

**University of Macau**  
**Undergraduate Civil Engineering Program**

Coordinating Unit:	Department of Mathematics, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	MATH 200	Year of Study:	2
Course Title:	Mathematical Analysis III		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	Nil		
Prerequisite Knowledge:	Nil		
Duration:	One semester	Credit Units:	4
Class/Laboratory Schedule:	Three hours of lecture and two hours of tutorial per week.		
Laboratory/Software Usage:	Nil		
Course Description:	This course aims at providing students with a solid foundation of basic techniques in discrete mathematics. The topics include elementary set theory, counting principle, and graph theory		
Course Objectives:	<ol style="list-style-type: none"> <li>1. Understand the fundamental theories of calculus of several variables. [a]</li> <li>2. Be able to formulate physical problems using partial derivatives and multiple integrals. [a]</li> <li>3. Possess the problem-solving skills using derivatives and integrals. [a]</li> </ol>		
Learning Outcomes (LOs):	<p>Upon completion of this course, students are expected to:</p> <ol style="list-style-type: none"> <li>1. be able to compute partial derivatives [PO: a];</li> <li>2. be able to calculate double, triple and line integrals [PO: a];</li> <li>3. have basic understanding of conservative field and potential functions [PO: a]</li> </ol>		
Texts & References: (* recommended textbook(s))	<ol style="list-style-type: none"> <li>1. * Calculus, 6th Ed, C. H. Edwards and D. E. Penney, Prentice Hall.</li> <li>2. Calculus and analytical geometry, 9th Ed. Thomas and Finney, Addison Wesley.</li> </ol>		
Student Assessment:	<ul style="list-style-type: none"> <li>• Assignments: 10%</li> <li>• Midterm examination: 30%</li> <li>• Final examination: 60%</li> </ul>		
Learning Outcome Assessment:	<ul style="list-style-type: none"> <li>• Assignments, midterm and final examination</li> </ul>		

Pedagogical Methods:	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Guest speakers <input type="checkbox"/> Case study <input type="checkbox"/> Role playing <input type="checkbox"/> Student presentation <input type="checkbox"/> Project <input type="checkbox"/> Simulation game <input checked="" type="checkbox"/> Exercises and problems	<input type="checkbox"/> Service learning <input type="checkbox"/> Internship <input type="checkbox"/> Field study <input type="checkbox"/> Company visits <input type="checkbox"/> e-learning <input type="checkbox"/> Independent study <input type="checkbox"/> Others: _____
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Major Assessment Methods: For each Major Assessment Method below, please indicate the specific pedagogical methods involved (by putting a ✓ in the relevant box(es) on the right-hand side).	Case Study	Role Playing	Student Presentation	Individual project/paper	Group project/paper	Simulation Game	Exercises & problems	Service learning	Internship	Field Study	Company visits	Written examination	Oral examination	Others (please specify)
Class Participation/ Discussion (0%)														
Assignments (10%)							✓							
Midterm Exam (30%)												✓		
Final Exam (60%)												✓		
Others (please specify)														
Course Web: (if any)	<a href="http://www.sftw.umac.mo/~fstitl/2012-calculus.html">http://www.sftw.umac.mo/~fstitl/2012-calculus.html</a>													

Course Content: (topic outline)	Week no.	Topics	Assignment no.	LO no.
	1	<b>Introduction:</b> Coordinate system, vector and scalar products Equation of straight lines, planes and quadratic surfaces, cylinders Interior and Boundary points	--	
	2	<b>Functions of several variables</b> Domain and Range of functions, Graph and Level curves, Limits <b>Limits and Continuity</b> Laws of limits, Composition and continuity of functions.	1	
	3	<b>Partial and Mixed Derivatives, Tangent Planes</b> Tangent planes, and Geometric Meaning, Differentials	2	
	4	<b>Global and Local Minimum and Maximum</b> Existence Theorem, Critical Points, Derivative Tests	3	
	5	<b>Applications of Partial Derivatives</b> First order approximation, Chain Rules, Directional Derivatives, Rate of Most Rapid Changes, Geometric meaning of Gradients, Lagrange Multipliers	4	
	6	<b>Double and Triple Integrals</b> Double Integral, Iterated integral Area, Volume and Double Integrals Cross section and Interchange of order of integration	5	
	7	<b>Transformation and Triple Integrals</b> Polar coordinates, Application of double integrals, Triple integral, Cross section Method	6	
	8	<b>Review and Mid-Term Examination</b>		
	9	<b>Surface Area, and Curves</b> Vector Fields and their operators, Review of Parameterization of Curve.	7	
	10	<b>Line integral</b> Line integral, Evaluation of Line Integral, Fundamental Theorem of line integral	8	
	11-12	<b>Potential Functions and Green Theorem</b> Potential functions and Independence of Path Green's Theorem and its applications.	9	
	13-14	<b>Applications of Integral</b> Geometric meaning of divergence and flux of vector fields Surface Integrals, Divergence Theorem, Stokes' Theorem and Review	10	
TBA	<b>Final Examination</b>			

TBA: To be arranged by the Registry

Course Instructor(s):	Dr. I. T. Leong
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