Course Description Form

1. Course Name:
Approximation Theory

2. Course Code:
MATH508

3. Semester / Year:
First 2023-2024

4. Description Preparation Date:
24/3/2024

5. Available Attendance Forms:
Attendance lectures in the classroom

6. Number of Credit Hours (Total) / Number of Units (Total)
60/4

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Osama Hameed Mohammad Email: Osama.hameed@nahrainuniv.iq

8. Course Objectives

Course Objectives	• be able to use and analyze the basic methods for polynomial approximations (interpolation, least squares, piecewise approximations, Hermite interpolation) • understand and use the theory of convergence (Weierstrass) and best approximations for continuous functions as well as error estimates for smooth functions. • understand and use the theory of stability and conditioning for polynomial approximation methods, including its relation to interpolation points via Lebesgue constants. • have a good understanding of a couple of current topics in approximation theory, with a deeper knowledge of at least one of them.

9. Teaching and Learning Strategies

Strategy	1- Lecture strategy. 2- Discussion strategy. 3- Cooperative education. 4- Provide illustrative examples. 5- Conclusion. 6- Brainstorming.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Polynomial interpolati	Basic facts about polynomial interpolatio and divided difference	Attendance interac lectures	Ask questions and give assignments
2	4	Polynomial interpolati	Basic facts about polynomial interpolatio and divided difference	Attendance interac lectures	Ask questions and give assignments
3	4	Piecewise Linear Approximation	The essential features o piecewise polynomial approximation	Attendance interac lectures	Ask questions and give assignments
4	4	Piecewise Cubic Interpolation	Describe various schem for piecewise cubic interpolation	Attendance interac lectures	Ask questions and give assignments
5	4	Best Approximatior properties of comple Cubic spline interpolat and its error	Describe the minimun norm property	Attendance interac lectures	Ask questions, give assignments,
6	4	Parabolic spline interpolation	Interpolation by parabo splines	Attendance interac lectures	Ask questions and give assignments and make a 1st attence mid exam
7	4	A representation for piecewise polynomial functions	Discuss the ways to represent piecewise polynomial functions o arbitrary order in compu	Attendance interac lectures	Ask questions and give assignments
8	4	Truncated power basis	Smoothing a histogran	Attendance interac lectures	Ask questions and give assignments
9	4	A representation of functions by B-splines	Defining the k-th order spline and its related theorems	Attendance interac lectures	Ask questions and give assignments
10	4	A representation of functions by B-splines	Defining the k-th order spline and its related theorems	Attendance interac lectures	Ask questions and give assignments
11	4	The stable evaluatior B-splines	Discuss the properties of splines that is linear combination of B-splines the B-splines series	Attendance interac lectures	Ask questions and give assignments
12	4	Approximations normed linear spaces	Definitions and theoren that talking about the conditions of best approximations	Attendance interac lectures	Ask questions, give assignments, and make a 2nd attendance mid exam

				Attendance interac lectures	Ask questions and give assignments
13	4	Approximations normed linear spaces	Definitions and theore that talking about conditions of approximations	Attendance interac lectures	Ask questions and give assignments
14	4	Applications	Spline interpolat numerical solutions ordinary differen equations by colloca method using spline	Attendance interac lectures	Ask questions and give assignments
15	4	Applications	Spline interpolat numerical solutions partial differential equati by collocation method us spline	Attendance interac lectures	Ask questions give assignmen

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. A practical guide to splines. By Carl DeBoor 2. Approximation theory and numerical methods. By G.A.Wttson
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	