

University of Macau
Undergraduate Civil Engineering, Electrical and Electronic Engineering,
Electromechanical Engineering, Software Engineering Programs

Coordinating Unit:	Department of Civil and Environmental Engineering, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	MATB 220 (Class 003/004)	Year of Study:	2
Course Title:	Engineering Mathematics II		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	MATB 210 Engineering Mathematics I		
Prerequisite Knowledge:	Differential and Integral Calculus of one variable		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Three hours of lecture and 1 hour of tutorial per week.		
Laboratory/Software Usage:	N/A		
Course Description:	Ordinary Differential Equations (First Order/Second Order Linear/Higher Order Linear). Laplace Transform. Fourier Analysis. Complex Analysis. Others (if time allows): e.g. Introduction to partial differential equations.		
Course Objectives:	To understand and apply usual methods for solving ordinary differential equations, Laplace Transform, Fourier Analysis and Complex Analysis		
Learning Outcomes (LOs):	Upon completion of this course, students are expected to: 1. be able to solve simple linear differential equations [POs: a]; 2. be able to apply Laplace Transform, Fourier Analysis and Complex Analysis [POs: a]		
Texts & References: (* recommended textbook(s))	1. Advanced Engineering Mathematics, 10 th ed., by Erwin Kreyszig, John Wiley and Sons, Inc. 2. Advanced Engineering Mathematics, 7th edition, by Peter. V O' Neil, Cengage Learning.		
Student Assessment:	<ul style="list-style-type: none"> • 10 - 12 Homework: 10%; • 8 – 10 Quizzes: 10% • 1 or 2 Midterm examination(s): 20% • Final examination: 60% 		

Learning Outcome Assessment:	<ul style="list-style-type: none"> • Midterm and final examination • Course evaluation 	
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 checked="" type="checkbox"/> e-learning <input type="checkbox"/> Independent study <input type="checkbox"/> Others: <u>Experiments and reports</u>

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%)														
Assignment(s) (10%)							✓							
Quizzes (10%)												✓		
Midterm Exam (20%)												✓		
Final Exam (60%)												✓		
Others (please specify) Lab reports (0 %)														
Course Web: (if any)														

Course Content: (topic outline)	Week no.	Topics	Assignment no.	LO no.
	1	Introduction: First Order Differential Equations, and their solutions. Vector fields and Exact DE, Separable ODE, First Order Homogeneous ODE.	1	1
	2	Integrating Factors, First Order Linear equations. Geomtric meaning of ODE, Existence and Uniqueness of Solutions.	2	1
	3	Second order Linear ODE: homogeneous and non-homogeneous, Linear dependence of functions, Initial Value Problem, General Solutions, and particular solutions. Principle of Superposition. Constant Coefficient 2 nd order ODE, characteristic roots. Complex exponential functions	3	1
	4	Euler-Cauchy Equations. Existence and Uniqueness of Solutions, Wronskian. General Solution of Non-homogeneous Linear ODE. Methods of Undetermined Coefficients. Variations of Parameters.	4	1
	5	Higher Oder Differential Equations. Determinant and Wronskians. Linear Dependence and basis of solutions. Improper Integrals, Laplace Transform. Gamma Functions.	5	1
	6	Transforms of Derivatives and Integrals. Inverse Laplace Transform. Heaviside Functions, Shifting Theorems.	6	2
	7	Dirac Functions, Convolutions and Applications to Differential Equations.	7	2
	8	Integral Equations, System of ODEs, Partial Fractions Techniques.	8	2
	8-9	Periodic Functions, Fourier Series, Convergence Theorem, Fourier cosine and sine series, Approximation by trigonometric polynomials	9	
	9-10	Bessel Inequality and Parseval Identity. Fourier Integrals, Fourier cosine and Fourier sine integrals.	10	2
	11-12	Fourier Transform, Inverse Fourier Transform, Fourier Integral Representation,	11	2
	12-13	Complex numbers, Power Series, Analytic Functions, Cauchy-Riemann Equation. Exponential and Trigonometric Functions, Complex Logarithm.	12	2
	13-14	Review and Final Examination (TBA)		

