Course Name : Numerical Analysis

Course Code	Course Type	Regular Semester	Lecture (hours/week)	Seminar (hours/week)	Lab. (hours/week)	Credits	ECTS
CMP 120	B	Spring	3.00	1.00	0.00	3.50	5.00

Lecturer	Elsid Miraka, Msc
Assistant	Shpendi Vila, Msc
Course language	Albanian
Course level	Bachelor
Description	Binary Numbers. Error analysis. Solving systems of linear equations: Gaussian elimination, modified Gaussian elimination, and LU decomposition. Solving nonlinear equations and systems: methods of Bisection, Newton, Secant, and fixed-point iteration. Interpolation: Lagrange approximation, Newton polynomials, and polynomial approximation. Curve fitting. Numerical differentiation; numerical integration. Numerical optimization. Numerical solutions of initial value problems and boundary value problems: Euler's methods, Heun's method, Taylor's method, Runge-Kutta.
Objectives	Understanding the difference between solving problems by hand and using a computer
Core Concepts	Binary Numbers. Error Analysis. Solving systems of linear equations: Gaussian elimination, modified Gaussian elimination, and LU decomposition. Solving nonlinear equations and systems: bisection method, Newton's method, secant method, and fixed-point iteration. Interpolation: Lagrange approximation, Newton polynomials, and polynomial approximation. Curve fitting. Numerical differentiation; numerical integration. Numerical optimization. Numerical solutions of initial value problems and boundary value problems: Euler's methods, Heun's method, Taylor's method, Runge-Kutta.

Course Outline

Week	Topic
1	Numrat Binare
2	Analiza e gabimeve
3	Zgjidhja e ekuacioneve x=g(x). Metodat e kllapave, Njutonit, Sekantit dhe metodat e iteracionit te pikes fikse
4	Procesi Aitkenit dhe Metodat e Steffensenit dhe Mullerit
5	Iteracioni per sistemet jo lineare
6	Iteracioni per sistemet jo lineare
7	Metoda e Njutonit per sistemet jo lineare
8	Provimi gjysmefinal
9	Optimizimet numerike
10	Zgjidhje te sistemeve te ekuacioneve jo lineare. Eliminimi Gausian dhe shnderrimi L-U.
11	Zgjidhje te sistemeve te ekuacioneve lineare. Modifikimi i metodes se eliminimit Gausian
12	Vizualimi i Matricave.
13	Polinomet Njuton dhe Përafërsimi i polinomeve
14	Integrimi numerik. Metoda e Trapezit dhe Simpsonit.

15	Deferencimet numerike dhe integrimet numerike. Metoda e Euler
16	Final Exam

Prerequisites	The student must attend the course at a minimum rate of 75%.
Literature	• John H.Mathews, Numerical Methods using Matlab, Prentice-Hall International, 2004 • Analize Numerike, Prof. Dr. Fatmir Hoxha
References	• Numerical Methods with C++ Programming. NITA H. SHAH PHI Learning Pvt. Ltd., 2008

Course Outcome

1	Te kuptuarit te ndryshimit mes zgjidhjes se problemeve me dore dhe duke perdorur kompjuterin
2	Te kuptuarit te zgjidhjeve te metodave numerike dhe padyshim te pasurit te nje strukture te nje algoritmi

Course Evaluation

In-term Studies	Quantity	Percentage
Midterms	1	40
Quizzes	0	0
Projects	0	0
Term Projects	0	0
Laboratory	0	0
Class Participation	0	0
Total in-term evaluation percent		**40**
Final exam percent		**60**
Total		**100**

ECTS Workload (Based on Student Workload)

Activities	Quantity	Duration (hours)	Total (hours)
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64
Study hours outside the classroom (Preparation, Practice, etc.)	14	4	56
Duties	0	0	0
Midterms	1	2	2
Final Exam	1	2	2
Other	1	1	1
Total Work Load			**125**
Total Work Load / 25 (hours)			**5.00**
ECTS			**5.00**