

Course Code	EM216
Course Title	Differential Equations
No. of Credits	3
Pre-requisites	
Compulsory/Optional	Compulsory for Mechanical Engineering Specialization
Aim(s): To introduce analytical solving techniques of linear ordinary differential equations and interpret the solutions	
Intended Learning Outcomes: On successful completion of the course, the students should be able to;	
<ul style="list-style-type: none"> • Identify/derive the mathematical models of many physical problems as differential equations. • Solve first order separable, linear and exact differential equations and reducible forms • Solve higher order linear ordinary differential equations analytically and analyze the solution of such second order equations • Apply matrix methods and Laplace transform in solving systems of linear systems of ordinary differential equations. • Find and classify the critical points of a first order autonomous equation and use them to describe the qualitative behavior and the stability of the solutions. • Obtain analytical solutions of first order and second order linear partial differential equations. 	
Time Allocation (Hours): Lectures 35 Tutorials 10 Practical Assignments (Notional Hours 150)	
Course content/Course description:	
<ul style="list-style-type: none"> • Introduction: Differential Equations as a mathematical model and Classification • First order ordinary Equations: Separable, Linear, Exact, Reducible forms • Higher order ordinary linear equations with constant coefficients: D-operators, Method of undetermined coefficients; Solution behaviors. • Linear Systems: Eigenvalue and eigenvector method; Decoupling; Matrix exponential method • Laplace Transforms: Laplace transform of functions and derivatives; Solving ordinary differential equations and linear systems; Convolution • Partial differential equations: Partial differential equations as a mathematical model and Classification; Method of characteristics, Method of separation of variables and the d’Alembert solution. 	
Recommended Texts :	
<ul style="list-style-type: none"> • R.K. Nagle, E.W. Saff, A.D. Snider, Fundamentals of Differential Equations, 8th edition, (2012), Pearson Education. • E. Kreyszig, Advanced Engineering Mathematics, 9th edition, (2010), John Wiley & sons Inc. • Philip Franklin, Differential Equations for Engineers, 5th edition, (1980), Dover Publications. • Walter A. Strauss, Partial Differential Equations, 2nd edition,(2007), John Wiley and Sons Inc. 	

Assessment	Percentage Mark
In-course	
Tutorials	10
Mid Semester Examination	30
End-semester	60