TBA: To be arranged by the registry

Contribution to Program Outcomes:	Program Outcomes	Contribution to POs [#]				
		5 -----> 1				
		5 Significant	4	3	2	1 Least
	(a) apply knowledge of mathematics, science, and engineering	✓				
	(b) design and conduct experiments, and analyze data					
	(c) design components, systems or processes in presence of constraints					
	(d) Function in a multi-disciplinary team					
	(e) Engineering problem solving					
	(f) Understand professional and ethical responsibility					
	(g) Communicate effectively					
	(h) Understand the impact of engineering solutions to the society					
	(i) Recognize the need and have the ability for lifelong learning					
	(j) Have knowledge of contemporary issues					
	(k) Apply the skills, techniques, modern engineering tools					
	(l) Use the computer/IT tools relevant to the discipline					
	# Note 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support					
Course Instructor(s):	Mr. Michael lung yam, WAN					

University of Macau
Faculty of Science and Technology
Department of Mathematics
MATB220 Engineering Mathematics II (Class 003/004)
Semester B, 2013 – 2014
Course Outline

Instructor	
Mr. MICHAEL lung yam, WAN E-mail address: miclywan@umac.mo Office: A711, Block 1 Office Tel. No.: 8397 8463	<u>Lecture</u> (Class 003) 8:30 a.m. – 10 a.m. Monday & Thursday (JLG202) (Class 004) 10 a.m. – 11:30 a.m. Monday & Thursday (JM11) <u>Tutorial</u> (Class 003) 12 noon – 12:50 p.m. Saturday (JLG202) (Class 004) 6 p.m. – 6:50 a.m. Wednesday (J308) <u>Office Hour</u> 4 p.m. – 6:30 p.m. Monday 10 a.m. – 12:30 p.m. Tuesday

Course Description:

Ordinary Differential Equations (First Order/Second Order Linear/Higher Order Linear)
Laplace Transform.
Fourier Analysis.
Complex Analysis.
Others (if time allows): e.g. Introduction to partial differential equations.

Course Objective:

To understand and apply usual methods for solving ordinary differential equations, Laplace Transform, Fourier Analysis and Complex Analysis

Prerequisites:

Differential and Integral Calculus of one variable

Textbook:

Advanced Engineering Mathematics, 10th ed., by Erwin Kreyszig, John Wiley and Sons, Inc.

References:

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Grading Policy:

Assignments:	10 %
Quizzes:	10 %
Tests:	20 %
Final Examination:	60 %
Total	100 %

Letter Grades	Grade Points	Percentage
A	4.0 (Excellent)	93-100
A-	3.7 (Very good)	88-92
B+	3.3	83-87
B	3.0 (Good)	78-82
B-	2.7	73-77
C+	2.3	68-72
C	2.0 (Average)	63-67
C-	1.7	58-62
D+	1.3	53-57
D	1.0 (Pass)	50-52
F	0 (Fail)	Below 50

Discipline Requirement:

Usual university requirement (Cheating in any form will NOT be tolerated.)

Student Disabilities Support Service:

The University of Macau is committed to providing an equal opportunity in education to persons with disabilities. If you are a student with a physical, visual, hearing, speech, learning or psychological impairment(s) which substantially limit your learning and/or activities of daily living, you are encouraged to communicate with your instructors about your impairment(s) and the accommodations you need in your studies. You are also encouraged to contact the Student Disability Support Service of the Student Counselling and Development Section (SCD), which provides appropriate resources and accommodations to allow each student with a disability to have an equal opportunity in education, university life activities and services at the University of Macau. To learn more about the service, please contact SCD at scd.disability@umac.mo, or 8397 4901 or visit the following website: http://www.umac.mo/sao/scd/sds/aboutus/en/scd_mission.php