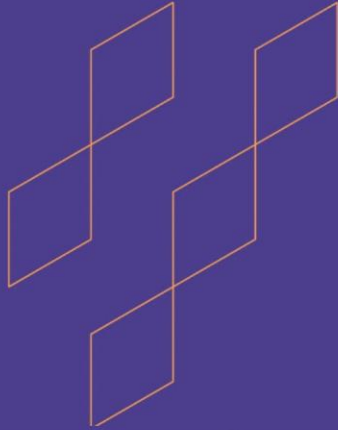




Course Specification

(Postgraduate Programs)

Course Title: Approximation Theory
Course Code: Math 630
Program: Master of Science in Mathematics
Department: Mathematics
College: College of Science and Humanities
Institution: Prince Sattam Bin Abdulaziz University
Version: V3
Last Revision Date: Dec 2024

Table of Contents

A. General information about the course:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:	4
C. Course Content:.....	5
D. Students Assessment Activities:.....	6
E. Learning Resources and Facilities:.....	6
F. Assessment of Course Quality:	6
G. Specification Approval Data:.....	3



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: (Level 3)

4. Course general Description:

Polynomial Interpolation: Lagrange interpolation formula, error in polynomial interpolation, Newton's interpolation method, Hermite interpolation. The approximation problem, existence of best approximation and uniqueness: approximation in a metric space, approximation in normed space, conditions for uniqueness of the best approximation, the uniform convergence of polynomial approximations, Least Squares approximation, Chebyshev approximation, Spline approximation..

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 make the students gain skills in the Concept of Approximation theory such as Polynomial Interpolation, Lagranges formula and its application etc., and able to apply the concepts in various types of physical problems.

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





No	Mode of Instruction	Contact Hours	Percentage
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	48

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	Recall and reproduce of the concepts of interpolation, different approximating functions and best approximation	K1, K2	1. Classroom lectures 2.Interactive sessions 3.Task	1. Two Internal Exams 2.Atleast two Quiz 3.End Semester Exam
1.2	Identify different types of interpolations and approximations and describe the appropriate methods to evaluate the same	K3		
2.0	Skills			
2.1	Apply appropriate methods to interpolate data and approximate functions and its derivatives	S1	1. Application oriented exercises during tutorial session. 2. Homework to	1.Homework 2.Assignments 3.Quiz 4. Mid Term and Final Exam





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Compare and contrast different interpolation and appropriation techniques	S3	improve the analytical skills	
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 during lectures and Interactive Session Brain Storming session	Oral Presentation Continuous assessment

C. Course Content:

No	List of Topics	Contact Hours
1.	Polynomial Interpolation: Lagrange interpolation formula,	6
2.	error in polynomial interpolation, Newton's interpolation method	6
3.	, Hermite interpolation.	6
4.	The approximation problem, existence of best approximation and uniqueness	6
5.	approximation in a metric space, approximation in normed space, conditions for uniqueness of the best approximation,	6
6.	the uniform convergence of polynomial approximations	6
7.	Least Squares approximation,	4
8.	Chebyshev approximation,	4
9.	Spline approximation	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	Powell, M. J. D. (1981). <i>Approximation theory and methods</i> . Cambridge university press..
Supportive References	Christensen, Ole, and Khadija L. Christensen. "APPROXIMATION THEORY FROM TAYLOR POLYNOMIALS TO WAVELETS." (2006).
Electronic Materials	Saudi Digital Library
Other Learning Materials	https://ocw.mit.edu/ https://bookstore.ams.org/gsm-101

2. Educational and Research Facilities and Equipment Required:

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	Indirect



Assessment Areas/Issues	Assessor	Assessment Methods
	Observation	
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

