Birzeit Univeristy
Mathematics Department
2nd Semester 2020/2021
MATH 330 – Course Outline

Text Book:

John H. Mathews and Kurtis D. Fink. **Numerical Methods using MATLAB**, **4th edition**. Pearson Education Inc., 2004.

Reference:

Richard L. Burden and J. Douglas Faires. **Numerical Analysis**, **8th edition**. Brooks/Cole, Cengage Learning, 2005.

Course Content:

	Chapter	Section
1	Preliminaries	1.1 + 1.3
2	Solution of Nonlinear Equations $f(x) = 0$	2.1 + 2.2 + 2.3 + 2.4
3	Solution of Linear Systems $AX = B$	3.3 + 3.4 + 3.5 + 3.6 + 3.7
4	Interpolation and Polynomial Approximation	4.1 + 4.2 + 4.3 + 4.4
5	Curve Fitting	5.1 + 5.2 + 5.3
6	Numerical Differentiation	6.1 + 6.2
7	Numerical Integration	7.1 + 7.2 + 7.5
9	Solution of Differential Equations	9.2 + 9.3 + 9.4 + 9.5

Grading Policy:

Quizzes, and Homeworks	10%
Two exams	50%
Final Exam	40%

Course Detailed Contents (with lectures)(approximated)

1	**Preliminaries**		
	1.1	Review of Calculus	1 Lecture
	1.3	Error Analysis	1 Lecture
2	**Solution of Nonlinear Equations $f(x) = 0$**		
	2.1	Iteration for Solving $x = g(x)$	2.5 Lectures
	2.2	Bracketing Methods for Locating a Root	1.5 Lecture
	2.3	Initial Approximation and Convergence Criteria	.5 Lecture
	2.4	Newton-Raphson and Secant Methods	2.5 Lectures
3	**Solution of Linear Systems $AX = B$**		
	3.3	Upper-Triangular Linear Systems	.5 Lecture
	3.4	Gaussian Elimination and Pivoting	1.5 Lectures
	3.5	Triangular Factorization	1 Lecture
	3.6	Iterative Methods for Linear Systems	.5 Lecture
	3.7	Iteration for Nonlinear Systems: Jacobi,Seidel and Newton's Methods	1.5 Lectures
4	**Interpolation and Polynomial Approximation**		
	4.2	Introduction to Interpolation	.5 Lecture
	4.3	Lagrange Approximation	2 Lectures
	4.4	Newton Polynomials	1.5 Lecture
5	**Curve Fitting**		
	5.1	Least-Squares Line	1 Lecture
	5.2	Methods of Curve Fitting	1 Lecture
	5.3	Interpolation by Spline Functions	1 Lecture
6	**Numerical Differentiation**		
	6.1	Approximating the Derivative	2 Lectures
	6.2	Numerical Differentiation Formulas	2 Lectures
7	**Numerical Integration**		
	7.1	Introduction to Quadrature	1 Lecture
	7.2	Composite Trapezoidal and Simpson's Rule	1 Lecture
	7.5	Gauss-Legendre Integration	1 Lecture
9	**Solution of Differential Equations (2 lecturs)**		
	9.2	Euler's Method	
	9.3	Heun's Method	
	9.4	Taylor Series Method	
	9.5	Runge-Kutta Methods	

Suggested Exercises:

Section	Page	Exercises
1.1	12	Part (a) of the exercises 1 – 15
1.3	37	2, 3, 5(b), 8, 9
2.1	50	1, 2, 3, 4, 5, 8, 9
2.2	61	1, 3(a+b), 5, 8, 12
2.3	69	1 – 6
2.4	85	1, 3, 5, 8, 10, 12, 13, 18, 21, 23
3.3	124	4, 5, 7
3.4	137	1, 5, 11, 14(a), 15
3.5	153	3(a), 6
3.6	165	5, 7
3.7	180	2(a+b), 5, 10
4.1	195	1, 3, 4, 12
4.2	205	1, 3
4.3	217	2, 5, 6, 7, 8, 9, 10, 11, 12, 13
4.4	228	5, 7, 9, 11
5.1	259	1(a), 3(a), 4, 8, 10(c)
5.2	275	1(a), 5, 11, 17
5.3	294	1, 3, 4, 5, 15
6.1	334	1, 4, 6, 10, 11
6.2	349	1, 3, 7, 9, 10, 11
7.1	362	1(b), 3, 6, 8, 9
7.2	374	1(a), 2, 4, 5, 6, 8
7.5	406	4, 9, 11
9.2	472	1, 3, 8
9.3	480	1, 3, 7
9.4	487	1, 3
9.5	502	1, 3