University of Moratuwa, Faculty of Engineering, Department of Mathematics-20150427
BSc Engineering Honors Degree-13 batch
Semester 3: 2015/04/27-2015/08/21-15 weeks, Reading Week-2015/07/11-2015/07/26
EN(112)/ER(46)/ME(100)/MT(41)-(299)-Fri 13.15: 15.15-NA2

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Module Code	**MA2013**	**Title**	**Differential Equations**			
Credits	**02**	**Hours/ Week**	**Lectures**	**02**	**Pre-requisites**	MA 1023
			Lab/Tutorials	**-**		

Learning Outcomes

At the end of this module the student should be able to

- Apply Fourier series approximations for periodic functions in real world situations.
- Solve initial-boundary-value problems involving partial differential equations.
- Apply Laplace transform and Fourier transform methods to solve differential equations in engineering applications

Outline Syllabus

Fourier Series Approximation

- Fourier coefficients, Dirichlet's condition, odd and even functions. 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 transform.
- 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.

Detailed Syllabus

ODE: Legendre, Leguerre, Bessel, Airy

PDE: Laplace, Heat, Wave, Schordinger's

Methods: Wronskian(done in S2), Power Series Method, Laplace Transform, Complex Inversion Formula, Fourier Series, Fourier Transform, Convolution, Separation of variables.

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%

Note

80% attendance is compulsory.
Please bring your calculators and laptops with Matlab and Mathematica installed.
We will solve one problem in detail at each lecture.