ATENEO DE MANILA UNIVERSITY
Loyola Schools

SYLLABUS FOR UNDERGRADUATE COURSES

A. COURSE INFORMATION

COURSE NUMBER	MATH 31.1			**NO. OF UNITS**	3
COURSE TITLE	Mathematical Analysis IA				
PREREQUISITE/S	MATH 21 for those in programs where MATH 21 is required				
DEPARTMENT/ PROGRAM	Mathematics			**SCHOOL**	Science and Engineering
SCHOOL YEAR	2023-2024			**SEMESTER**	1st
INSTRUCTOR/S	Clark Kendrick Go			**LMS**	Canvas
VENUE	Onsite	**SECTION**	C1	**SCHEDULE**	MTh 11.00-12.30

B. COURSE DESCRIPTION

MATH 31.1 is part of the first of a series of 3 calculus courses. Its main focus is differential calculus of functions on one variable. Analysis and reasoning in mathematics are stressed. Emphasis is placed on the formal statements, proofs, and applications of the definitions and different theorems presented in the course.

WHERE IS THE COURSE SITUATED WITHIN THE FORMATION STAGES IN THE FRAMEWORK OF THE LOYOLA SCHOOLS CURRICULA	
	FOUNDATIONS: Exploring and Equipping the Self
X	ROOTEDNESS: Investigating and Knowing the World
	DEEPENING: Defining the Self in the World
	LEADERSHIP: Engaging and Transforming the World

C. CORE CURRICULUM LEARNING OUTCOMES

Alignment of Program to the Core Curriculum Learning Outcomes

The Ideal Ateneo Graduate: A Person of Conscience Competence Compassion Commitment							
CCLO 1	**CCLO 2**	**CCLO 3**	**CCLO 4**	**CCLO 5**	**CCLO 6**	**CCLO 7**	**CCLO 8**
	✓						

Alignment of the Course to the Program Learning Outcomes (BSM-AMF, AMDSc)

PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
✓	✓			✓	✓			✓

Alignment of the Course to the Program Learning Outcomes (BS MATH)

PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
	✓	✓		✓	✓	✓		✓	

LEGEND:

CCLO 1	Demonstrate effective communication skills (listening and speaking, reading and writing) in English and Filipino.
CCLO 2	Evaluate information and issues in various spheres of life using mathematical reasoning and statistical tools to process and manage data.
CCLO 3	Propose ways to address pressing social and ecological problems using appropriate critical approaches and scientific thinking
CCLO 4	Develop a creative and moral imagination that is responsive to contemporary global realities and challenges, but also deeply rooted in local histories, conditions, norms, and institutions.
CCLO 5	Internalize the significance and value of her/ his unique existence and purpose in life in light of Christian faith.
CCLO 6	Discern life choices with a keen awareness of ethical dilemmas and considerations.
CCLO 7	Exemplify a commitment to enhancing human life and dignity, especially those who are excluded and in greatest need.
CCLO 8	Practice a vision of leadership and committed citizenship rooted in Christian humanism.

BSM AMF and AMDSc PLOs (Undergraduate Applied Math Component)

PLO 1	Demonstrate broad and coherent knowledge and understanding in the core areas of mathematics and allied fields.
PLO 2	Demonstrate skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem solving and rigorous argument.
PLO 3	Demonstrate proficiency in reading and writing mathematical proofs.
PLO 4	Interpret scientific, economic, and market data in order to arrive at critical judgments that include reflection on relevant scientific and ethical issues.
PLO 5	Implement basic mathematical, statistical, and computational methods in data analysis and problem solving.
PLO 6	Communicate, both orally and in writing, information, ideas, and solutions to problems, to other scientists, decision makers, and the public.
PLO 7	Understand the limitations and implications of mathematical models as applied in real-life contexts.
PLO 8	Collaborate in research and development projects.
PLO 9	Develop creativity, rigor, and discipline in dealing with various mathematical problems.

