
PUSAT PENGAJIAN SAINS FIZIK
UNIVERSITI SAINS MALAYSIA

First Semester, 2015/16 Academic Session

COURSE DETAILS

Course name: Calculus and Linear Algebra
Course code: ZCA 110
Credit hours: 4 (i.e. 4 lectures per week for 14 weeks, plus tutorial sessions)

LECTURERS

- Four separate classes for ZCA 110 (Groups: A, B, C, and D) handled concurrently by four lecturers:

A group: Dr. Norhaslinda Mohamed Tahrin (NMT)

B group: Dr. Ramzun Maizan Ramli (RMR)

C group: Dr. Yoon Tiem Leong (YTL)

D group: Prof. Fauziah Sulaiman (FS)

COURSE DESCRIPTIONS

- A core course offered by School of Physics
- Course conducted in English, but the students can answer the final exam either in Bahasa Malaysia or English

Duration: 7th September 2015 – 18th December 2015

Semester Break: 9th – 15th November 2015

Public Holidays: Wed 16th September (Hari Malaysia)
Thur 24th September (Aidiladha)
Wed 14th October (Maal Hijrah)

Meeting times: Mon 10.00 – 10.50 am
 Wed 9.00 – 9.50 am
 Thurs 12.00 – 12.50 pm
 Fri 10.00 – 10.50 am

Pre-requisite: None, BUT will assume that students are familiar with basic mathematics at STPM or Matrikulasi level (i.e. arithmetic of addition, subtraction, division and multiplication; basic algebra, geometry, trigonometry, simple differentiation, and integration)

E-learn: For updates, announcements, assignments, etc.

CONTENTS

Preliminaries: Sets, real numbers, rational and complex numbers (read the Appendix section of Thomas' calculus)

The course consists of two parts:

A. *Calculus (~weeks 1 – 12)*

- Functions
- Limits and continuity
- Differentiation and its applications
- Integration and its applications
- Transcendental functions
- Sequences and series

B. *Linear algebra (~weeks 12 – 14)*

- Matrix algebra, types of matrices
- Determinants, minors, cofactors
- Solving system of linear equations
- Vector spaces: subspaces, basis and dimension, linear transformations

OBJECTIVES

Calculus

1. Differentiation: learn the different rules of differentiation, and its applications
2. Integration: learn the different techniques of integration, and its applications
3. To learn about sequence and series (basic concepts), including the calculus of transcendental functions

Linear algebra

1. To learn about matrix algebra and its types
2. To solve system of linear equations using matrix
3. To learn about vector spaces: subspaces, basis and dimension, and linear transformation

COURSE EXPECTATIONS

After completing this course, students should be:

- Well-versed in the so-called foundation mathematics that will be needed for numerous applications in physics
- Well-prepared for more advanced mathematics courses as well (e.g. ZCT 112/3, ZCT 210/4, ZCT 219/4, etc.)

CONSULTATION HOURS

Consult your respective group lecturers for details.

ASSESSMENT

COMPONENTS	DESCRIPTION	WEIGHTAGE
Course work	Two (2) tests – 20% (10% each) Assignments – 20%	40%
Final examination	Will cover all topics	60%
Attendance	<ul style="list-style-type: none">• will be recorded• students missing tests without valid reasons/M.C. will get zero• students with attendance less than 70% will be barred from sitting for the final examination	
Total		100%

TESTS

	Dates	Time	Venue
<i>Test 1</i> <i>(Calculus Part 1)</i>	6 th November 2015	10.00 – 11.00 am	E41*
<i>Test 2</i> <i>(Calculus Part 2, linear algebra)</i>	11 th December 2015	10.00 – 11.00 am	E41*

* Basement of PHS II (Adjacent to Eureka building)

Note: All students (A, B, C, D groups) will sit for the same tests and final examination. Topics covered will be announced later.

ASSIGNMENTS and TUTORIALS

- About ten (10) assignments to be completed by students throughout the course duration
- Students are required to submit them to her/his respective tutors, and will be graded
- Assignments received after the respective due date will not be graded (which means that you will get zero for that particular assignment)
- Tutorial sessions – each session is to be held during one of the usual lecture hours. Details of which will be announced later by your respective group lecturers.

REFERENCES

Main textbooks

- (1) **Thomas' Calculus Early Transcendentals**, 11th edition, G.B. Thomas, as revised by MD Weir, J Hass and F.R. Giordano, Pearson international edition, 2008
- (2) **Schaum's Outline of Theory and Problems of Matrices**, SI (Metric) Edition, Frank Ayres, McGraw-Hill, 1974

Additional references

1. S.L. Salas, E. Hille, and G.J. Etgen, *Calculus*, John Wiley & Sons, New York, 9th Edition, 2003, John Wiley & Sons.
2. Edwards and Penny, *Calculus*, 6th Edition, 2002, Prentice Hall.
3. Gerald L. Bradley and Karl J. Smith, *Calculus*, 2nd Edition, 1999, Prentice Hall.
4. Seymour Lipschutz and Marc Lipson, *Schaum's Outlines, Linear Algebra*, 3rd Edition, 2001, McGraw-Hill.
5. *Introductory Linear Algebra with Application* by Bernard Kolman and David R. Hill, 7th Edition, 2001, Prentice Hall.

Lecture schedule – tentative

WEEK	DATE	TOPICS TO BE COVERED
1	7 – 13 September 2015	PART I: CALCULUS Chapter 1 Functions Chapter 2 Limits and continuity
2	14 – 20 September 2015	Chapter 2 Limits and continuity Chapter 3 Differentiation
3	21 – 27 September 2015	Chapter 3 Differentiation
4	28 – 4 October 2015	Chapter 4 Applications of derivatives Chapter 5 Integration
5	5 – 11 October 2015	Chapter 5 Integration Chapter 6 Applications of integrals
6	12 – 18 October 2015	Chapter 7 Transcendental functions
7	19 – 25 October 2015	Chapter 8 Techniques of integration
8	26 – 1 November 2015	Chapter 8 Techniques of integration
9	2 – 8 November 2015	Chapter 8 Techniques of integration Chapter 9 Sequences and series Test 1
	9 – 15 November 2015	Semester break
10	16 – 22 November 2015	Chapter 9 Sequences and series

11	23 – 29 November 2015	Chapter 9 Sequences and series
12	30 – 6 December 2015	PART II: LINEAR ALGEBRA Chapter 1 Matrices
13	7 – 13 December 2015	Chapter 1 Matrices Chapter 2 Vector spaces Test 2
14	14 – 20 December 2015	Chapter 2 Vector spaces