University of Moratuwa, Faculty of Engineering, Department of Mathematics-20141201
BSc Engineering Honors Degree
Semester 4(12 batch): 2014/12/01-2015/04/03-16 weeks, Reading Week-2014/12/19-2015/01/05
CS(100)-Mo 16.15: 18.15-CS tutorial room
Lecturer: Dr. Udaya Chinthaka Jayatilake
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Module Code	MA2063	Title	Differential Equations and Applications			
Credits	**02**	**Hours/ Week**	**Lectures**	**02**	**Pre-requisites**	MA1013
			Lab/Tutorials	**-**		

Learning Outcomes

At the end of this module the student should be able to
- Solve ordinary differential equations in engineering applications.
- Apply approximate Fourier series for periodic functions in real world applications.
- Solve various categories of partial differential equations that appear in engineering system modeling.
- Apply Laplace transform and Fourier transform methods to solve differential equations in engineering applications

Outline Syllabus

Differential Equations
First order differential equations: Variable separable, homogeneous, linear and exact equations.
Second order differential equations.

Fourier Series approximation
Fourier coefficients, Dirichlet's condition.
 Odd and even function, half range series.
Trigonometric approximation to discrete data.

Partial Differential Equations
Classification of second-order partial differential equations.
Solutions by separation of variables.
Fourier series application to boundary value problems.

Laplace Transform and applications
Laplace transforms of elementary functions and some basic theorems on Laplace transforms.
Application of Laplace transforms to solution of differential equations and system of differential equations.
Transfer functions, Convolution theorem, concepts of stability and controllability.

Fourier Transform and applications
Non-periodic function, Fourier transforms, properties of Fourier transform and applications.

Method of Assessment
End of semester examination: 2 hour closes book paper: 70%
Mid semester examination: 1 hour open book paper: 10%
In-class assessments: 10%
Take-home assessment: 10%

Requirements
80% attendance is compulsory

References

- Calculus, Volume II, Tom M. Apostol.
- Differential Equations-Linea-Nonlinear-Ordinary-Partial, A.C. King, J. Billingham, S.R. Otto
- Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright
- Advanced Engineering Mathematics, Michael D. Greenberg
- Partial Differential Equations-An Introduction, Walter A. Strauss
- Introduction to Partial Differential Equations, K. Sankara Rao
- http://www.wolframalpha.com/
- http://mathworld.wolfram.com/