

Program	Level		Third cycle			
	Name of the program		SEE Doctoral Studies in Mathematical Science			
COURSE						
Course title	Numerical simulations					
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)		
AMAT 665	II	Elective course	10	30		
Lecturer	prof. dr Aleksandra Kostić					
Course Goals	A number of problems in natural and technical sciences are described by differential or partial differential equations, which in practice are solved most often by numerics. The goal of the course is to get participants acquainted with methods, understand some of the algorithms, get acquainted with the stability of methods and the estimation of error and to train for a quality and independent approach to this topic.					
COURSE CONTENT						
<ul style="list-style-type: none"> - Repetition of basic concepts and theorems from differential equations and partial differential equations. - Single-step methods (Ojler polygonal method, general single-step step proces (Hojen method, explicit Runge-Angle method) and extrapolation method) - Multi-step methods (Adams-Basfort method, Adam-Moulton method, predictor-concealer method, Milne method, implicit Ojler method, BDF method) - Krut (stiff) problem (motivation, stability area, implicit Runga-Kuta method, Rozenbrok method, extrapolation, choice of method) - Differential-algebraic systems or shorter DAS index 1 (DAS system index, mass matrix problem, multi-step method) - Numerical methods for boundary conditions (methods for solving initial conditions, finite difference method, variation methods) - Finite differences methods for elliptical boundary conditions (problem model, Nojman boundary conditions, Poinson equation in general area, general differential operator, ideas for finite volume method) - Konačni elementi za eliptične granične uslove (variacione metode, metode konačnih elemenata, procjena greške, realizacija metoda konačnih elemenata, software) - Parabolični početni uslovi (metoda konačnih razlika, metoda linije) 						
LITERATURE			GRADING			
[1] Heinrich Voss, Numeričke simulacije-skripta Tehničkog univerziteta Hamburg-Harburg [2] Wolfgang Dahman, Arnold Reusken, Numerik fuer Ingenieure und Naturwissenschaftler, Springer 2005, ISBN-10 3-540-25544-3 [3] Desanka P. Radunović , Numeričke metode, akademska misao, Beograd 2003. [4] Aleksandra Kostić , Viša matematika za inženjere, Prirodno-matematički fakultet Sarajevo 2015., ISBN 978-9958-592-66-9			Criterion		Maximum points	Minimum points
			1.	Assignments	20	10
			2.	Projects	40	25
			3.	Final exam	40	20
			Total		100	55