University of Moratuwa, Faculty of Engineering, Department of Mathematics-3ed
BSc Engineering Honors Degree
Level 1 Semester 2: 2014/01/16-2014/03/23-16 weeks
Reading Week-2014/03/07-2014/03/16
ME/TT-Mon 09.15-10.15-ASSH
CE/CP/ER-Mon 11.15: 12.15-NA2
EE/EN/MT-Mon 13.15: 14.15-NA2

Lecturer: Dr. Udaya Chinthaka Jayatilake
Email: ucjaya@uom.lk, Mobile: 0770064997, Room: MA218, Ext. 6305
Web: http://www.math.mrt.ac.lk/content/drudayajayatilake-teaching

Module Code	**MA1023 Part 2**	**Title**	**Methods of Mathematics** **Ordinary Differential Equations & Multivariate Calculus**			
Credits	**01**	**Hours/ Week**	**Lectures**	**01**	**Prerequisites**	**MA1013**
			Lab/Tutorial	**1/3**		

Learning Outcomes

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

- Solve initial value problems involving second order linear ordinary differential equations.
- Application of multivariate calculus to solve simple engineering problems.

Outline Syllabus

Ordinary Differential Equations & Multivariate Calculus

- Reimann integration;
- First order ordinary differential equations: Variable separable, homogeneous and exact eqations.
- Second order differential equations: Reducible forms.
- Functions of several variables: partial differentiation, chain rule, directional derivatives.
- Maxima and minima, Lagrange multipliers;
- Taylor series expansion of multivariate functions.

Detailed Syllabus

- Reimann Integration: partitions, definition, integrability, properties, fundamental theorem of calculus, integration by parts, differentiation under the integral sign, improper integrals, comparison theorems, non inetegrable functions.
- Differential Equations: variable separable, homogeneous, linear and exact equations, second order linear ordinary differential equations, variation of parameters, Wronskian, power series methods, concepts of existence and uniqueness.
- Functions of Several Variables: partial differentiation, chain rule, directional derivatives, inverse function theorem, implicit function theorem, maxima and minima, Lagrange multipliers, Taylor series expansion of multivariate functions, Frechet derivative.

Method of Assessment (for the whole course MA1023)

End of semester examination: 2 hour closed book paper: 80%

Mid semester examination: 1 hour open book paper: 15%
Tutorial class activities: 5%

References

- *Principles of Mathematical Analysis,* Walter Rudin
- *Mathematical Analysis,* Tom M. Apostol
- *Real Analysis*, N. P. Bali
- *Differential Equations with Boundary Value Problems*, D.G. Zill and W.R. Wright
- *Advanced Calculus,* David V. Widder