



Module (Course Syllabus) Catalogue

2025-2026

College/ Institute	Erbil Technical Engineering College, Erbil Polytechnic University	
Department	Department of Highway and Bridge Engineering	
Module Name	Engineering Analysis and Numerical Methods	
Module Code	EAN605	
Degree	Technical Diploma <input type="checkbox"/> Bachelor <input checked="" type="checkbox"/> High Diploma <input type="checkbox"/> Master <input type="checkbox"/> PhD <input type="checkbox"/>	
Semester	6 th	
Qualification	MSc	
Scientific Title	Lecture	
ECTS (Credits)	3	
Module type	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weekly hours		
Weekly hours (Theory)	(2) hrs. Class	(3 credits *27=81) Total hrs Workload
Weekly hours (Practical)		
Number of Weeks	12	
Lecturer (Theory)	Haval Ahmed Abdulrahman	
E-Mail & Mobile NO.	Haval.abdulrahman@epu.edu.iq	
Lecturer (Practical)	None	
E-Mail & Mobile NO.	None	
Websites		

Course Book

<p>Course Description</p>	<p>This course deals with more Engineering Analysis and Numerical Methods topics which provide students with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions.</p> <p>The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program. The course provides mathematical techniques in the more advanced areas of mathematics that are of most relevance to engineering disciplines.</p> <p>Applications of these techniques for the solution of boundary value and initial value problems will be given. The problems treated and solved in this course are typical of those seen in applications and include problems of mixing problems, mechanical vibrations and beam bending.</p>				
<p>Course objectives</p>	<p>The objective of Engineering Analysis and Numerical Methods is for students to learn the basics of Modeling and solution of differential equations. They will study standard functions with graph, geometrical meaning of differential equations, modeling and solution of ordinary and partial differential equations also application of Laplace transform, Fourier series and Fourier integral. More generally, the students will improve their ability to think critically, to analyze a real problem and solve it using a wide array of mathematical tools. They will also be able to apply these ideas to a wide range of problems that include the engineering equations. The students should be able to interpret the concepts of modeling algebraically, graphically and verbally.</p>				
<p>Student's obligation</p>	<p>Students should attend in all the lectures except what is allowed by university regulations. They should attend quizzes, exams and do their homework, this is in addition to the assignments which can carry considerable credits.</p>				
<p>Required Learning Materials</p>	<p>All the lectures will be given with the aid of projector, using PowerPoint presentations. Students will have access to the handouts.</p>				
<p>Evaluation</p>	<p>Task</p>	<p>Weight (Marks)</p>	<p>Due Week</p>	<p>Relevant Learning Outcome</p>	
	<p>Paper Review</p>				
	<p>Assignments</p>	<p>Homework</p>	<p>10%</p>		
		<p>Class Activity</p>	<p>2%</p>		
		<p>Report</p>			
		<p>Seminar</p>	<p>8%</p>		
		<p>Essay</p>	<p>8%</p>		
		<p>Project</p>			

	Quiz	8%		
	Lab.	0		
	Midterm Exam	24%		
	Final Exam	40%		
	Total	100%		
Specific learning outcome:	<p>After successful completion of the course, students are expected to have</p> <ol style="list-style-type: none"> 1. an ability to apply knowledge of mathematics, and engineering; 2. an ability to identify, formulate, and solve engineering problems; 3. an ability to analyse complex problems to determine the relevant mathematical principles and then apply that knowledge to solve civil engineering problems; <p>And specifically, they can</p> <ol style="list-style-type: none"> 4. Solve ordinary differential equations; 5. Solve systems of ordinary differential equations; 6. Solve differential equations by Laplace transform; 7. Solve differential equations by Fourier series; 8. Solve Partial differential equations; 9. Solve Matrices; 10. Solve Complex Variable Functions; 11. Create models of Engineering problems. 			
Course References:	<ol style="list-style-type: none"> i. Erwin Kreyszig "Advanced Engineering Mathematics", 10th edition, 2011 (TEXT BOOK) ii. Peter V. O'Neil "Advanced Engineering Mathematics", 7th edition, 2012. (TEXT BOOK) iii. Michael D. Greenberg "Advanced Engineering Mathematics ", 2nd edition 1998. iv. Alan Jeffrey" Advanced Engineering Mathematics ", 2002 v. Dean G. Duffy" Advanced Engineering Mathematics ", 1998 vi. C.R. Wylie" Advanced Engineering Mathematics " <p>F.B. Hildbrand "Advanced Calculus for Applications"</p>			
Course topics (Theory)		Week	Learning Outcome	
<ol style="list-style-type: none"> i. First order Differential Equations ii. Partial Differential Equations iii. Linear Differential Equations with constant equations iv. Review of Matrices v. Fourier Series vi. Laplace equations vii. Linear Interpolations viii. Numerical Solutions <p>Optimization</p>		12	It is written above.	

Practical Topics	Week	Learning Outcome
None	None	None
<p>Questions Example Design</p> <p>Solving Problems Such as solve, derive, find, determine, ... etc.</p> <p>Explanations and graphing Such as explain, why, show that, prove that ..., etc.</p> <p>Number of Questions: 3-6 Number of Assignments: 2-4</p> <p>Recommendations for Students at Exams</p> <ul style="list-style-type: none"> • Read the questions carefully and at least twice. • Think about the answers and don't hurry. <p>Answer the questions with the easiest first At the end, review the answers.</p>		
<p>Extra notes:</p> <p>For the above time schedule, 12 weeks of teaching is considered, hence, the completion of the program is dependent on the available number of weeks. However, some changes might happen to optimize the available time.</p>		
<p>External Evaluator</p> <p>I hereby confirm that all syllabuses given in the attached course book is sufficient to cover required subjects, areas and titles needed for students regarding the study year.</p> <p>Dr.Slar Othman Ali: Head of QA/QC committee of Highway and Bridges Engineering Department 2025-2026</p>		