Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): MATH 1112 MATHEMATICAL ANALYSIS II (3,3,1)

Course Aims: This course deals with the basic theory of analysis in real-valued functions in single variable. It provides students with a good foundation for more advanced courses in the mathematical science major. Topics include sequences and series, Riemann integrals and power series.

Prerequisite: MATH1111 MATHEMATICAL ANALYSIS I

Prepared by: Prof Wu Xiaonan

Learning Outcomes (LOs):
Upon successful completion of this course, students should be:

No.	Learning Outcomes (LOs)
	Knowledge
1	Able to understand the concept and theory of Riemann integral
2	Able to understand the concept and theory of series of numbers
3	Able to understand the concept and theory of series of functions
4	Able to understand the concept and theory of uniform convergence
5	Able to understand the concept and theory of Fourier series
6	Able to understand the concept and theory of improper integrals
	Skills
7	Able to apply basic skills for integration
8	Able to apply basic skills for testing the convergence of series
	Attitudes
9	Able to solve problems independently and collaboratively as part of a team
10	Able to appreciate the power and beauty of mathematics

Assessment:

No.	Assessment Methods	Weighting	Remarks
1	Two 1-hour Tests and Continuous Assessment	30%	Two 1-hour Tests and Continuous Assessment are designed to measure how well the students have learned the basic concepts and fundamental theory of convergent of sequence and series, and definite integral.
2	Final Examination	70%	Final Examination questions are designed to see how far students have achieved their intended learning outcomes. Questions will primarily be analysis and skills based to assess the student's versatility in solving problems in sequences and series, Riemann integrals, power series and improper integrals.

Learning Outcomes and Weighting:

Content	LO No.	Teaching (in hours)
I. Riemann Integrals of Functions in One Variable	1,7,9-10	15
II. Sequences and Series of Numbers	2,8-10	6
III. Sequences and Series of Functions	3,4,8-10	9
IV. Fourier series	5,8,10	6
V. Improper Integrals	6,7,10	6

Textbook: P.M. Fitzpatrick, Advanced Calculus, PWS, 1996.

References:

T.M. Apostol, Mathematical Analysis, 5th edition, Addison-Wesley, 1971.
Wilfred Kaplan, Advanced Calculus, Addison-Wesley, 1993.
J.R. Kirkwood, An Introduction to Analysis, PWS-KENT, 2nd edition, 1995.
Jonathan Lewin, An Introduction to Mathematical Analysis, 2nd edition, McGraw Hill, 1993.
William R. Parzynski, Introduction to Mathematical Analysis, International Student Edition, McGraw Hill, 1982.
S. Salas, E. Hille and G.J. Etgen, Calculus, One and Several Variables, 8th edition, John Wiley & Sons, 1999.

Course Content in Outline:

Topic	Hours
I. Riemann Integrals of Functions in One Variable A. Darboux sums and Riemann sums B. Integrability and properties C. Fundamental theorem of calculus D. Change of variables and integration by parts for definite integrals E. Applications: area, volume, arc length and center of mass	15
II. Sequences and Series of Numbers A. Tests for convergence B. Absolute and conditional convergence	6
III. Sequences and Series of Functions A. Uniform convergence B. Power series C. Taylor's series	9
IV. Fourier series A. Trigonometric functions and orthogonality B. Fourier coefficients C. Convergence analysis	6
V. Improper Integrals A. Infinite intervals B. Unbounded integrands	6