BS MATH PLOs

PLO 1	Develop mastery in the core areas of mathematics such as analysis, algebra, and geometry.
PLO 2	Demonstrate skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem solving and rigorous argument.
PLO 3	Develop creativity, rigor and discipline in dealing with various mathematical problems.
PLO 4	Demonstrate proficiency in reading and writing mathematical proofs.
PLO 5	Implement basic mathematical, statistical, and computational methods in mathematical modelling and problem solving.
PLO 6	Understand the limitations and implications of mathematical models as applied in real-life contexts.
PLO 7	Demonstrate a fundamental understanding of one or more areas related to mathematics.
PLO 8	Appreciate the importance of mathematics in the modern world, including the interrelationships among fields inside and outside mathematics.
PLO 9	Communicate, both orally and in writing, information, ideas, and solutions to problems, to other scientists, decision makers, and the public.
PLO 10	Produce a rigorous exposition of a mathematical topic and an exploration of conjectures.

D. COURSE LEARNING OUTCOMES

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

COURSE LEARNING OUTCOMES
CLO1: Demonstrate a coherent knowledge of the basic concepts and results of differential calculus
CLO2: Apply the concept of limits in defining derivatives
CLO3: Determine if a function is continuous at a point or on an interval
CLO4: Compute derivatives of various functions
CLO5: Apply derivatives in describing the behavior of functions, in measuring rates of change, and in solving optimization problems
CLO6: exemplify the discipline of constructing comprehensive and organized solutions and/or mathematical proofs for a given problem

E. COURSE OUTLINE and LEARNING HOURS

Topic	Section*	CLOs	Estimated Learning Hours
Module 1. Limits and Continuity			
The Limit of a Function, 10 August	1.5	1	3
Calculating Limits Using the Limit Laws, 14 August	1.6	1, 6	8
The Precise Definition of a Limit, 17 August	1.7	1, 6	6
Continuity, 31 August	1.8	1, 3, 6	4
Limits at Infinity, Horizontal Asymptotes, 04 September	3.4	1, 6	6
Module 2. Derivatives			
The Derivatives and Rates of Change, 07 September	2.1	1, 2	2
The Derivative as a Function, 07 September	2.2	1, 2, 6	3
Differentiation Formulas, 11 September	2.3	1, 4, 6	4
Derivatives of Trigonometric Functions, 14 September	2.4	1, 4, 6	4
The Chain Rule, 18 September	2.5	1, 4, 6	4
Implicit Differentiation, 21 September	2.6	1, 4, 6	4
Long Test 1 (Tentative date: 25 September)			
Rates of Change in the Natural and Social Sciences, 28 September	2.7	1, 4, 5, 6	3
Related Rates, 02 October	2.8	1, 4, 5, 6	5
Linear Approximations and Differentials, 09 October	2.9	1, 4, 5, 6	3
Exponential Functions and Their Derivatives, 12 October	6.2	1, 4, 6	4
Derivatives of Logarithmic Functions, 16 October	6.4	1, 4, 6	4
Inverse Trigonometric Functions, 19 October	6.6	1, 4, 6	3
Long Test 2 (Tentative date: 30 October)			
Module 3. Applications of Derivatives			
Minimum and Maximum Values, 06 November	3.1	1, 4, 5, 6	3
The Mean Value Theorem, 09 November	3.2	1, 4, 5, 6	2
What Derivatives Tells Us about the Shape of a Graph, 13 November	3.3	1, 4, 5, 6	4
Summary of Curve Sketching, 16 November	3.5	1, 4, 5, 6	4
Optimization Problems, 20 November	3.7	1, 4, 5, 6	4
Long Test 3 (Tentative date: 05 December)			

*Sections here refer to chapter numbers in our main reference (see **H. Main Reference**). All dates approximate.

F. ASSESSMENTS AND RUBRICS

Assessment	Weight	CLO
3 Departmental Long Tests (25% per LT)	75%	1, 2, 3, 4, 5, 6
Other Graded Assessments	25%	1, 2, 3, 4, 5, 6

G. TEACHING and LEARNING METHODS

TEACHING & LEARNING METHODS and ACTIVITIES	CLOs
Onsite Lecture sessions	1, 2, 3, 4, 5, 6
Boardwork / Problem Solving Sessions	1, 2, 3, 4, 5, 6
Practice Exercises	1, 2, 3, 4, 5, 6

Independent Work/Reading Assignments	1, 2, 3, 4, 5, 6

H. MAIN REFERENCE/REQUIRED READING

Stewart J. et al. (2020), *Calculus* (Metric Version), 9th ed., Cengage Learning.

