties. Cauchy theorem for analytic functions. Leibniz- Newton formula 1.6. The zeros of an analytic function. Isolated singular points: classification (removable, pole, essential) 1.7. Laurent series. The convergence annulus. The theorem of existence and uniqueness. Expansion in Laurent series 1.8. The residue of a function at an isolated singular point. The residue theorem. Application to the computing of certain real improper integrals			
2. Ordinary Differential Equations 2.1. ODEs, initial conditions, Cauchy problems 2.2. Solving first order ODEs through elementary methods: exact ODEs, separable ODEs, homogenous ODEs, linear ODEs, Bernoulli, Riccati, Clairaut, Lagrange ODEs 2.3. ODEs of higher order with constant coefficients. Euler ODEs 2.4. Systems of linear first order ODEs with constant coefficients	Face to face		9
3. Fourier Series 3.1. Periodic signals. Odd, even functions, extension through periodicity, oddness, evenness, odd extensions, even extensions 3.3. Fourier coefficients, the Fourier series associated to a function 3.4. Parseval's formula. Bessel's inequality 3.6. Expansions in Fourier series, Fourier sine series, Fourier cosine series. The computing of the sums of certain numerical series by using Fourier series	Face to face		6
4. Laplace and z-Transforms 4.1. Improper integrals. Euler's Beta and Gamma functions 4.2. Original signals. Laplace transform: definition, properties, fundamental theorems 4.4. Laplace transforms of elementary functions	Face to face		9

4.5. Calculus of various Laplace transforms, finding the original, applications to ODEs and integral equations			
4.6. Elementary discrete signals. z-transform (discrete Laplace transform)			
4.7. Finding of the general term of discrete signals that are defined by linear recurrence			
5. Fourier Transform 5.1. Integrable signals. Fourier transform. Inversion of the Laplace transform, Mellin–Fourier Theorem 5.2. Fourier transforms through sine and cosine 5.3. Solving certain integral equations, representation of certain functions as Fourier integrals	Face to face		6
Bibliography:			
1. C. Avramescu, C. Vladimirescu, Differential and Integral Equations for Computer Science Students, Univ. of Craiova Publisher, 2003 (in Romanian). 2. C. Avramescu, C. Vladimirescu, Calculus Course, Univ. of Craiova Publisher, 2002 (in Romanian). 3. T. Bălan, Chapters of Special Mathematics, Univ. of Craiova Publisher, 1998 (in Romanian). 4. V. Ditkine, A. Proudnikov, Calcul Opérationnel, Mir, Moscou, 1979. 5. M. Evgrafov et. coll., Recueil de Problèmes sur la Théorie des Fonctions Analytiques, Mir, Moscou, 1974. 6. G.B. Folland, Fourier Analysis and Its Applications, First Edition, Pure and Applied Undergraduate Texts, American Mathematical Society, 1992. 7. U. Graf, Applied Laplace Transforms and Z-Transforms for Scientists and Engineers. A Computational Approach using a Mathematica Package, Birkhäuser Basel, 2004. 8. W.R. LePage, Complex Variables and the Laplace Transform for Engineers, Dover Publications, 2010. 9. J.L. Schiff, The Laplace Transform. Theory and Applications, Springer, 1999. 10. C. Vladimirescu, Special Mathematics, Universitaria Craiova Publisher, 2020 (in Romanian). 11. C. Vladimirescu, Mathematical Analysis - Theory and Applications (electronic support), 2025. 12. D.G. Zill, P.D. Shanahan, A First Course in Complex Analysis with Applications, Jones and Bartlett Publishers, 2003.			

7.2. Seminar	The method of implementation	Teaching methods	Allocated time (hours)
1. Complex Analysis 1.1. Complex numbers. Algebraic properties. The Euclidean distance, the modulus, the conjugate. Inequalities. Geometric representation 1.2. Sequences of complex numbers. Complex functions of complex variables. Continuity, differentiability, Cauchy-Riemann equations, analytic functions 1.3. Power series with complex coefficients, convergence, the fundamental theorems of Abel, Cauchy-Hadamard,	Face to face	Solving practical applications The seminar is taught interactively with the students. Seminar support is provided in electronic format on the Google Classroom platform.	8

differentiability, expansion in Taylor series 1.4. Elementary functions defined as power series. The exponential, sin, cos, argument, logarithm, the power function, the root function. Solving simple equations 1.5. Paths in the complex plane. The integral of a complex function: definition, properties. Cauchy theorem for analytic functions. Leibniz-Newton formula 1.6. The zeros of an analytic function. Isolated singular points: classification (removable, pole, essential) 1.7. Laurent series. The convergence annulus. The theorem of existence and uniqueness. Expansion in Laurent series 1.8. The residue of a function at an isolated singular point. The residue theorem. Application to the computing of certain real improper integrals			
2. Ordinary Differential Equations 2.1. ODEs, initial conditions, Cauchy problems 2.2. Solving first order ODEs through elementary methods: exact ODEs, separable ODEs, homogenous ODEs, linear ODEs, Bernoulli, Riccati, Clairaut, Lagrange ODEs 2.3. ODEs of higher order with constant coefficients. Euler ODEs 2.4. Systems of linear first order ODEs with constant coefficients	Face to face		6
3. Fourier Series 3.1. Periodic signals. Odd, even functions, extension through periodicity, oddness, evenness, odd extensions, even extensions 3.3. Fourier coefficients, the Fourier series associated to a function 3.4. Parseval's formula. Bessel's inequality 3.6. Expansions in Fourier series, Fourier sine series, Fourier cosine series. The computing of the sums of certain numerical series by using Fourier series	Face to face		4
4. Laplace and z-Transforms 4.1. Improper integrals. Euler's Beta and Gamma functions	Face to face		6

