Salahaddin University - Erbil
College of engineering - Civil Department

Module Name	Engineering Analysis			Code	111
Course Status	Core	Duration:	15 week – one semester	Credit point	5
Pre-requisites	Mathematics III		Total Work Load 135 hr	Class Attendence 60 hr	Self Studies 75 hr
Course Description	A comprehensive course to familiarize engineering professionals with advanced applied mathematics as it relates to solving practical engineering problems. The course of intensive study blends the theoretical underpinnings of advanced applied mathematics with an understanding of how these powerful tools can be used to solve practical engineering problems. The material covered includes application of Differential Equations; Laplace Transforms; Fourier series and their application; Heat and Wave equation; Fourier transform, Z- Transform.				
Course Objectives	The objective of the course, is to introduce fundamental mathematical concepts and their practical applications primarily to civil engineering students. The main idea behind this subject is the development of the student's ability to use mathematics with understanding to solve engineering problems. Recognizing the increasing importance of mathematical modelling in engineering practice, many of the worked examples and exercises incorporate mathematical models that are designed both to provide relevance and to reinforce the role of mathematics in various branches of engineering, which are seen as essential if engineers are to tackle the increasingly complex systems that are being called upon to analyze and design				
Learning Outcome	At the end of the semester, students would be able to use mathematics with understanding to solve engineering problems and recognize the increasing importance of mathematical models in engineering practice. The student will get familiar to use Laplace Transform to simplify calculations in system modeling, where a large number of differential equations are used. Also, they will get to know better analyze a signal in another domain rather than in the original domain by using the Fourier series, which allows us to model any arbitrary periodic signal with a combination of sines and cosines.				
Literature & text Books	1- Advanced Engineering Mathematics by Erwin Kreyszic, 10th edition, 2011, John Wiley & Sons. 2- Modern Engineering Mathematics by Glyn James, Fifth Edition, 2015.				
Type of Teaching	Theory Lectures		Tutorial	Practical	
	3 hr		1 hr	0 hr	

Evalution Profile

Students are required to do first midterm exam on 8 week, class room activities, quizzes, home works and final exam on week 15th. So that the final grade will be based upon the following criteria:

Course period efforts (out of 40%)	Midterm Exam (90 min written exam at week 8)	20 %
	Short exams (Quiz) at least 2 during the course period (one of them must befor week 8)	10 %
	assignments and home works at least 2 during the course period	6 %
	Class Room Activities, Reports and Seminars	4 %
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Course period efforts (out of 60%)	Written exam (120 min written exam week 15)	60 %
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Week	Course Outlines
one	Introduction - Coursebook
Two	First order ordinary differential equations (Separable ODEs, Exact ODEs)
Three	Linear ODEs, Application of the first order ODEs.
Four	Second- Order Homogenous and Non -Homogenous linear ODEs.
Five	Applications of second order ODEs, Higher Order Linear ODEs.
Six	Laplace transform, Laplace transform of drivatives.
Seven	Laplace Inverse, Laplace transform and Convolution
Eight	Midterm Exam
Nine	The solution of differential equations using Laplace transform. The solution of simultaneous differential equations using Laplace transform.
ten	Fourier series for periodic functions and non-periodic functions.
Eleven	Even and odd Function, half- range Expansions, Fourier series over any range.
Twelve	Application of Fourier series, Wave and Heat equations.
Thirteen	Fourier transform
Fourteen	Discrete and Fast Fourier Transforms.