SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Computer science/ Engineer
1.7 Form of education	Full time
1.8 Subject code	8.

2. Data about the subject

2.1 Subject name	*Mathematical analysis II (Integral calculus and differential equations)*				
2.2 Course responsible/lecturer	Prof. dr. Dumitru Mircea Ivan - mircea.ivan@math.utcluj.ro				
2.3 Teachers in charge of seminars/ laboratory/ project	Assoc.prof.dr. Mircea Rus – rus.mircea@math.utcluj.ro				
2.4 Year of study	I	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DF
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars	2	Laboratory		Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars	28	Laboratory		Project	

3.3 Individual study:	
(a) Manual, lecture material and notes, bibliography	20
(b) Supplementary study in the library, online and in the field	20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
(d) Tutoring	5
(e) Exams and tests	4
(f) Other activities:	0

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	69
3.5 Total hours per semester (3.2+3.4)	125
3.6 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	Basic knowledge Integral Calculus
4.2 Competence	Competences in elementary Integral Calculus: primitives, definite integrals

5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

6. Specific competence

6.1 Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 -** Recognizing and describing specific concepts to calculability, complexity, programming paradigms and modeling of computing and communication systems **C1.2 -** Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and communication systems

	C1.3 - Building models for various components of computing systems
	C1.4 - Formal evaluation of the functional and non-functional characteristics of computing systems
	C1.5 - Providing theoretical background for the characteristics of the designed systems
6.2 Cross competences	N/A

7. Discipline objective (as results from the *key competences gained*)

7.1 General objective	A presentation of the concepts, notions, methods and fundamental techniques used in integral calculus.
7.2 Specific objectives	Use of the integral calculus in order to solve problems in engineering.

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Ordinary differential equations (ODE) of order one	2		
Linear homogeneous ODE with constant coefficients	2		
Linear non-homogeneous ODE with constant coefficients	2		
Positive and linear functionals.	2		
Riemann-Stieltjes integral. Primitives.	2	Explanation	
Improper integrals.	2		
Integrals depending on parameters.	2		
Special functions	2	Demonstration	
Paths. Vector fields. Line integrals with respect to the coordinates. Circulation.	2	Collaboration	
Differential Forms. Exact differential forms. Path-independence. Work.	2	Interactive activities	
Line integrals with respect to the arc length. Total mass, center of mass.	2		
Double integral. Green-Riemann formula.	2		
Surface integral. Flux of vector field across a surface. Stokes' Theorem.	2		
Volume integral. Gauss-Ostrogradsky Theorem. MATHEMATICA capabilities.	2		
Bibliography			
1. Mircea Ivan. Elemente de calcul integral. Mediamira, Cluj-Napoca, 2003. ISBN 973-9357-40-7.			
2. Dumitru Mircea Ivan. Calculus. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9358-88-8.			

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Ordinary differential equations (ODE) of order one (Exercises)	2		
Linear homogeneous ODE with constant coefficients (Exercises)	2		
Linear non-homogeneous ODE with constant coefficients (Exercises)	2		
Positive and linear functionals (Exercises)	2		
Riemann-Stieltjes integral. Primitives (Exercises)	2	Explanation	
Improper integrals (Exercises)	2		
Integrals depending on parameters(Exercises)	2	Demonstration	
Special functions (Exercises)	2		
Line integrals with respect to the coordinates(Exercises)	2	Collaboration	
Differential Forms (Exercises)	2		
Line integrals with respect to the arc length. (Exercises)	2	Interactive activities	
Double integral. Green-Riemann formula. (Exercises)	2		
Surface integral. (Exercises)	2		
Volume integral. MATHEMATICA related capabilities. (Exercises)	2		
Bibliography			
1. Dumitru Mircea Ivan, et al. Analiză matematică - Culegere de probleme pentru seminarii, examene şi concursuri. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9357-20-2.			
2. Mircea Ivan et al. Culegere de Probleme Pentru Seminarii, Examene şi Concursuri. UT Press, Cluj-Napoca, 2000.			

*Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica şi etapele proiectului.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Collaboration with engineers in order to identify and solve problems raised by the market.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Abilities of understanding and using creatively the concepts and proofs	Written examination	30%
Seminar	Abilities of solving problems and applying algorithms	Written examination	70%
Minimum standard of performance: Ability to present coherently a theoretical subject and to solve problems with practical content.			

Date of filling in:	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Prof.dr. Mircea Ivan	
	Applications	Assoc.prof.dr. Mircea Rus	

Date of approval in the department	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the Faculty Council	Dean Prof.dr.ing. Liviu Miclea