Department of Mathematics and Computer Science
College of Science
University of the Philippines Baguio

SYLLABUS

A. COURSE DETAILS

Course Number:	Math 100	
Course Name:	Introduction to Calculus	
Course Description:	This course introduces the student to the fundamentals of calculus. It covers functions and their graphs, concepts of limit and continuity, theory of differentiation, derivatives of algebraic and trigonometric functions, theory of integrals, and applications of the definite integral.	
Credit Units:	4 units (Lecture)	
Prerequisite:	None	
Requirements:	Four Long Examinations	60%
	Quizzes, Problem Sets, Reporting	15%
	Final Examination	20%
	Attendance	5%
Passing Grade:	60%	

B. COURSE OUTCOMES

At the end of the course, the student should be able to:

CO1: Evaluate a function.
CO2: Perform addition, subtraction, multiplication, division, and composition of functions.
CO3: Solve problems involving functions.
CO4: Illustrate the limit of a function using a table of values and graph of the function.
CO5: Evaluate the limit of a function using limit theorems.
CO6: Define continuity at a point and on an interval.
CO7: Illustrate continuity of a function at a given number and interval.
CO8: Determine whether a function is continuous at a number or interval.
CO9: Illustrate the different types of discontinuity.
CO10: Illustrate the tangent line to the graph of a function at a given point.
CO11: State the definition of the derivative of a function and its relation to the slope of the tangent line to the function.
CO12: Apply the differentiation rules to get the derivative of a function.
CO13: Relate derivative as a rate of change.
CO14: Solve problems on marginal analysis.
CO15: Solve problems involving the chain rule of differentiation.
CO16: Use the implicit differentiation to solve the derivatives of implicit functions.
CO17: Solve related rates problems.
CO18: Apply the derivative tests to find extrema of a function and the graph of functions.
CO19: State the Rolle's theorem and Mean Value theorem.
CO20: Solve optimization problems using the first and second derivative tests.
CO21: Find the partial derivatives of functions with more than one variable.
CO22: Solve optimization problems in two or more variables using Lagrange multipliers.

CO23: Illustrate the antiderivative of a function.
CO24: Compute antiderivatives of various functions.
CO25: Solve separable differential equations using antidifferentiation.
CO26: Solve situational problems involving exponential growth and decay, bounded growth, and logistic growth.
CO27: Define the definite integral of a continuous function on the specified interval.
CO28: Illustrate the fundamental theorems of calculus.
CO29: Compute the definite integral of a function using the second fundamental theorem of calculus.
CO30: Solve problems involving areas of regions.

C. COURSE OUTLINE

Timeline	Course Outcome	Topics	Assessment Tools
Week 1 Week 2 Week 3 Week 4		1.1 Functions and their Graphs 1.2 Operations on Functions and Types of Functions 1.3 Functions as Mathematical Models 1.4 Limit of a Function and Limit Theorems 1.5 One-sided Limits and Infinite Limits 1.6 Continuity at a Point and on an Interval 1.1 1.7 Continuity of the Trigonometric Functions	Quiz 1 Problem Set 1 Long Exam 1
Week 5 Week 6 Week 7 Week 8		2.1 The Tangent Line and the Derivative 2.2 Non-existence of the Derivative 2.3 Theorems on Differentiation of Algebraic and Trigonometric Functions 2.4 Higher-order Derivatives 2.5 The Derivative as a Rate of Change and Marginal Analysis 2.6 Differentiation of Exponential and Logarithmic Functions 2.7 Chain Rule and Implicit Differentiation 2.8 Related Rates	Quiz 2 Problem Set 2 Long Exam 2
Week 9 Week 10 Week 11 Week 12		3.1 Maximum and Minimum Function Values 3.2 Applications Involving an Absolute Extremum on a Closed Interval 3.3 Rolle's Theorem and the Mean Value Theorem 3.4 Increasing and Decreasing Functions and the First Derivative Test 3.5 Concavity, Points of Inflection, and the Second Derivative Test 3.6 Optimization Problems 3.7 Functions of Two Variables and Partial Derivatives	Quiz 3 Problem Set 3 Long Exam 3
Week 13 Week 14 Week 15 Week 16		4.1 Anti-differentiation 4.2 Some Techniques of Anti-differentiation 4.3 Differential Equations: Growth and Decay 4.4 Area and the Definite Integral 4.5 The Fundamental Theorems of Calculus 4.6 Area of a Plane Region	Quiz 4 Problem Set 4 Long Exam 4

