Imperial College London

Module Outline

Mathematics 2

Module Code	CIVE50006	FHEQ Level	Level 5
Pre-requisites	N/A	Co-requisites	N/A
Teaching Term	Autumn	Available for CPD (MSc only)	No
Primary Department	Civil & Environmental Engineering		
Module Leader	Christou, Marios		
Additional Teaching Departments	N/A		
Teaching Staff	Christou, Marios; Burridge, Henry		

Programmes on which the Module is delivered	Core/Elective
MEng Civil Engineering (H201)	Core
MEng Civil Engineering with a Year Abroad (H202)	Core
Civil Engineering (H21E)	Core

Module Overview	Provide you with an essential 'tool box' of applied mathematical techniques as necessary for the solution of real world engineering problems. Enable you to formulate and solve engineering problems, which require the solution for a variable that alters in both space and time. Equip you with the mathematical techniques required in the engineering courses covered in year 3 (e.g. the classification and solution of partial differential equations describing the motion of a fluid, the dispersion of a contaminant, or the displacement of a beam), and the specialist elective courses in year 4.
Learning Outcomes	You will learn how to: • Determine the Fourier series expansions of the simple functions. • Use the Cauchy-Riemann equations; determine orthogonal trajectories. Evaluate double integrals by change of variables and by inverting the order of integration. • Carry out calculations involving the grad, div and curl vector operators. Find the general solution of linear second order ordinary differential equations by the method of variation of one parameter; solve ODEs in matrix form. • Classify second order linear partial differential equations; derive d'Alembert's solution of the one-dimensional wave equation; derive solutions of certain partial differential equations by separation of variables using Fourier series.

Description of Content	• Complex variables (differentiation; Cauchy-Riemann equations; orthogonal trajectories). • Vector Calculus (scalar functions of a vector; scalar fields; vector fields; grad; div; curl; repeated operations). • Integration (line integrals; double integrals; Green's theorem). • Ordinary Differential Equations (constant coefficients; variable coefficients; method of substitution; systems of ODEs). • Fourier series (odd and even functions; full-range and half-range Fourier series; Parseval's theorem). • Partial Differential Equations (heat, wave and Laplace equation; separation of variables; reduction to canonical form).

Assessment			
Assessment information will be provided separately.			
Learning & Teaching Hours	Independent Study Hours	Placement Hours	Total Hours
40	85	0	125
ECTS Credit	5	CATS Credit	10
Date of introduction	1/10/2020	Date of Last Revision	7/9/2020

Reading Lists:

Category as defined by Central Library:

C = Core, S = Supplementary

S	KREYSZIG E. Advanced Engineering Mathematics (10th Edition), John Wiley & Sons, 2011.
S	STROUD K. A. and BOOTH D. J. Advanced Engineering Mathematics (5th Edition), Palgrave, 2011.
S	JEFFREY A. Mathematics for Engineers and Scientists.
S	STEPHENSON G. Mathematical Methods for Science Students, Longmans, 1973.