I. SUGGESTED READINGS

1. Stewart, James et al. (2020). Calculus: Early Transcendentals, 9th ed. Boston, MA, USA: Cengage.
2. Stewart, James (2019). Calculus: Concepts and Contexts, 4th ed. Boston, MA, USA: Cengage.
3. Goldstein, Larry J et al. (2019) Calculus & its applications, 14th ed. NY, NY: Pearson.
4. Hass, Joel et al (2018) University calculus: Early Transcendentals, 3rd ed. Harlow: Pearson Education Ltd.
5. Larson, R. and Edwards, B. (2018). Calculus, 11th ed., Cengage Learning.
6. Berresford, Geoffrey C. (2016). Applied calculus, 7th ed. Boston, MA, USA: Cengage Learning.
7. Hughes-Hallett, et. al. (2015), Applied Calculus, 5th ed., Wiley.

J. GRADING SYSTEM

Each assessment task listed in Section F (in this syllabus) will be individually marked. Using the assessment weights indicated, the weighted average of the scores will be computed and this will be the final numerical grade for the course. The following conversion table will be used to determine the corresponding letter grade.

Final Grade Conversion

92 – 100	A
86 – 91	B+
77 – 85	B
69 – 76	C+
60 – 68	C
50 – 59	D
Below 50	F

K. CLASS POLICIES

1. The official learning management system for this course will be Canvas. Only students who are officially enrolled will be included in the Canvas class and will be allowed to take and submit graded assessments.
2. Attendance will be checked. As per the updated academic policies released by the Assistant Vice President for Undergraduate Education, students will receive the grade of W if the total number of absences in a class exceeds 20% of the total number of meetings during the term.
3. Students who arrive 15 minutes or more after the start time will incur 1 cut. Those who arrive within the first 15 minutes are given half a cut.
4. No extra work will be given to students who want to improve their grades. The course requirements already provide ample opportunity for students to get good grades.
5. Make-up long tests may be given in the case of grave medical and familial reasons (e.g., debilitating illness, death in the family) or official representation of the school (e.g., athletic events and other competitions, as endorsed by the appropriate Ateneo office), after the submission of relevant documents as proof. **Commitments to attend events like weddings and birthdays, and to travel are <u>not</u> considered valid reasons to secure a make-up exam.**
6. Use A4 bond paper in all long tests. Erasable pens are not allowed. Only non-metallic black or blue ink is allowed.

7. Late submission of graded requirements will incur deductions. Penalties (e.g., a zero in that graded requirement) will solely be at the discretion of the teacher.
8. Penalties will be imposed on submissions that are either completed after the deadline or not compliant to the guidelines set by the teacher.
9. You are expected to have all the learning tools you need for this course. No borrowing and/or lending of calculators, especially during exams. Furthermore, cellular phones may not be used as calculators.
10. Requests for a recheck of any grade work should be made within two days after it is returned. Any requests made after that will not be entertained.
11. Cellular phones and other electronic devices should either be switched off or placed in silent mode during class hours.
12. The teacher reserves the right to send anyone out of the classroom on the grounds of discourtesy to the teacher or to a fellow student, of misbehavior in the classroom, and of other reasons as provided by the student handbook.
13. Students are expected to exercise the highest level of academic integrity. Students are expected to treat their classmates and instructor with respect. Cheating, plagiarism, discourtesy or misbehavior which includes, but is not limited to, posting of answers, hints, or any useful information to any graded work in any platform will not be tolerated and will be treated in accordance to the Student Handbook.
14. Ateneo de Manila University does not discriminate on the basis of sex, gender, marital or parental status, sexual orientation, or gender identity or expression. For more information visit these links: http://www.ateneo.edu/ls/ls-gender-policy and https://www.ateneo.edu/policies/code-decorum-investigation-sexual-harassment

L. CONSULTATION HOURS

NAME OF FACULTY	EMAIL	DAY/S	TIME
Clark Kendrick Go	cgo@ateneo.edu	MTh	15.00-17.00