



**The Islamic University of Gaza
Civil Engineering Department**

COURSE TITLE: Numerical Analysis ECIV 3306

SEMESTER: First Semester 2011/2012

TEXT BOOK: Numerical Methods for Engineers, S. C. CHAPRA & R. P. CANALE, Fourth Edition, McGraw-Hill Inc. UK, 2002

REFERENCE: Applied Numerical Analysis, by: G. F. Gerald, P.O. Wheatley, Addison-Weseley Publishing Company, fifth edition 1994.
Numerical Analysis, by R. L. Burden, J.D. Faires, Prindle, Weber & Schmidt, third edition, 1985.

INSTRUCTOR: Eng. Hussein A. Hussein
Office: Room B243
Phone: 2860700 Ext. 2814, Email: hhussein@iugaza.edu.ps

TEACHING ASSISTANT:

- Eng. Ahmed Jaber
Office: Room B240
Phone: 2860700 Ext.2842 , Email:

PERQUISITE: Computer Programming (ECIV 2203), Differential Equations (MATH 2314)

COURSE AIMS:

- Solve complex mathematical problem using computer.
- Understanding the different sources of errors in numerical computations.
- Solve linear and nonlinear system of equations by different methods.
- Understanding how to fit curves with different methods.
- Differentiate and Integrate equations numerically.
- Solve system of differential equations.
- Using computer packages to solve numerical problems.

COURSE INTENDED LEARNING OUTCOMES:

- Understanding different methods to solve system of equations.
- Understanding how to select the suitable method to solve mathematical problem.
- Write individual complete computer programs to do specific tasks.
- Using computer packages like Matlab and Excel
- Implementation of curve fitting in different experimental works.
- Use of numerical integration of equations in finite element method.
- Implementation of numerical analysis on many real life problems.

Exams and Grading Policy:

Homework, Quizzes and Programming Assignment	20 points
Midterm Exam	30 points
Final Exam	50 points
Total	100 points

COURSE OUTLINE:

Week	Topics	
1	Introduction (Approximation and Errors)	
	Chapter 1	Mathematical Modeling
	Chapter 3	Approximation and Round-off Errors
	Chapter 4	Truncation Errors and Taylor Series
	1.3(b), 1.4, 1.5, 1.6, 3.6, 3.10, 4.2, 4.14	
2-4	Roots of Equations	
	Chapter 5	Bracketing Methods
	Chapter 6	Open Methods
	Chapter 7	Roots of Polynomials
	Chapter 8	Engineering Applications
5.3, 5.6, 5.12, 5.15, 5.22, 6.1, 6.3, 6.7, 6.14, 6.15, 6.30, 7.3, 8.16		
5-8	System of Linear Algebraic Equations	
	Chapter 9	Gauss Elimination
	Chapter 10	LU Decomposition and Matrix Inversion
	Chapter 11	Special Matrices and Gauss-Seidel
	Chapter 12	Engineering Applications
9.5, 9.6, 9.9, 10.3, 10.9, 11.5, 11.13, 11.17, 12.13, 12.18		
Midterm Exam 17th, November. Thursday (11:00-12:30)		
9-10	Curve Fitting	
	Chapter 17	Least-Square Regression
	Chapter 18	Interpolation
	Chapter 20	Engineering Applications
17.2, 17.13, 17.8, 17.9, 18.7, 18.13, 20.29		
11-12	Numerical Differentiation and Integration	
	Chapter 21	Newton-Cotes Integration Formulas
	Chapter 22	Integration of Equations
	Chapter 23	Numerical Differentiation
	Chapter 24	Engineering Applications
21.6, 21.7, 22.8, 22.9(a), 23.8, 24.17		
13	Ordinary Differential Equations	
	Chapter 25	Runge-Kutta Methods
	25.2, 25.19	
14	Partial Differential Equations	
	Chapter 29	Finite Difference Method: Elliptic Equations
	Chapter 30	Finite Difference Method: Parabolic Equations

Polices:

- ◆ Student with absences that exceed 25% will not be permitted to take the final exam.
- ◆ Homeworks must be submitted on time (*Penalty will be assigned for late delivery, or it may be not accepted*).
- ◆ The computer programs MATLAB will be introduced in this course.
- ◆ Programming Assignments must be error-free, tested using typical and unusual data and well documented.