



Course Specification

(Postgraduate Programs)

Course Title: Numerical Analysis
Course Code: Math 633
Program: Master of Science in Mathematics
Department: Mathematics
College: College of Science and Humanities
Institution: Prince Sattam Bin Adbdulaziz University
Version: V3
Last Revision Date: Dec 2024

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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3,0,0)				
2. Course type				
A.	☐ University	☐ College	☒ Department	☐ Track
B.	☒ Required		☐ Elective	
3. Level/year at which this course is offered: (first)				
4. Course general Description:				
Norms, Arithmetic, and well-posed computations (Norms of vectors and matrices, Floating-point arithmetic and rounding errors, Well-posed computations); Iterative solution of non- linear equations (Functional iterations for a single equation: error propagation, second and higher order iteration methods. Some explicit iteration procedures: The Chord method, Newton method, method of false position and Aitkin's delta square method, Special methods for polynomials: evaluation of polynomials and their derivatives, sturm sequence, Bernoulli's method, Bairsou's method); Solution of Systems of Nonlinear equations: Substitution, Secant and Newton Raphson method, Continuation methods.				
5. Pre-requirements for this course (if any):				
Nil				
6. Pre-requirements for this course (if any):				
Nil				
7. Course Main Objective(s):				
Objectives : To prepare the students understand various concepts of Numerical Analysis and solve problems using various methods such as iterative techniques, chord method, newton method, Bairsou Technique etc.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3 Hours per week	100%
2	E-learning		
3	Hybrid - Traditional classroom - E-learning	E-learning: In case of suspension of regular classes due to any unforeseen eventualities	Not applicable
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures (16 X 3)	48



2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	
5.	Others (Office Hours)	16
	Total	64

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Demonstrate understanding of the concepts of Norms of vectors and matrices, floating-point arithmetic and rounding errors, Well-posed computations	K1	1. Classroom lectures 2.Interactive sessions	1. Two Internal Exams 2.Atleast two Quiz 3.End Semester Exam
1.2	Identify the nonlinear equations, system of nonlinear equations and polynomials, and their describe suitable Iterative solution techniques	K3	3.Group and individual discussion	
2.0	Skills			
2.1	Apply Advanced technical skills /techniques to solve nonlinear equations, system of nonlinear equations and polynomials	S1	1. Application oriented exercises during tutorial session. 2. Group and individual task to enhance analytical skills 3. Inquiry based learning	1.Homework 2.Assignments 3.Quiz 4. Mid Term and Final Exam 5. Presentation
2.2	Problem-solving and decision-making by carrying out a comparison among different techniques in solving nonlinear problems and present solutions	S3		
3.0	Values, autonomy, and responsibility			
3.1	Work effectively with honesty to exhibit integrity and professional value to the assigned task	V1	Group Discussion /Task Brain Storming session	1. Seminars 2. Oral Presentation

C. Course Content:

No	List of Topics	Contact Hours
1.	Norms, Arithmetic, and well-posed computations (Norms of vectors and matrices,	6
2.	Floating-point arithmetic and rounding errors, Well-posed computations	6
3.	Iterative solution of non- linear equations (Functional iterations for a single equation: error propagation, second and higher order iteration methods	4
4.	Some explicit iteration procedures: The Chord method, Newton method,	6
5.	method of false position and Aitkin's delta square method	6
6.	Special methods for polynomials: evaluation of polynomials and their derivatives, Sturm sequence	6
7.	Bernoulli's method, Baisou's method	4
8.	Solution of Systems of Nonlinear equations: Substitution, Secant and	6
9.	Newton Raphson method, Continuation methods.	4

Total		48

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz 1,2	4, 10	10%
2.	Mid Term Exam I	6	15%
3.	Mid Term Exam II	13	15%
...	Continuous Assessment – Homework, Assignment, Attendance etc.		10%
	End Semester Exam	18	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	B. S. Grewal , NUMERICAL METHODS IN ENGINEERING AND SCIENCE C, C++, AND MATLAB®, MERCURY LEARNING AND INFORMATION, 2019.
Supportive References	S. Chapra, Numerical Methods for Engineers, McGraw-Hill Education, 2015.
Electronic Materials	Saudi Digital Library
Other Learning Materials	https://ocw.mit.edu/

2. Educational and Research Facilities and Equipment Required:

Items	Resources
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Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms with Smart boards with seating facilities for at least 20 students
Technology equipment (Projector, smart board, software)	- Smartboard, Internet Connection for Blackboard - Computer Lab with 40 terminals - Visual Studio software.
Other equipment (Depending on the nature of the specialty)	NIL

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Peer Review/Classroom Observation	Indirect
Effectiveness of students' assessment	Independent member teaching staff	Check marking by an independent member teaching staff of samples of student work.
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Quality Assurance Committee	End Semester online survey
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL MEETING 4
REFERENCE NO.	ITEM 4
DATE	OCT 2024