4.2. Original signals. Laplace transform: definition, properties, fundamental theorems 4.4. Laplace transforms of elementary functions 4.5. Calculus of various Laplace transforms, finding the original, applications to ODEs and integral equations 4.6. Elementary discrete signals. z-transform (discrete Laplace transform) 4.7. Finding of the general term of discrete signals that are defined by linear recurrence			
5. Fourier Transform 5.1. Integrable signals. Fourier transform. Inversion of the Laplace transform, Mellin–Fourier Theorem 5.2. Fourier transforms through sine and cosine 5.3. Solving certain integral equations, representation of certain functions as Fourier integrals	Face to face		4
Bibliography: 1. C. Avramescu, C. Vladimirescu, Differential and Integral Equations for Computer Science Students, Univ. of Craiova Publisher, 2003 (in Romanian). 2. C. Avramescu, C. Vladimirescu, Calculus Course, Univ. of Craiova Publisher, 2002 (in Romanian). 3. T. Bălan, Chapters of Special Mathematics, Univ. of Craiova Publisher, 1998 (in Romanian). 4. V. Ditkine, A. Proudnikov, Calcul Opérationnel, Mir, Moscou, 1979. 5. M. Evgrafov et. coll., Recueil de Problèmes sur la Théorie des Fonctions Analytiques, Mir, Moscou, 1974. 6. G.B. Folland, Fourier Analysis and Its Applications, First Edition, Pure and Applied Undergraduate Texts, American Mathematical Society, 1992. 7. U. Graf, Applied Laplace Transforms and Z-Transforms for Scientists and Engineers. A Computational Approach using a Mathematica Package, Birkhäuser Basel, 2004. 8. W.R. LePage, Complex Variables and the Laplace Transform for Engineers, Dover Publications, 2010. 9. J.L. Schiff, The Laplace Transform. Theory and Applications, Springer, 1999. 10. C. Vladimirescu, Special Mathematics, Universitaria Craiova Publisher, 2020 (in Romanian). 11. C. Vladimirescu, Mathematical Analysis - Theory and Applications (electronic support), 2025. 12. D.G. Zill, P.D. Shanahan, A First Course in Complex Analysis with Applications, Jones and Bartlett Publishers, 2003.			

8. Correlating the content of the discipline with the expectations of representatives from the epistemic community, professional associations and representative employers in the field related to the program

Development and acquiring of notions, methods, and actual mathematical techniques, used to the mathematical modelling of engineering problems.

9. EVALUATION

Activity Type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Final mark weight
9.4. Course	- The understanding the problem - The mathematical statement	Exam: written test Exam assistance: 2 internal examiners Evaluations: The written test has 6 applicative problems with actual working time 3 hours;	80%

	- The solving of the problem	each problem is mandatory and is assessed by a score from 1 (for free) to 10. The score at the written test is the arithmetic mean of the scores at the 6 problems. The weight of the score at the written test in the final score is 80%. Evaluations of continuous assessments is made during the semester, based on: - a set of homeworks, whose weight in the final score is 10%; - the activity of the students at the seminar, whose weight in the final score is 10%.	10% 10%
9.5. Seminar	- the degree of development of practical skills and the ability to operate with the fundamental notions, techniques, and methods introduced	The activity of the students at the seminar has the weight in the final score 10%. The final score is deduced by using the formula: $S_{final} = 0.8 \times SWT + 0.1 \times SHW + 0.1 \times SS$, where SWT is the score obtained at the final written test SHW is the score at the homeworks, and SS is the score at the activity at the seminar.	10%
9.6. Minimum standard of performance			
- Minimum standards to promote: the understanding of the notions and basic terminology. - The obtaining of a minimum 50% from the continuous assessments and the written exam. - The the final score is made by rounding up to integer number.			

Date of Completion	Signature of the Course Activities Holder,	Signature of the Practical Activities Holder,
23.08.2025	Prof. dr. Cristian VLADIMIRESCU	Asist. dr. Andrei GRECU Prof. dr. Cristian VLADIMIRESCU

Date of Approval in the Department	Signature of the Department Director,
25.08.2025	Ş.I.dr.ing. Nicolae ENESCU

Date of Approval in the Faculty	Signature of the Dean,
	Prof.dr.ing. Dorin ŞENDRESCU