

University of Moratuwa, Faculty of Engineering, Department of Mathematics-20160914

BSc Engineering Honors Degree

Batch 15-Semester 2(694)-2016/09/12:2016/12/23-14 weeks

Reading Week-2016/10/28:2016/11/07

BM(16)+EE(101)+EN(101)-(218)Wed-14.15:15.15-ASSH

CE(126)+CH(80)+MT(50)+TT(50)-(306)Thu-10.15:11.15-NA1

ME(120)+ER(50)-(170)Thu-13.15:14.15-ASSH

Lecturer: Dr. Udaya Chinthaka Jayatilake

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Module Code	MA1023 Part C	Title	Methods of Mathematics Numerical Methods			
Credits	01	Hours/ Week	Lectures	01	Prerequisites	MA1013
			Lab/Tutorial	1/3		
<u>Learning Outcomes</u>						
At the end of this module the student should be able to						
<ul style="list-style-type: none"> Solve initial value problems involving second order linear ordinary differential equations. Application of multivariate calculus to solve simple engineering problems. 						
<u>Outline Syllabus</u>						
<u>Numerical Methods</u>						
<ul style="list-style-type: none"> Algorithms and errors; Numerical solution of non-linear equations. Bisection and false position methods, simple iterations. Newton-Raphson method; Estimation of errors and acceleration of convergence. Approximations of functions. Numerical integration; Trapezoidal rule, Simpson's rule. 						

Detailed Syllabus

- **Intermediate value theorem, Mean value theorem, Taylor series with remainders.**
- **Cauchy sequences, Completeness, Banach fixed point theorem.**
- **Numerical root finding: Bisection, Iterative and Newton's methods, Error estimates.**
- **Interpolation: Lagrange interpolation, Least square approximation, Error estimates, Introduction to cubic splines.**
- **Numerical Integration: Trapezoidal and Simpson's methods, Error estimates**
- **Numerical optimization: Steepest descent method**
- **Numerical solution to ODE: Euler's method.**

Method of Assessment (for the whole course MA1023)

- End of semester examination: 2 hour closed book paper: 70%
- Mid semester examination: 1 hour open book paper: 15% (on 2016/11/07 from 5.30-6.30pm)
- Spot Tests in Tute classes: 10%
- Spot Tests in Lectures: 5%

References

- *Numerical Methods for Scientific and Engineering Computation*, M.K. Kain, S.R.K. Iyenger, R.K. Jain
- *Classical and Modern Numerical Analysis*, A.S. Ackleh, E.J. Allen, R.B. Hearfott, P. Seshaiyer.
- *Numerical Analysis*, F. Scheid.
- *Numerical Analysis: Mathematics of Scientific Computing*, D. Kincaid, W. Cheney.
- *Numerical Recipes in C++*, W.H. Press, S.A. Teukosky, W.T. Vetterling, B.P. Flannery.
- *Mathematical Analysis*, Tom M. Apostol
- *Calculus-Volume 1 and 2*, Tom M. Apostol
- *Advanced Calculus*, David V. Widder