

MOI UNIVERSITY
SCHOOL OF AEROSPACE SCIENCES
Course outline

COURSE CODE: MAT 204

ACADEMIC YEAR: 2015/2016

COURSE TITLE: INTEGRAL CALCULUS
AND NUMERICAL METHODS

COURSE LECTURER: Mr. Koech W. Cheruiyot

YEAR OF STUDY: II

PHONE NUMBER: 0720949512

SEMESTER: I

Email address: koech80@gmail.com

SESSION: AUGUST – SEPTEMBER 2015

Prepared by: _____
(Signature) **Koech w. Cheruiyot**

Submission Date: 03/08/2015 _____

Purpose of the Course

- To enable learners to understand differentiation and integration in more than one variable
- To equip the learner with interpolation skills used in approximating solutions of non-linear equations
- To enable the learner to apply iterative techniques in the approximation of solutions to system of equations.
- To expose the learner to numerical differentiation and integration methods

Course Description

1. Partial Differentiation and applications
2. Anti-derivatives
 - i. Methods of Integration
 - ii. The Mean Value Theorem for Integral Calculus
3. Multiple integration
4. Errors
 - i. Types of errors
 - ii. Roots of polynomials
5. Interpolation
 - i. Newton's methods; Forward, Backward and Divided Difference formulae
 - ii. Lagrange's interpolation
6. Numerical differentiation , Numerical Integration and their applications

Expected Learning Outcomes

By the end of the course the learner should be able to:

- State and prove some of the fundamental theorems of calculus
- Solve problems on double and triple integral.
- identify the main sources of errors
- distinguish between numerical and analytical methods/solutions
- appreciate the need for learning and applying numerical methods
- derive and use certain interpolation methods
- derive and apply the use of numerical differentiation and numerical integration methods
- find the roots (or zeroes) of a given polynomials

Instructional material / equipment

- Textbooks, whiteboard, LCD, chalkboard, hand outs

Course Assessment:

Continuous assessment Tests	30%
End of semester examination	70%
Total	100%

CLASS SCHEDULES:

WEEK	TOPICS WITH SUMMARY OF CONTENT
1	Partial Differentiation and applications
2	Anti-derivatives -Methods of Integration -The Mean Value Theorem for Integral Calculus
3	Multiple integration
4	C.A.T 1
5	Errors -Types of errors -Roots of polynomials
6	Interpolation -Newton's methods; Forward, Backward and Divided Difference formulae
7	Lagrange's interpolation
8	Numerical differentiation ,
9	Numerical Integration and their applications
10	CAT 2
11 - 13	END OF SEMESTER EXAMINATIONS

Reference

1. Calculus and its applications by Larry J. Goldstein, David C. Lay and David J. Schneider
2. Calculus by James Stewart, 5e
3. Calculus With Applications by Lial G. Ritchey
4. Calculus and Analytic Geometry by George B. Thomas, Jr.
5. Advanced Engineering Mathematics by K.A Stroud

Internet Resources

1. *Introduction to Partial Differentiation* ,R Horan & M Lavelle (2004)
www.tech.plym.ac.uk/maths/resources/PDFLaTeX/partial_diff.pdf
2. *The Anti-derivative*, http://www.math.mit.edu/~djk/calculus_beginners/chapter16/section01.html
3. *Mean Value Theorem for Integral Calculus*
<http://www.sosmath.com/calculus/integ/integ04/integ04.html#answer3>
4. *Interpolation (Newton's methods)*,
<http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/mathematics-2/node109.html>
5. *Interpolation (Newton's Divided Difference Formula)*,numericalmethods.eng.usf.edu/mtl/gen/.../mtl_gen_inp_txt_ndd.doc
6. *Interpolation (lagrange's)*,staff.science.nus.edu.sg/~phywjs/CZ5101/nrlec3.ppt
7. *Numerical Differentiation*, www.math.ohiou.edu/courses/math3600/lecture27.pdf
8. *Numerical Integration*,
<http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter25/contents.html>
9. *Lecture notes on calculus*
<http://www.pages.drexel.edu/~gln22/Lecture%20Notes%20on%20Calculus.htm>

HOD: _____

(Signature) Dr. Nyamwala F.

Date _____