

COURSE OUTLINE

Department & Faculty : Dept. of Mathematical Sciences, Faculty of Science	Page : 1 of 2
Subject & Code: ENGINEERING MATHEMATICS (SSCE 1993) Total Lecture Hours: 42 hours	Semester: Semester 2 Academic Session: 2016/17

<u>Lecturers</u>	<u>Section No</u>	<u>Tel No</u>	<u>Office Address</u>	<u>E-mail</u>
Assoc Prof Dr. Ong Chee Tiong	20	34082	C21-426	octiong@utm.my
Assoc Prof Dr. Munira Ismail (P)	16, 18, 48	34272	C22-442	muniraismail@utm.my
Assoc Prof Dr. Khairil Anuar Arshad	64, 65	34385	C15-308	khairilanoar@utm.my
Dr Faridah Mustapha	63, 68	34464	C10-417	faridahmustapha@utm.my
Dr Rashidah Ahmad	66	34351	C10-335	rashidahahmad@utm.my
Dr Zuhaila Ismail	67	34226	C22-435	zuhaila@utm.my
Dr Maslan Osman	62	075215327	SpaceUTM	maslan@utm.my
Dr Zaiton Mat Isa	19, 49, 50	34223	C22-	zaitonmi@utm.my
Tn Hj Ibrahim Mohd Jais	15, 17, 47			ibrahimmi@utm.my
FBME(7) FKM (4) FKA (6)				

Synopsis :

This course is about multivariable calculus of real and vector-valued functions. The basic theory of partial derivatives and multiple integrals of real functions with their applications are discussed. This theory is extended to vector valued functions to describe motion in space, directional derivatives, gradient, divergence and curl, line integrals, surface integrals and volume integral. Related theorems, namely Green's Theorem, Stokes' Theorem and Gauss' Divergence Theorem and their applications are discussed.

Objectives (Course Outcome):
 On completing the course, students should be able to:

1. express functions of two and three variables using graphical representations.
2. apply partial derivatives on problems involving rate of change, estimations, relative and absolute extrema.
3. solve double and triple integrals in various coordinate systems involving area, volume, centre of mass and moment.
4. Discriminate express directional derivatives, tangent, normal vectors, divergence and curl of vector-valued functions using del operator.
5. solve line and surface integrals, and apply related theorems to engineering problems (chemical/civil/electrical/mechanical).

Main References:

1. Glyn James (2004). Advanced Modern Engineering Mathematics. 3rd Edition. Prentice Hall.

Textbook:

2. Abd Wahid Md Raji & et al 2016. Advanced Calculus for Science and Engineering Students, UTM.
3. Maslan Osman & Yusof Yaacob, 2008. Multivariable and Vector Calculus, UTM Press.(C22-418, 1-2pm)
4. Yudariah, Roselainy & Sabariah. Multivariable Calculus for Indpt. Learners, 2nd Ed.09. Pearson Edu Pb.

Teaching Methodology :
 Lectures and tutorials

Attendance Policy:

1. **All** students are required to attend a **minimum of 80% of lecture and tutorial classes** during this course.
2. All absences from class, including absences due to illness, or other official activities, are counted as official absences
3. If your attendance falls below 80%, you may receive **ZERO** marks for your final examination.
4. A **doctor's certificate** will be required to apply for any re-evaluations that you may have missed.

Prepared by: Name: Assoc Prof Dr Ong Chee Tiong Date: 21 th August, 2016	Certified by: Name: Signature: Date:
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Weekly Schedule: Session 2016 / 2017 Semester 1 (4 Sept 2016 – 11 Feb 2017)

Week	Lecture Topics	Notes
1 12/2-16/2/17	Functions of several variables: Domain and range, level curves	
2 19/2-23/2/17	Common surfaces; level surfaces	
3 26/2-02/3/17	Partial derivatives: Rate of change; the chain rule; increments and total differential, implicit differentiations	
4 5/3-9/3/17	Extrema of multivariable functions – relative and absolute	
5 12/3-16/3/17	Double integrals: Integrals in rectangular coordinates; iterated integrals and Fubini's Theorem; changing the order of integration	
6 19/3-23/3/17	Double integrals in polar coordinates; Application of double integral: Area, volume, mass, centre of mass, and moments	H K DYMMSJ 23/3/17(Thur)
7 26/3-30/3/17	Triple integrals: Triple integral in rectangular coordinates, Triple integral in cylindrical coordinates; Triple integral in spherical coordinates	Test 1(15%) 28/3/17(Tues)
31/3-8/4/17	<i>MID SEMESTER BREAK</i>	<i>1 week</i>
8 09/4-13/4/17	Applications of the triple integral: Mass, centre of mass, and moments	
9 16/4-20/4/17	Vector-valued functions : Graphs of vector functions, differentiation and integration of vectors; velocity, acceleration, vector tangent and vector normal	
10 23/4-27/4/17	Scalar and vector fields; Del operator, gradient; directional derivatives; divergence and curl	
11 30/4-4/5/17	Vector Calculus: Line Integrals - line integrals in scalar and vector fields; path independence, potential functions and conservative fields	LabourD 1/5/17(Mond) Test 2(15%) 2/5/17(Tues)
12 7/5-11/5/17	Green's Theorem, Surfaces integrals of scalar and vector fields	WesakD 10/5/17(Wedn)
13 14/5-18/5/17	Stokes' Theorem	
14 21/5-25/5/17	Gauss' Divergence Theorem	

ASSESSMENT

Tests	Content	Date
Test I (15%)	1 hour 15 min	Lectures: Weeks 1-5 12/10/2016, Wed
Test 2(15%)	1 hour 30 min	Lectures: Weeks 6-8 23/11/2016, Wed
Quiz I(5%) & Quiz 2(5%)	To be determined	CO4 To be determined
Assignmt/Quiz(10%)	CO5	To be determined
Final Examination (50%)	3 hours	Lectures: Weeks 1-15 To be determined

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