Course Description Form

1. Course Name:
Engineering Analysis and Numerical Methods
2. Course Code:
3. Semester / Year:
Third
4. Description Preparation Date:
5. Available Attendance Forms:
Registered students
6. Number of Credit Hours (Total) / Number of Units (Total):
5 hrs.
7. Course administrator's name (mention all, if more than one name)
Name: Maher Kheder Abbas Email: maher.abbas@uowa.edu.iq
8. Course Objectives

Course Objectives	**Define the following terms for the student:** • **Specific differences, approximation, and completion.** • **Numerical differentiation and the methods used for specific and non-specific differentiation.** • **Numerical integration and the methods used for specific and non-specific integration.** • **Numerical solution of ordinary differential equations.** • **Fourier series.**

9. Teaching and Learning Strategies

Strategy	Daily exams, documented exams, seasonal exams, final exams, oral questions and discussions during lectures, and homework.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
15	5 hrs	A- Stated Objectives A1- Empowering the student to know and understand the practical applications of engineering analyses according to the course objectives. A2- Preparing applied engineers in the field of engineering analyses distinguished by a high level of knowledge, technological creativity, and compliance with internationally recognized standards in ensuring the quality and academic accreditation of engineering programs, while adhering to the ethics of the engineering profession. B- Program-specific Skills Objectives B1- Discussion and dialogue. B2- Brainstorming by encouraging students to generate many ideas about a certain issue or problem raised during the lecture. B3- Self-learning by teaching the student himself according to his own abilities and cognitive and intellectual levels, responding to his inclinations and interests to achieve the development and integration of his abilities.	• An introduction to finite difference • Interpolation polynomial. • Newton's Divided Difference Formula, Gregory-Newton's Formula • Numerical Differentiation • Numerical Integration (The Method of Trapezoids, Simpson's 1/3 Rule) • Numerical Integration (Method of Undetermined coefficients) • Gaussian Quadrature • Numerical Solution of Ordinary Differential Equation (Taylor series). • Numerical Solution of Ordinary Differential Equation (Euler's Method). • Numerical Solution of Ordinary Differential Equation (Runge–Kutta Methods). • Higher Order Differential Equations. • Boundary Value Problem • Boundary Conditions • Fourier series	Theoretical, Applied, and Laboratory.	Short exams, Semester exams, and Homework, class assignments.

		B4- Cooperative learning through working collectively. B5- Competitive learning by creating an atmosphere of competition among peers.			

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, any)	Kreyszig, Erwin. "Advanced engineering mathematics," 8th ed., (1999).
Main references (sources)	Kreyszig, Erwin. "Introductory Functional Analysis with Applications." (1978).
Recommended books and references (scientific journals, reports…)	Kreyszig, Erwin. "Advanced Engineering Mathematics," 10th Edition., (2016).
Electronic References, Websites	https://www.wolframalpha.com/examples/mathematics/applied-mathematics/numerical-analysis