

## CURRICULUM GUIDE: OFFICIAL COURSE OUTLINE

Course Code	MATH 105	Course Title	Integral Calculus with Applications to Commerce and Social Sciences			
Credit Value	3	Department	Mathematics and Science			
No. of weeks	14	Hrs. per week	<i>Lecture</i>	<i>Tutorial</i>	<i>Laboratory</i>	<i>Total</i>
			4	0	0	4
Course Description	<p>Antiderivatives, the definite integral, techniques of integration, applications of integration, partial derivatives, optimization with and without constraints, an introduction to differential equations, discrete and continuous random variables and probability.</p> <p><i>Note: Students with credit for MATH 152 may not take MATH 105 for further credit.</i></p>					
Prerequisite(s)	ENGL 088 (formerly EASL 089/ENGL 097), MATH 104 or MATH 151					
Initial Articulation Targets	<i>UBC</i>	<i>SFU</i>	<i>UVic</i>	<i>UNBC</i>	<i>TRU</i>	
	MATH 105 (3)	MATH 158 (3) – Q	MATH 101 (1.5)	MATH 101 (3)	MATH 1240 (3); ALEX MATH 104 (3) & ALEX MATH 105 (3)=TRU MATH 1140 (3) & TRU MATH 1240 (3)	
For updated information on the transferability of this course, please consult the BC Transfer Guide, <a href="http://www.bctransferguide.ca">www.bctransferguide.ca</a>						
Learning Outcomes	<p>Upon successful completion of this course, the student will be able to:</p> <ul style="list-style-type: none"> <li>Evaluate indefinite and definite integrals by a variety of integration techniques (including numerical integration methods such as midpoint, trapezoidal, and Simpson’s rule).</li> <li>Determine whether an improper integral converges or diverges. If it converges, compute its value.</li> <li>Apply integration techniques to business applications including total money flow, present and future value problems, capital value, consumer and producers’ surplus.</li> <li>Demonstrate an understanding of multivariable functions by determining maxima and minima of multivariable functions using critical values and using Lagrange multipliers.</li> <li>Use double integrals to find average value and volumes under a surface and apply this concept to solve problems in business and social sciences.</li> <li>Solve ordinary first order differential equations (including the use of Euler’s method) and apply the tool of differential equations to state and solve problems in economics, commerce, and social sciences.</li> </ul>					



	<ul style="list-style-type: none"> <li>Understand the concept of random variable and use integration techniques to determine probabilities, expected value, median, standard deviation, and variance of continuous random variables.</li> </ul>	
Content	<p><b>Core</b> topics – all of the following will be covered:</p> <ul style="list-style-type: none"> <li>The antiderivative</li> <li>Definition of the definite integral</li> <li>The Fundamental Theorem of the Calculus</li> <li>Integration techniques (including substitution, integration by parts, and the use of tables)</li> <li>Applications of integration in economics</li> <li>Differential equations (first-order linear) with applications</li> <li>Numerical integration (including the trapezoid and Simpson’s rule)</li> <li>Introduction to multivariable calculus, including partial derivatives, optimization, Lagrange multipliers, and double integrals.</li> <li>Sequences and series</li> <li>Introduction to probability and statistics, including continuous probability density functions</li> </ul> <p>Additional topics may also be covered, at the discretion of the instructor.</p>	
Methods of Instruction	Lectures, problem sessions and assignments	
Required Textbook(s)	<p>The following textbook(s) is/are required, or approved equivalent(s).</p> <p>Calaway, Shana et al. Applied Calculus. 12th Ed. OpenTextBookStore, 2014.</p> <p>Lial, Margaret, Raymond Greenwall and Nathan Ritcheny. Calculus with Applications. 12th Ed. Pearson Publishing, 2022.</p> <p>Strang, Gilbert and Edwin Herman. Calculus Volume 1. OpenStax, 2022.</p>	
Required Equipment and Technology	<p>Students are required to have a computer with internet access.</p> <p>The following resources are provided by the College:</p> <ul style="list-style-type: none"> <li>Office 365</li> <li>Student email</li> </ul>	
Homework Hours	At minimum, students can expect one hour of homework for every hour of instructional time.	
Evaluation	<i>Component</i>	<i>% Value</i>
	Assignments, in-class activities, participation	10-30%
	Quizzes (weekly, biweekly, module, chapter)	10-30%
	Midterm examination(s)	20-30%
	Final examination	30-35%
Completion Requirements	The minimum grade to pass this course is D (50%). Unless otherwise stated, a minimum grade of C- (55%) is required for this course to fulfil a prerequisite.	



Course Designer(s)	Len Berggren, Ph.D., Department of Mathematics, Simon Fraser University	Consultant(s), <i>if applicable</i>	
Dean's Approval	Barbara Moon, Ph.D., Dean of Arts and Sciences, Alexander College	Dean's Approval Date	September 27, 2006
Curriculum Committee Approval Date	September 27, 2006	First Term Offered	Fall 2008
Last Review Date	March 1, 2023	Next Review Date	March 1, 2028
Revision History	May 1, 2014-All MATH and STAT courses will be 4 hours, commencing Fall 2014, per SASC. January 5, 2015-Revised by Len Berggren, Mathematics faculty March 1, 2023-Minor updates (e.g., assessment ranges, textbooks) by Kelly Cheung and Krishna Subedi		