Douglas College

EFFECTIVE: SEPTEMBER 2004
CURRICULUM GUIDELINES

A.	Division:	**Instructional**	Effective Date:		**September 2004**
B.	Department / Program Area:	**Mathematics/ Science & Technology**	Revision	**X**	New Course
			If Revision, Section(s) Revised:		**C, F, H, J, M**
			Date of Previous Revision:		**September 1998**
			Date of Current Revision:		**September 2004**

C: MATH 1220 **D: Calculus II** **E: 3**

Subject & Course No.	Descriptive Title	Semester Credits

F: Calendar Description:

MATH 1220 is an introduction to integral calculus. It develops the concept of the integral and its applications. Other topics include techniques of integration, improper integrals, sequences and series of numbers, Taylor series, polar coordinates, parametric equations, and separable differential equations.
This course is taught using a graphing calculator.

G: Allocation of Contact Hours to Type of Instruction / Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture

Number of Contact Hours: (per week / semester for each descriptor)

4 hours

Number of Weeks per Semester:
15

H: Course Prerequisites:

MATH 1120

I: Course Corequisites:
None

J: Course for which this Course is a Prerequisite

MATH 2321and MATH 2421

K: Maximum Class Size:

35

L: PLEASE INDICATE**:**

	Non-Credit
	College Credit Non-Transfer
X	College Credit Transfer:

SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bccat.bc.ca)

M: Course Objectives / Learning Outcomes

General comments: MATH 1220 is a second course in calculus. The four-semester sequence of MATH 1120, 1220, 2321, and 2421 provides the foundation for continued studies in science, engineering, computer science, or a major in mathematics.

Specific objectives:

At the conclusion of this course, the student should be able to:

- compute finite Riemann sums and use to estimate area
- form limits of Riemann sums and write the corresponding definite integral
- recognize and apply the Fundamental Theorem of Calculus
- evaluate integrals involving exponential functions to any base
- evaluate integrals of reciprocal functions
- evaluate integrals involving basic trigonometric functions and integrals whose solutions require inverse trigonometric functions
- be able to choose an appropriate method and apply the following techniques to finding antiderivatives and evaluate definite integrals:
    a) integration by parts
    b) trigonometric and rationalizing substitution
    c) completing the square for integrals involving quadratic expressions
    d) partial fractions
    e) integrals of products of trigonometric functions
- apply integration to problems involving areas, volumes, arc length, work, velocity and acceleration
- be able to determine the convergence or divergence of improper integrals by comparison test
- determine if a given sequence converges or diverges
- determine if a sequence is bounded and/or monotonic
- determine the sum of a geometric series
- be able to choose an appropriate test and determine series convergence/divergence using:
    a) integral test
    b) simple comparison test
    c) limit comparison test
    d) ratio and root test
    e) alternating series test
- distinguish and apply concepts of absolute and conditional convergence of a series
- determine the radius and interval of convergence of a power series
- approximate a differentiable function by a Taylor polynomial, determine the remainder term, and compute the error in using the approximation
- find a Taylor or Maclaurin series representing specified functions by:
    a) "direct" computation
    b) means of substitution, differentiation or integration of related power series
- find the area of a region bounded by the graph of a polar equation or parametric equations
- find the lengths of curves in polar coordinates or in parametric form
- solve first order differential equations by the method of separation of variables; apply to growth and decay problems

N: Course Content:

1. Introduction to the Integral
    - sigma notation
    - Riemann sums
    - the definite integral
    - the Fundamental Theorem of Calculus
    - antiderivatives; elementary substitutions
    - applications to area under and between curves, volume and work

2. Techniques of Integration
    - parts
    - trigonometric substitution

- trigonometric integrals (products and powers)
- partial fractions (linear factors and distinct quadratic factors)
- rationalizing substitutions
- improper integrals

3. Applications of Integration
   - areas between curves
   - volumes by slicing and cylindrical shells
   - work
   - separable differential equations
   - arc length

4. Infinite Series
   - sequences
   - sum of a geometric series
   - absolute and conditional convergence
   - comparison tests
   - alternating series
   - ratio and root test
   - integral test
   - power series
   - differentiation and integration of power series
   - Taylor and Maclaurin series
   - polynomial approximations; Taylor polynomials

5. Parametric Equations and Polar Coordinates
   - areas and arc lengths of curves in polar coordinates
   - areas and arc lengths of functions in parametric form

6. Optional Topics (included at the discretion of the instructor)
   - tables of integrals
   - approximation of integrals by numerical techniques
   - Newton's law of cooling, Newton's law when force is proportional to velocity, and logistics curves
   - a heuristic "proof" of the Fundamental Theorem of Calculus
   - the notion of the logarithm defined as an integral
   - further applications of Riemann sums and integration
   - binomial series

O: Methods of Instruction

Lectures, problem sessions and assignments

P: Textbooks and Materials to be Purchased by Students

Stewart, Calculus: Early Transcendentals, 3rd Edition, Brooks/Cole.
A graphing calculator is also required.

Q: Means of Assessment

Evaluation will be carried out in accordance with Douglas College policy. The instructor will present a written course outline with specific evaluation criteria at the beginning of the semester. Evaluation will be based on the following criteria:

1.	Weekly quizzes	0 – 40%
2.	Tests	20 – 70%
3.	Assignments	0 – 15%
4.	Attendance	0 – 5%
5.	Class participation	0 – 5%
7.	Final examination	30%

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

Not open for PLAR.

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Education Council / Curriculum Committee Representative

Dean / Director Des Wilson

Registrar Trish Angus