D. REFERENCES

1. Barnett, R.A., Ziegler M.R., Byleen K.E., and Stocker C.J., *Calculus for Business, Economics, Life Sciences, and Social Sciences*, 8th Edition, NJ: Pearson Prentice Hall, 2005.
2. Hoffman, L., Bradley, G.L., Sobecki, D., and Price M., *Calculus for Business, Economics and the Social and Life Sciences*, 11th Edition, McGraw-Hill Education, 2012.
3. Crowdis, D.G., *Concepts of Calculus with Applications to Business*, Prentice Hall, 1975.
4. Tan, S., *Calculus for the Managerial, Life, and Social Sciences*, 7th edition, Brooks Cole, 2007
5. Leithold, L., The Calculus 7, Harper Collins, 1996.

E. CLASS RULES

1. The University rule on class attendance (Article 346 of the University Code) shall be strictly enforced.
2. If a student misses a short quiz, his/her grade in that quiz is zero. If a student misses a long examination for a valid reason (this requires documentation), his/her final grade in the final exam will also account as his/her grade for the missed exam. This applies to no more than one long exam missed. A student who fails to take any examination for invalid reasons will get a grade of 0% for that exam.
3. Cheating, in any form, will not be tolerated.

F. RUBRIC FOR ASSESSMENT

A. Problem Set

CRITERIA	Unacceptable 0	Poor 1	Basic 2	Acceptable 3	Exemplary 4
Interpretation of the Problem 30%	Incorrect interpretation of problem. A major misinterpretation of what is given or what is to be shown.	There is at least some sign of relevant ideas regarding the problem.	Correct but incomplete interpretation of the problem. May overlook significant details in the statement of the problem. Might be stated for indirect proof but a direct proof is given or vice-versa.	Correct but with minor incorrect or unnecessary concepts for its solutions.	Correct statement with the hypothesis (given) and conclusion (to show) clearly stated.
Correctness of Proof 70%	Mainly incorrect consequences Improperly deduced from the given. Little or no sense of how to prove the result.	Unconnected, mostly true statements properly deduced from the given. Listing facts without a	Statements linked into a reasonable (though perhaps misguided) attempt to prove the	A correct approach to proving the theorem is attempted. Some statements may be	A correct and complete proof is given. Some irrelevant information may be

		sense of how to link them to get a correct proof. May just jump to the conclusion without justification.	theorem. The proof may be left incomplete or may depend upon a major Unjustified leap.	unjustified or improperly justified, but errors are minor and could be fixed without substantially changing the proof.	included, particularly on timed work where the student is unable to polish up the presentation.

B. Reporting

Criteria	Needs Improvement 1	Satisfactory 2	Good 3	Exemplary 4
Organization 10%	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.
Content Knowledge 50%	Students shows no understanding of mathematical concepts within the presentation	Students are visibly uncomfortable with the mathematical concepts of the presentation	Students are at ease with the mathematical concepts of the presentation but lack a deep conceptual understanding	Students demonstrate a complete and comprehensive understanding of the mathematical concepts in the presentation
Visuals 10%	Students use no visuals	Students occasionally use visuals that rarely support the presentation and audience understanding	Students use visuals that are related to the presentation but did not completely support audience understanding	The visuals used supported audience understanding
Mechanics 10%	Students presentation contained four or more spelling, grammatical or mathematical errors	Presentation had three spelling, grammatical or mathematical errors	Presentation had no more than two spelling, grammatical or mathematical errors	Presentation had no spelling, grammatical or mathematical errors
Delivery 20%	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly.	Student used a clear voice and correct, precise pronunciation of terms.

Prepared:

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