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CURRICULUM GUIDE: OFFICIAL COURSE OUTLINE

<table>
<tr><td>Course Code</td><td>MATH 152</td><td>Course Title</td><td colspan="4">Calculus II</td></tr>
<tr><td>Credit Value</td><td>3</td><td>Department</td><td colspan="4">Mathematics and Science</td></tr>
<tr><td rowspan="2">No. of weeks</td><td rowspan="2">14</td><td rowspan="2">Hrs. per week</td><td>Lecture</td><td>Tutorial</td><td>Laboratory</td><td>Total</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Description</td><td colspan="6">Integrals, techniques and applications of integration, approximations, sequences and series, area and arc length in polar coordinates.

Note: Students with credit for MATH 105 may not take MATH 152 for further credit.</td></tr>
<tr><td>Prerequisite(s)</td><td colspan="6">ENGL 088 (formerly EASL 089/ENGL 097), MATH 151</td></tr>
<tr><td rowspan="2">Initial Articulation Targets</td><td>UBC</td><td>SFU</td><td>UVic</td><td>UNBC</td><td colspan="2">TRU</td></tr>
<tr><td>MATH 101 (3)</td><td>MATH 152 (3) – Q</td><td>MATH 101 (1.5)</td><td>MATH 101 (3)</td><td colspan="2">MATH 1240 (3)</td></tr>
<tr><td colspan="6">For updated information on the transferability of this course, please consult the BC Transfer Guide, www.bctransferguide.ca</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">Upon successful completion of this course, the student will be able to:
Evaluate definite and indefinite integrals by using various integration techniques including substitution, integration by parts, trigonometric identities, trigonometric substitutions, and partial fractions.
Apply the concept of definite integral to problems such as areas between curves, volumes of solids (by disk, washer, and shell methods), lengths of curves, the average value of a function, and the work done by a varying force.
Recognize improper integrals and evaluate certain improper integrals analytically.
Approximate values of definite integrals numerically using the midpoint rule, the trapezoidal rule, and Simpson’s rule; and compute errors bounds for these approximations.
Solve first-order differential equations and apply the techniques of first-order differential equations to practical problems arising in a variety of situations including: physics, biology, and economics.
Demonstrate an understanding of the concepts of convergence and divergence of sequences and series, and use various tests (p-series, Integral Test, Direct Comparison, Limit Comparison, Alternating Series, Ratio Test, or the Root Test) to determine whether a series converges or diverges.
Approximate a differentiable function by a Taylor polynomial, determine the remainder term and compute the error by using the approximation.</td></tr>
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	• Find the area of a region of a curve given in polar coordinates or in parametric form as well and the lengths of curves given in these ways.
Content	**Core** topics – all of the following will be covered: The Integral • Areas of distance • The definite integral • The fundamental theorem of calculus • Indefinite integrals and the net change theorem • The substitution rule Applications of the Integral • Areas between curves • Volumes (including volumes by cylindrical shells) • Work and force • Average value of a function Techniques of Integration • Integration by parts • Trigonometric integrals • Trigonometric substitution • Integration by partial fractions • Numerical (approximate) integration • Improper integrals Further Applications of Integration • Arc length • Area of a surface of revolution Differential Equations • Separable differential equations • Linear first-order differential equations Polar Coordinates and Parametric Curves • Area and length in polar coordinates Infinite Sequence and Series • Infinite sequences • Infinite series and convergence • The integral test and estimates of sums • The comparison tests • Alternating series • Absolute convergence and the ration and root tests • Power series

<table>
<tr><td></td><td colspan="3">

- Representations of functions as power series
- Taylor and Maclaurin series

Additional topics may also be covered, at the discretion of the instructor.
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<tr><td>Methods of Instruction</td><td colspan="3">Lectures, tutorial, problem sessions, assignments</td></tr>
<tr><td>Required Textbook(s)</td><td colspan="3">The following textbook(s) is/are required, or approved equivalent(s).

Strang, Gilbert and Edwin Herman. Calculus Volume 1. OpenStax, 2022.</td></tr>
<tr><td>Required Equipment and Technology</td><td colspan="3">Students are required to have a computer with internet access.
The following resources are provided by the College:
• Office 365
• Student email</td></tr>
<tr><td>Homework Hours</td><td colspan="3">At minimum, students can expect one hour of homework for every hour of instructional time.</td></tr>
<tr><td rowspan="5">Evaluation</td><td>Component</td><td colspan="2">% Value</td></tr>
<tr><td>Assignments, in-class activities, participation</td><td colspan="2">10-30%</td></tr>
<tr><td>Quizzes (weekly, biweekly, module, chapter)</td><td colspan="2">10-30%</td></tr>
<tr><td>Midterm examination(s)</td><td colspan="2">20-30%</td></tr>
<tr><td>Final examination</td><td colspan="2">30-35%</td></tr>
<tr><td>Completion Requirements</td><td colspan="3">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.</td></tr>
<tr><td>Course Designer(s)</td><td>Len Berggren, Ph.D., Department of Mathematics, Simon Fraser University</td><td>Consultant(s), if applicable</td><td></td></tr>
<tr><td>Dean’s Approval</td><td>Barbara Moon, Ph.D., Dean of Arts and Sciences, Alexander College</td><td>Dean’s Approval Date</td><td>September 27, 2006</td></tr>
<tr><td>Curriculum Committee Approval Date</td><td>September 27, 2006</td><td>First Term Offered</td><td>Winter 2007</td></tr>
<tr><td>Last Review Date</td><td>March 1, 2023</td><td>Next Review Date</td><td>March 1, 2028</td></tr>
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Revision History	May 1, 2014-All MATH and STAT courses will be 4 hours, commencing Fall 2014, per SASC. January 5, 2015-Revision by Len Berggren, Mathematics faculty March 1, 2023-Minor updates (e.g., assessment ranges, textbooks) by Kelly Cheung and Krishna Subedi