

Subject	Differential Equations	Course Code	MA252	Theoretical	4 hrs / wk
Semester	3	Prerequisite	MA151	Practical	0 hrs / wk

Program Learning Component

1. Review of Differentiation and Integration		
	Specific Learning Outcomes	Resources
Week 1-3	<ul style="list-style-type: none"> • Review of basic differentiation rules. • Review of derivatives of sine's and cosines. • Review of derivatives of logarithmic and exponential functions • Implicit differentiation. • Review of Integration by substitution and by parts. • Review of complex numbers. 	Projector.
2. First Order Differential Equations		
	Specific Learning Outcomes	Resources
Week 4-7	<ul style="list-style-type: none"> • Identify separable equations • Homogenous and nearly homogenous D.E. • Testing exact D.E. • Integration factors and Bernoulli equations. • Linear First order D.E. • Application to RL and RC circuits. • First Mid-term Evaluation Test. 	Projector. Simulation using software package.
3. Linear Second Order Differential Equations		
	Specific Learning Outcomes	Resources
Week 8-10	<ul style="list-style-type: none"> • Existence of Linear Second Order Differential Equations. • Finding general solution of : $y'' + Ay' + By = 0$ for $A^2 - 4B \geq 0$ • Background on complex Exponential functions • Finding general solution of : $y'' + Ay' + By = 0$ for $A^2 - 4B < 0$ • Reducing of order using absent dependent 	Projector. Simulation using software packages.

	variable. • Reducing of order using absent independent variable. • Second Mid-term Evaluation Test.	
Week 11-12	4. Higher Order Differential Equations	
	Specific Learning Outcomes	Resources
	<ul style="list-style-type: none"> • Higher order linear homogenous D.E with constant coefficients. • Solve nth order using characteristic equation. • Explain different roots of characteristic equation distinct, repeated or complex. • Method of undetermined coefficients. 	Projector.
Week 13-14	5. Laplace Transform	
	Specific Learning Outcomes	Resources
	<ul style="list-style-type: none"> • Defining Laplace transform. • Shifting in the s and t-variable. • Calculating the Laplace transform. • Calculating the Inverse Laplace transform. • Solving typical Engineering Problem. • Understanding Convolution. 	

Course Assessment:

Course Work	Mid–Term Test	Final Examination
10	30	40

NOTE: Course Work may include assignments, projects and practical activities.

Textbooks:

Elementary Differential Equation, by W.E. BOYCE and R.C. DIPRIMA