



Instructors: Prof. Taiseer Alghanim and Eng.Mohammad Musleh
Sec#1:12:00-1:00, S-T.-Th, Room: L228
Sec#2:9:30-11:00, M, W, Room: L346

Course description:

Error analysis. Solution of equations in one variable. Numerical solution of a set of linear and nonlinear equations. Curve fitting and interpolation. Numerical integration and differentiation. Numerical solution of ordinary differential equations.

Course Learning Outcomes: *By the completion of the course the student should be able to:*

- 1-Solve equations in one variable.
- 2-Solve set of linear and nonlinear equations in multi-variables.
- 3-Use curve fitting to interpolate experimental data.
- 4-Use interpolating polynomial to interpolate experimental data.
- 5-Compute differentiation and integration numerically.
- 6-Solve the initial value problem.
- 7-Analyze the error performance of the different numerical methods.

Textbooks:

S.C. Chapra and R.P. Canale, *Numerical Methods for Engineers*, 7th Ed., McGraw – Hill, 2015

Course Structures

Topic		Topic	Ref.in Text	Lect. Hr	CLO	Teaching Procedure
1		Approximation and round-off errors	Ch.3	1		L*
2	Roots of Equations	The Graphical Method	Ch. 5.1	1	1&7	L, T*
		The Bisection algorithm	Ch. 5.2-3	2		L, T
		Fixed point Iteration	Ch. 6.1	2		L, T
		The Newton Raphson Method	Ch. 6.2	2		L, T
		The Secant Method	Ch. 6.3	2		L, T
First Test						
3	Linear Algebraic Equations	Gaussian Eliminations and Backward Substitution	Ch. 9.1-4	2	2 & 7	L, T
		Gauss-Jordan Method	Ch. 9.7	2		L, T
		LU Decomposition and Matrix Inversion	Ch. 10.1-2	2		L, T
		Gauss-Siedel Algorithm	Ch. 11.2	2		L, T
4	Curve Fitting	Least Squares Approximation	Ch. 17.1-2	3	3	L, T
5	Interpolation	Divided-Difference Method	Ch. 18.1	2	4	L, T
		Lagrange Method	Ch. 18.2	2		L, T
6	Integration Differentiation	Numerical Integration	Ch. 21.1-2	2	5 & 7	L, T
		Numerical Differentiation	Ch. 23.1	2		L, T
Second Test						
7	ODE	Euler Method	Ch. 25.1	3	6 & 7	L, T
Final Test						
				2		



(*) L: Lecturing

(**) T: Tutorial and Computer simulation.

References

1- R.L. Burden & J.D. Faires, "Numerical Analysis", 9th ed, Brooks/Cole, 2010.

2- W. Cheney & D. Kincaid, "Numerical Mathematics and Computing", 6th ed, Brooks/Cole, 2008

Assessment Methods:

Methods	Grade	Date
Test 1	20	
Test 2	20	
Lab. Work+Assignment + Quizzes	10	
Final Exam	50	

Relationships to Program Outcomes (SLO)	(a) an ability to apply knowledge of mathematics, science, and engineering
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