



ROMÂNIA
MINISTERUL EDUCAȚIEI ȘI CERCETĂRII
UNIVERSITATEA DIN CRAIOVA
FACULTATEA DE INGINERIE ELECTRICĂ

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NUMELE DISCIPLINEI MATEMATICI SPECIALE I	COURSE NAME SPECIAL CHAPTERS OF MATHEMATICS I
DATE GENERALE	GENERAL INFORMATION
Program de studii: Ingineria Sistemelor Electroenergetice Anul: I Semestrul: II Credite ECTS: 4 Tipuri de activități: Curs, Seminar Tip evaluare: examen Titular: Catalin Sterbeti	Study Program: Power Systems Engineering Year: I Semester: II ECTS Credits: 4 Types of activities: Lecture, Seminar Assessment: exam Lecturer: Catalin Sterbeti
SCOPUL DISCIPLINEI	COURSE PURPOSE
Disciplina cuprinde capitolele Ecuatii diferentiale si Analiza complexa, capitole esentiale pentru ingineria electrica. Cele doua capitole de matematici mentionate sunt baza pentru cursul de Matematici Speciale II, in care transformarile integrale (Fourier si Laplace) sunt aplicatii ale analizei complexe. De asemenea teoria ecuatiilor cu derivate partiale este o prelungire naturala a teoriei ecuatiilor diferentiale. Disciplina genereaza studentilor de la ingineria sistemelor electroenergetice cadrul pentru a putea intelege modelele matematice ce apar in discipline fundamentale specifice domeniului ingineresc.	The course includes the chapters Differential Equations and Complex Analysis, essential chapters for electrical engineering. The two mathematics chapters mentioned are the basis for the course Special Mathematics II, in which integral transforms (we talk about Fourier and Laplace) are applications of complex analysis. Also, partial differential equations are a natural extension of differential equations. The course generates for students of power systems engineering the framework to be able to understand the mathematical models that appear in fundamental disciplines specific to the engineering field.
CERINȚE PREALABILE	PREREQUISITES
Analiza matematica	Mathematical Analysis
OBIECTIVE	OBJECTIVES
• Analiza circuitelor de current alternativ • Procesarea semnalelor • Teoria controlului	• AC Circuit Analysis • Signal Processing • Control Theory
CONȚINUT CURS	LECTURE CONTENT
1. Ecuatii diferentiale ordinare . Notiuni fundamentale 2. Ecuatii diferentiale de ordinul I (cu variabile separabile, omogene, reductibile la ecuatii omogene, cu derivate totale exacte) 3. Ecuatii diferentiale liniare de ordinul I, ecuatii Bernoulli, Riccati, Lagrange, Clairaut 4. Ecuatii liniare de ordin superior (metoda variatiei constantelor si rezolvarea cu ajutorul metodei ecuatiei caracteristice) 5. Ecuatii diferentiale de ordin superior. Cazuri de reducere a ordinului 6. Sisteme de ecuatii diferentiale	1. Ordinary differential equations. Fundamental notions 2. First-order differential equations (with separable variables, homogeneous, reducible to homogeneous equations, with exact total derivative) 3. First-order linear differential equations, Bernoulli, Riccati, Lagrange, Clairaut equations 4. Higher-order linear equations (variation of constants method and solution using the characteristic equation method) 5. Higher-order differential equations. Cases of order reduction



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7. Aplicatii ale ecuatiilor diferentiale in studiul circuitelor electrice	6. Systems of differential equations
8. Multimea numerelor complexe (forma algebrica, forma trigonometrica, operatii cu numere complexe, reprezentari geometrice)	7. Applications of differential equations in the study of electrical circuits
9. Functii complexe elementare (polinomiale, rationale,exponentiala, functiile trigonometrice, unele functii multivoce)	8. The set of complex numbers (algebraic form, trigonometric form, operations with complex numbers, geometric representations)
10. Calcul diferential (conditii de derivabilitate - teorema Cauchy-Riemann), functii olomorfe, calculul derivatei)	9. Elementary complex functions (polynomials, rationals, exponentials, trigonometric functions, some multivalued functions)
11. Calcul integral. Integrala curbilinie complexa, integrala definita, integrale de tip Cauchy, teorema reziduurilor)	10. Differential calculus (differentiability conditions - Cauchy-Riemann theorem), holomorphic functions, derivative calculus)
12. Integrala Cauchy. Teorema lui Cauchy. Teorema reziduurilor	11. Integral calculus. Complex curvilinear integral, definite integral, Cauchy-type integrals, residue theorem)
13. Lemele lui Jordan. Aplicatii ale calculului integral la calculul integralelor reale	12. Cauchy integral. Cauchy's theorem. Residue theorem
14. Transformari conforme	13. Jordan's lemmas. Applications of integral calculus to the calculation of real integrals
	14. Conformal transformations
METODE DE EVALUARE	EVALUATION METHODS
Examen, Evaluare continua, Referate, Teme	Exam, Continuous Assessment, Papers, Homework
COMPETENȚE DOBÂNDITE	ACQUIRED COMPETENCIES
• Imbinarea rationamentului mathematic abstract cu aplicabilitatea practica • utilizarea proprietăților funcțiilor complexe, a ecuațiilor Cauchy-Riemann, a integralelor pe contur, pentru a modela și rezolva probleme ingineresti din ingineria electrică • capacitatea de a descrie matematic procesele fizice cu ajutorul ecuatiilor diferentiale	• Combining abstract mathematical reasoning with practical applicability • using the properties of complex functions, Cauchy-Riemann equations, and contour integrals to model and solve engineering problems in electrical engineering • the ability to mathematically describe physical processes using differential equations
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