

300-level SUBJECT HANDBOOK ENTRY 2008 – New Generation subjects

Subject Code	620-3xx
Title of the subject	Differential Equations in Engineering
Credit points	12.5
Coordinator	Karen Baker
Semester of offer	1
Prerequisites and/or corequisites	One of 620-xxx Real Analysis with Applications or 620-2xx Vector Calculus or 620-xxx Multivariable & Vector Calculus
Mode of delivery	Lectures and tutorials
Contact hours	36 one-hour lectures (three per week), 11 one-hour practice classes (one per week)
Estimated total time commitment	120
Description	<p>This subject illustrates how ordinary differential equations (ODE's) arise in engineering. Techniques to solve linear ODE's will be introduced using Laplace and Fourier transforms. Non-linear ODE's will be introduced. Students will also learn the concept of the method of characteristics to solve relevant first and second order partial differential equations.</p> <p>Solution of unforced and forced linear ordinary differential equations using Laplace transforms, Fourier series and Fourier integrals; Qualitative solutions to non-linear ODE's; Classification of partial differential equations; Separation of variables; Method of characteristics for first order quasi-linear partial differential equations and second order linear hyperbolic partial differential equations; Special solutions with delta function forcing; Green's functions.</p>
Assessment	One written assignments 10% (due in week 4 of the semester), one written assignments 10% (due before week 10 of the semester), a 3-hour written examination 80% (in the examination period).
Prescribed texts	
Notes	
Subject objectives	<p>At the completion of this subject, students should be able to</p> <ul style="list-style-type: none"> • Solve systems of ordinary differential equations using Laplace transforms • Sketch phase plane portraits for linear and nonlinear systems of ordinary differential equations • Represent suitable functions using Fourier methods • Solve partial differential equations using method of characteristics, separation of

	variables and Green's function.
Generic skills	<ul style="list-style-type: none">• ability to apply knowledge of basic science and engineering fundamentals• ability to communicate effectively, not only with engineers but also with the community at large• in-depth technical competence in at least one engineering discipline• ability to undertake problem identification, formulation and solution• expectation of the need to undertake lifelong learning, capacity to do so• capacity for independent critical thought, rational inquiry and self-directed learning• intellectual curiosity and creativity, including understanding of the philosophical and methodological bases of research activity