

# SYLLABUS

<b>Discipline name</b>	Special Mathematics
<b>Profile</b>	Electronics and Telecommunications Engineering
<b>Specialization</b>	Telecommunications Technologies and Systems
<b>Code</b>	51320909
<b>Course leader</b>	Prof. Dorian Popa, Ph.D., <a href="mailto:dorian.popa@math.utcluj.ro">dorian.popa@math.utcluj.ro</a>
<b>Collaborators</b>	Lecturer Adela Novac, Ph.D., <a href="mailto:adela.novac@math.utcluj.ro">adela.novac@math.utcluj.ro</a>
<b>Department</b>	Mathematics
<b>Faculty</b>	Automation and Computer Science

Sem.	Type of discipline	Course	Applications			Course	Applications			Ind. study	TOT AL	Cr ed its	Form of assessment
		[hours/week]			[hours/sem.]								
			S	L	P		S	L	P				
<b>2</b>	<b>Fundamental</b>	<b>2</b>	<b>2</b>		<b>-</b>	<b>28</b>		<b>28</b>	<b>-</b>	<b>94</b>	<b>150</b>	<b>5</b>	<b>Exam</b>

## Acquired competences :

### Acquired skills (what the student is able to do):

Motions and concepts concerning, line integrals, multiple integrals, surface integrals and relations between them, complex functions – differentiation and integration.

### Acquired abilities: (what type of equipment/instruments/software the student is able to handle)

- To operate with line integrals
- To operate with multiple integrals
- To operate with surface integrals
- To operate with complex functions

## Prerequisites ( if necessary)

Notions on mathematical analysis, algebra and trigonometry from high school

## A. Course/Lecture (course/lecture titles)

- Course 1 – Line integrals of the first kind
- Course 2 – Line integrals of the second kind
- Course 3 – Differential forms
- Course 4 – Measurable sets in  $\mathbb{R}^n$
- Course 5 – The Riemann integral in  $\mathbb{R}^n$
- Course 6 – Evaluation of multiple integral by iteration
- Course 7 – Change of variables in multiple integrals
- Course 8 – Surface integrals of the first kind.
- Course 9 – Surface integrals of the second kind.
- Course 10 Integral formulas: Green, Stokes, Gauss-Ostrogradski
- Course 11 –Holomorphic functions. Cauchy-Riemann equations
- Course 12 – Complex integral
- Course 13 – Taylor series. Laurent series
- Course 14- Residues theorem

## B1. Applications – Laboratory (list of laboratories), Seminar (contents), Project (project contents)

<b>1</b>	<ul style="list-style-type: none"> <li>Seminar 1 – Line integrals of the first kind</li> <li>Seminar 2 – Line integrals of the second kind</li> <li>Seminar 3 – Differential forms</li> <li>Seminar 4 – Measurable sets in <math>\mathbb{R}^n</math></li> <li>Seminar 5 - The Riemann integral in <math>\mathbb{R}^n</math></li> <li>Seminar 6 – Evaluation of multiple integral by iteration</li> <li>Seminar 7 – Change of variables in multiple integrals</li> <li>Seminar 8 – Surface integrals of the first kind.</li> <li>Seminar 9 – Surface integrals of the second kind.</li> <li>Seminar 10 - Integral formulas: Green, Stokes, Gauss-Ostrogradski</li> <li>Seminar 11 –Holomorphic functions. Cauchy-Riemann equations</li> <li>Seminar 12 – Complex integral</li> <li>Seminar 13 – Taylor series. Laurent series</li> <li>Seminar 14- Residues theorem</li> </ul>
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<b>C. Individual study</b> (reference study contents, synthesis materials, projects, applications etc.)						
2 synthesis reports						
12 sets of problems (the preparation part in every laboratory)						
3 sets of problems (course homework)						
Individual study structure	Course study	Problem solving, laboratory, project	Applications preparation	Examination time	Additional reference study	Total no. of individual study hours
Hours	28	36	18	3	9	94

<b>References</b> ( Textbooks, courses, laboratory manual, exercise book)
T.Apostol, Mathematical Analysis, Addison-Wesley Publishing Company, 1981.
S.Lang, Undergraduate Analysis, Springer, 1997.
D. Popa, Calcul integral, Editura Mediamira, 2005.

<b>Final evaluation</b>	
Evaluation method	Written paper – 3 hours containing theory and problems. After 7 courses partial evaluation (3 hours)
Mark components	Seminar S Theory T Problems P
Mark computation	$N=0,2S+0,2T+0,6P$

**Course leader,  
Prof.dr.Dorian Popa**