

## Module Specification

### Module Summary Information

<b>1</b>	<b>Module Title</b>	Numerical Analysis
<b>2</b>	<b>Module Credits</b>	20
<b>3</b>	<b>Module Level</b>	5
<b>4</b>	<b>Module Code</b>	ENG5099

<b>5</b>	<b>Module Overview</b>
<p>The module introduces the mathematical concepts such as transform calculus and matrix theory used to solve systems of first and second order differential equations underpinning the engineering disciplines undertaken within the Faculty.</p> <p>This provides you with the capability of modelling systems using both the transfer function and state-space paradigms. In particular, you will be able to model linear systems in continuous and discrete time as well as by frequency response methods.</p> <p>Teaching and assessment will comprise not only traditional lectures and tutorials but also provide training in industry standard software for problem solving within coursework assessment.</p>	

<b>6</b>	<b>Indicative Content</b>
<p>Introduction to numerical analysis for data analysis, the solution of simultaneous equations, differentiation and integration. We will apply numerical analysis to some real engineering problems such as vibration, thermal heat flow and data.</p> <p>The application of matrices to least squares fitting of experimental data.</p> <p>The use of the Trapezoidal method and Simpson rule for numerical integration.</p> <p>The use of Euler method to solve linear differential equations.</p> <p>The use of matrices to solve differential equations.</p> <p>The Eigenvalue problem in vibration.</p>	

<b>7</b>	<b>Module Learning Outcomes</b>
<b>On successful completion of the module, students will be able to:</b>	
<b>1</b>	Analyse experimental data and identify underlying equations.
<b>2</b>	Solve integration problems using Trapezoidal and Simpson's methods.
<b>3</b>	Use matrices to solve vibration and heat flow engineering problems.
<b>4</b>	Use Euler's method to solve linear differential equations found in engineering.

8 Module Assessment			
Learning Outcome			
	Coursework	Exam	In-Person
1-4	30%	70%	

9 Breakdown Learning and Teaching Activities	
Learning Activities	Hours
<b>Scheduled Learning (SL)</b> includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	48
<b>Directed Learning (DL)</b> includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	0
<b>Private Study (PS)</b> includes preparation for exams	152
<b>Total Study Hours:</b>	200