University: ***Fayoum University***
Faculty: ***Computers and Information***
Department: ***Basic Science***

Course Specification

1- Basic Information		
Code: INF 332	**Course Title:** Numerical Computing Methods	**Year/Level:** Third year – First term
Programme: B.Sc degree in Computer Science	**Number of units:** **Lecture:** 3 hrs/ week **Tutorial:** 2 hrs/ week **Practical:** - hrs/ week	

2- Aims of Course:	**On completion of this course the successful student will be able to:** 1) Study Computational errors. Floating-point computation. 2) Explain Root finding 3) Understand Approximation theory 4) Study Numerical differentiation and integration. Initial value problems for ODE. 5) Numerical solutions of nonlinear systems of equations 6) Numerical solutions to partial differential equations. 7) Apply and solve the problems (problem-solving skills).

3- Intended Learning Outcomes	
A- Knowledge and Understanding:	**On completing this course, students should have knowledge and understanding of :** **A3-** Demonstrate the essential mathematics and physics relevant to computer science. **A8-** Express the main concepts of statistics, probability theory, algebra and numerical analysis and their role in the computing and information discipline **Through the following:** a1. Study Computational errors. Floating-point computation. a2. Understand Root finding: Bisection method, Newtons method, and secant method. a3. Understand Approximation theory: Polynomial approximation, least squares method, interpolation, extrapolation, a4. Understand Numerical differentiation and integration.
B- Intellectual Skills:	**On completion of this course the successful student will be able to:** **B12.** Define the standard methodologies for solving information systems problems. **Through the following:**

	b1. Study Numerical differentiation and integration. Initial value problems for ODE: Eulers method, Taylor-series methods, and Rung-Kutta methods. b2. Study Numerical solutions of nonlinear systems of equations: Boundary-value problems for ODE
C- Professional and Practical Skills:	**C6**.Employ the statistical, probabilistic and mathematical techniques in analyzing data and interpreting experimental results. c1. Evaluate Numerical differentiation and integration. Initial value problems for ODE: Eulers method, Taylor-series methods, and Rung-Kutta methods c2. Evaluate Numerical solutions of nonlinear systems of equations: Boundary-value problems for ODE. C3. Evaluate Numerical solutions to partial differential equations.
D- General and transferable Skills	----

4-Course Content:	1) Computational errors. Floating-point computation. 2) Root finding: Bisection method, Newtons method, and secant method. 3) Approximation theory: Polynomial approximation, least squares method, interpolation, extrapolation, 4) Numerical differentiation and integration. Initial value problems for ODE: Eulers method, Taylor-series methods, and Rung-Kutta methods. 5) Numerical solutions of nonlinear systems of equations: Boundary-value problems for ODE. 6) Numerical solutions to partial differential equations.

5- Teaching and Learning Methods:	1. Lectures 2. Tutorials 3. Class discussions

6- Teaching and Learning Methods for handicapped students :	-

7- Student Assessment			
A- Assessment Methods:	1. Midterm written exam 2. Oral Exam 3. Final written exam		
B- Assessment schedule:	Midterm Examination: Week 7 or 8 Oral Examination: Week 14 Final Examination: Week 15-17		
C- Weighting of assessments:	Year work (Mid-Term Examination)	15 (15%)	
	Oral exam.	10(10%)	
	Final-Term Examination	75(75%)	

8- Books and References	
A- Notes:	
B- Essential Books (Text Books):	- Numerical computer methods. / Part D by Ludwig Brand; Michael L Johnson; (2012)
C- Recommended Books:	
D- Periodicals, Web sites, … etc	

- **Course Coordinator:** Dr. Moustafa Sakran- Head of Department: Dr. Amira Edress

Course Content Intended Learning Outcomes Matrix

Course Title: Numerical Computing Methods **Course Code:** INF 332

Course Content	Week	Knowledge & Understanding				Intellectual Skills		Professional & Practical Skills		
		a1	a2	a3	a4	b1	b2	c1	c2	c3
-Computational errors. -Floating-point computation.	1	x								
-Root finding: Bisection method, Newtons method, and secant method.	2-3		x							
-Approximation theory: Polynomial approximation, least squares method, - interpolation, extrapolation,	4			x						
-Numerical differentiation and integration. -Initial value problems for ODE -Eulers method, Taylor-series methods, and Rung-Kutta methods.	5-7				x	x		x		
- Mid-Term Exam	8	x	x	x	x	x				
Numerical solutions of nonlinear systems of equations: Boundary-value problems for ODE.	9-10						x		x	
-Numerical solutions to partial differential equations	11-12									x
-Revision	13	x	x	x	x	x	x	x		

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