



Course name: MATH 428 Scientific Computing		Department: Mathematics		Semester		
				8		
Methods of Education					Credit (ECTS)	
Lecture	Recitation/ (Etud)	Lab	Exams	Homework/ Quiz	Other	Total
42	0	0	40	0	98	180
						6

Language English

Compulsory/Elective Elective

Prerequisites None

Weeks	Subjects
1	<ul style="list-style-type: none"> ▪ Computational Basics
2	<ul style="list-style-type: none"> ▪ Background of Numerical Linear Algebra
3	<ul style="list-style-type: none"> • Solving Linear Systems
4	<ul style="list-style-type: none"> • Eigen-Problems • The Power Method
5	<ul style="list-style-type: none"> ▪ Jacobi Iteration ▪ The Pseudoinverse
6	<ul style="list-style-type: none"> • Singular Value Decomposition
7	<ul style="list-style-type: none"> • Background: Numerical Calculus • Data Fitting
8	<ul style="list-style-type: none"> ▪ Finding Roots ▪ The Piecewise Linear Approach
9	<ul style="list-style-type: none"> ▪ The Newton-Raphson Method
10	<ul style="list-style-type: none"> ▪ Bivariate Functions
11	<ul style="list-style-type: none"> ▪ Bilinear Interpolation ▪ The Newton-Raphson Method with Multivariate Functions

Course Contents

	12	<ul style="list-style-type: none"> Visualizing Empirical Data 	
	13	<ul style="list-style-type: none"> Case Studies with MATLAB 	
	14	<ul style="list-style-type: none"> Case Studies with MATLAB 	
Course Objectives	<p>1.To familiarize students with the basic concepts, principles and methods of Scientific Computing</p> <p>2.To provide the knowledge of applications of Scientific Computing and Programming</p>		
Learning Outcomes and Competences	<p>To understand and use basic methods with:</p> <ul style="list-style-type: none"> Write simple Matlab program scripts Solve systems of linear equations using Matlab. Find roots of of mathematical functions. Numerically solve simple differential equations. Find optimum solutions to numerical problems Use Monte-Carlo techniques to obtain approximate solutions. Explain the mathematical basis of the above techniques. 		
Textbook and /or References	<ul style="list-style-type: none"> Introduction to Scientific Computing and Data Analysis, Mark H. Holmes (Author), Springer; 1st ed. 2016. Scientific Computing with MATLAB and Octave Alfio Quarteroni (Author), Fausto Saleri (Author), Paola Gervasio (Author), Springer; 4th ed. 2014. 		
Assessment Criteria		If any, mark as (X)	Percentage (%)
	Midterm Exams	X	40
	Quizzes		
	Homework		
	Projects		
	Term Paper		
	Laboratory work		
	Other		
	Final Exam	X	60
Instructors			