COURSE CONTENT

Academic Year	2019-2020	**Semester**	1
Course Coordinator	A/P Law Wing-Keung, Adrian		
Course Code	MT1001		
Course Title	Mathematics I for Maritime Studies		
Pre-requisites	NIL		
No of AUs	3		
Contact Hours	Total: 39 Hours (Lecture: 26 hours; Tutorial: 13 hours)		
Proposal Date	28 Feb 2020		

Course Aims

This course aims to:

i) Introduce the basic mathematical theories and techniques as listed in the course contents;

ii) Provide the students essential mathematics used in finance, business, management, as well as maritime technology and maritime sciences.

Course Learning Outcomes (Course LO)

By the end of this course, you should be able to:

1. Understand commonly used functions in maritime studies and their graphs.
2. Understand and evaluate limits to analyze the behaviors of functions (asymptote, tangent line, continuity and smooth).
3. Understand and evaluate derivatives to carry out marginal analysis and elasticity analysis and to solve nonlinear equations.
4. Use derivatives to analyze the behaviors of functions (stationery points, peak and bottom points, inflection points, and points of diminishing return) related to maritime studies.
5. Use arithmetic and geometric progressions to calculate the present and accumulated values of investment with different interests.
6. Appraise an annuity plan (ordinary annuity, annuity due and deferred annuity).
7. Understand indefinite integration and its basic formulas.
8. Analyze indefinite integrals using different techniques (integration by substitution, integration by parts, integration by partial fraction, and integration using a table of integrals).
9. Evaluate definite integrals using Newton-Leibniz formula; estimate definite integrals with numerical integration; and apply definite integrals related maritime studies.
10. Understand multivariable functions in maritime studies; evaluate limits and partial derivatives, and carry out marginal analysis.
11. Use partial derivatives to analyze the behaviors of functions (continuity and smooth; tangent plane, extrema and saddle points).
12. Find maxima and minima of multivariable functions with or without constraints related maritime studies.

13. Understand and evaluate double integrals using iterated integrals related to maritime studies.

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1	Function and graph. Limits and continuity.	4	2
2	Differentiation. Optimization of business functions.	5	3
3	Mathematics of finance: interest, geometric series, investment appraisal.	4	2
4	Indefinite and definite integrations. Applications of integrals in business and economics.	5	2
5	Partial and total differentiation. Production function analysis & applications.	4	2
6	Double integrals. Applications of double integrals in ship technology.	4	2
	Total:	26	13

Assessment (includes both continuous and summative assessment)

Components	**Course LO tested**	**Related programme SLO or graduate attributes**	**weighting**	**Team/ Individual**	**Assessment rubrics**
1. Final Examination	All	SLOs A, G	60%	Individual	NA
2. Continuous Assessment 1: Quiz 1	1, 2, 3	SLOs A, G	20%	Individual	NA
3. Continuous Assessment 2: Quiz 2	7, 8, 9	SLOs A, G	20%	Individual	NA
Total			100%		

*SLOs = Student Learning Outcomes - NTU Maritime Studies

Related Programme SLO or Graduate Attributes

B. Describe and apply concepts and theories in sub-fields as contributing to the maritime industry and integrate various related themes, skills and knowledge

G. Approach and solve basic maritime problems, through both strategic and research methods, and put theoretical knowledge into practical applications in related industries

Formative feedback

1. Feedback will be through dissemination of your performance in quizzes as well as review of the quiz questions in class. Follow-up consultation will be arranged as needed.
2. Besides having interactive discussion during tutorial, we encourage you to initiate individual consultation sessions on your particular learning needs

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lectures	Weekly lectures to provide you with the specific knowledge and techniques to achieve the learning outcome stated above.
Tutorials	Weekly tutorials to enable you to apply the knowledge to solve structured problems. We encourage you to explore alternative approaches and techniques.

Textbooks/References:

1. Haeussler, E.F., Paul, R.S. & Wood, R.J. (2011). "Introductory Mathematical Analysis." 13th Edition. Prentice Hall.
2. Barnett R.A., Ziegler M.R. and Byleen K.E. (2011). "Calculus for Business, Economics, Life Sciences, and Social Sciences." 13th Edition. Prentice Hall.

Course Policies and Student Responsibilities

The standing university policy governing student responsibilities shall apply.
No special policy for this course.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion, and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors AY2019/20

Instructor	Office Location	Phone	Email
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Planned Weekly Schedule

Week	Topics	Course LO	Activities
1	Equations and graphs of functions;	1	Lectures & Tutorial

	Transformation of functions; Commonly used functions in maritime studies.		
2	Limits and evaluation; Asymptotes and limit of difference quotient; Continuity and differentiability; Introduction to marginal analysis.	2	Lectures & Tutorial
3	Derivatives and evaluation; Marginal analysis; Newton's method; Elasticity of demand / supply functions.	3	Lectures & Tutorial
4	Application of differentiation: Stationery points; Extrema; Inflection points; and, Points of diminishing return.	4	Lectures & Tutorial
5	Arithmetic and geometric progressions; Simple and compound interests; Present and accumulated values.	5	Lectures & Tutorial
6	Appraisal of investment; Ordinary annuity; Annuity due and Deferred annuity.	6	Lectures & Tutorial
7	Introduction to indefinite integration.	7	Lectures & Tutorial
8	Techniques of indefinite integration: Integration by substitution; Integration by parts; Integration by partial fraction; and, Integration using a table of integrals.	8	Lectures & Tutorial
9	Evaluation of definite integrals; Applications of definite integrals in maritime studies; Improper integrals; and Numerical integration.	9	Lectures & Tutorial
10	Use of multivariable functions in maritime studies; Limits and partial derivatives; Continuity and differentiability; Linear approximation and total differentials.	10, 11	Lectures & Tutorial
11	Chain rule; Extrema of multivariable functions with or without constrains; Lagrange multiplier method; Global maxima / minima and applications in maritime studies..	11, 12	Lectures & Tutorial
12	Partial anti-differentiation and iterated integrals; Double integrals; Evaluate double integrals using iterated integrals	13	Lectures & Tutorial
13	Reverse the order of iterated integral; and Applications of double integrals.	13	Lectures & Tutorial