SOUTH FLORIDA STATE COLLEGE DIVISION OF ARTS AND SCIENCES COURSE SYLLABUS

Semester MAC 2311 Calculus I & Analytic Geometry (4 credit hours) CRN – Meeting Days and Time

Instructor: Office Location: Office Hours: Phone: Email:

Welcome:

Catalog Description:

This course is designed for students who have mastered the concepts of College Algebra, Trigonometry, and Pre-Calculus mathematics. Topics include functions, graphing, continuity, derivatives, integrals, analytical geometry, and applications. Note: Check the General Education Requirements in the college catalog for additional requirements.

Course Specific Outcomes:

To achieve success on the college-wide learning outcomes students must be able to do the following:

1.1 Given an inequality, solve and write the solution in interval notation.

1.2 Given an equation or inequality containing absolute value, write the solution in interval notation.

1.3 Given an equation or inequality, graph it using proper graphing techniques, as well as making a table of pairs.

1.4 Write an equation of any vertical or horizontal line given a point on the line.

1.5 Compute the slope of any line given two points on the line.

1.6 Write an equation of any line given two points on the line, a point and the slope, or the slope and the y-intercept.

1.7 Find an equation of the line passing through a given point and parallel or perpendicular to a given line.

1.8 Define the term function and identify some of the types frequently used in Calculus.

1.9 Given a function, f(x), find the domain and range of the function.

1.10 Define and identify the Greatest and Least Integer functions.

1.11 Define and recognize Even and Odd functions and their symmetry.

1.12 Convert radian measure to degree measure and vice versa.

1.13 Define the six basic trigonometric functions in terms of the sides of a right triangle and in terms of x, y, r for an angle in standard position in a circle of radius r.

1.14 Find the values of the six trigonometric functions of the standard angles [multiples of 30° ($\pi/6$) and 45° ($\pi/4$)] from 0° (0 rad) to 360° (2π rad).

1.15 Identify the graphs of the six trigonometric functions and the various trigonometric identities.

2.1 Given y = f(x), find the average rate of change with respect to x over the interval [x, y].

2.2 Given y = f(x), find the limit f(x) or explain why it does not exist.

2.3 Define and apply the Squeeze Theorem.

2.4 Write the formal definition of a limit and find delta algebraically given a function, its limit, x_0 , and $\epsilon > 0$.

2.5 Given a function, algebraically find the right-hand and left-hand limit as x $-x_0$

2.6 Using limit $(\sin\theta/\theta)$, find the limit f(x).

2.7 Find the limit of f(x) as $x \rightarrow \pm \infty$

2.8 Given a rational function, calculate its limit as or . $x \rightarrow x_0$.

2.9 Given f(x) / g(x), find any horizontal, vertical, or oblique asymptotes.

2.10 Graph a rational function.

2.11 Describe the behavior of a function with an infinite limit.

2.12 Use dominant terms to discuss the behavior of a given f(x).

2.13 Given a function y = f(x), determine its points of continuity and discontinuity and justify your conclusion.

2.14 Find the limit of a composite function and discuss continuity at x_0 as $x \rightarrow x_0$.

2.15 Given a function f(x), find the slope and the equation of the tangent line to the curve y = f(x) at (x_0 , y_0).

3.1 Define the derivative of a function using the limit of the difference quotient (slope of a curve at a point on the curve).

3.2 Apply the definition of a derivative to find the derivative of a function.

3.3 Apply the various alternate notations for a derivative.

3.4 Graph the derivative of the function y = f(x).

3.5 Determine one-sided limits and continuity on a closed interval.

3.6 Determine continuity at a point and on an open interval.

3.7 Determine infinite limits from the left and from the right.

3.8 Understand and use the Intermediate Value Theorem.

3.9 Find the derivative of a function using the constant rule, power rule, constant multiple rule, sums rule, and the difference rule.

3.10 Find the horizontal tangent to a curve.

3.11 Find the derivative of a function using the product and quotient rule.

3.12 Find the higher-order derivative of a function.

3.13 Use derivatives to find rates of change (i.e. velocity, acceleration, and marginal's).

3.14 Solve vertical motion problems.

3.15 Find the derivative of the sine, cosine, tangent, secant, cotangent, and cosecant functions.

3.16 Find the derivative of a composite and trigonometric function using the chain rule and the general power rule.

3.17 Use the parametric formula for finding dy/dx and d^2y/dx^2 .

3.18 Find the equation for the tangent line to a parametric curve.

3.19 Distinguish between functions written in implicit form and explicit form.

3.20 Use implicit differentiation to find the derivative of a function.

3.21 Find a related rate and use related rates to solve real-life problems.

3.22 Calculate the linearization L(x) of f(x) at x = a.

3.23 Find the differentials of functions.

3.24 Estimate change using differentials.

4.1 Locate and identify extreme values of a continuous function from its derivative.

4.2 Solve real-world optimization problems.

4.3 Find c in the Mean Value Theorem.

4.4 Find functions from derivatives.

4.5 Find position from velocity and from acceleration.

4.6 Understand and apply the definition of increasing, decreasing, and monotonic.

4.7 Use the first derivative test for monotonic functions and local extrema.

4.8 Know the definition of concave up and concave down.

4.9 Apply the second derivative test for concavity.

4.10 Find the inflection point of a curve.

4.11 Use the first and second derivative to graph a function.

4.12 Solve applied optimization problems.

4.13 Use L'Hopital's rule to find a limit.

4.14 Work with the indeterminate forms ∞/∞ , $\infty \cdot 0$, $\infty \cdot \infty$.

4.15 Apply Newton's Method to estimate the solutions of an equation.

4.16 Find an anti-derivative for a function.

4.17 Find a particular derivative of a function.

4.18 Find an Indefinite Integral.

4.19 Solve initial value problems.

5.1 Use finite approximations to estimate the area under a curve using upper and lower sums.

5.2 Find the average value of a function.

5.3 Use sigma notation and algebraic rules for finite sums.

5.4 Find values of a finite sum.

5.5 Partition a closed interval and use a Riemann sum to approximate the area between the graph of a continuous function and the x-axis.

5.6 Express limits as definite integrals.

5.7 Use properties of definite integrals to evaluate a definite integral.

5.8 Find the area under a curve as a definite integral.

5.9 Use the definite integral to find the average value of a function.

5.10 Apply the Mean Value Theorem of Calculus to evaluate integrals.

5.11 Apply the Fundamental Theorem of Calculus to evaluate integrals.

5.12 Use the Power Rule and the Substitution Rule to evaluate integrals.

5.13 Evaluate the integrals of sin2x and cos2x.

5.14 Use the substitution formula to evaluate definite integrals.

5.15 Find the area between curves.

Prerequisites:

MAC 1114 and MAC 1140 with a grade of "C" or better.

Note: Check the General Education Requirements in the college catalog for additional requirements

Required Course Materials:

<u>Calculus</u> 11th Edition Authors: Larson and Edwards Publisher: Cengage Learning ISBN: 9781337275347 Scientific Calculator or Graphing Calculator

Instructional Methods:

Reading assignments, lecture notes, practice assignments, quizzes, tests, projects, and exams.

Course Resources:

SFSC is committed to student success and, therefore, provides several tutoring services. The Tutoring and Learning Center is located on the first floor of the LRC and offers free tutoring, mainly in Math and Writing. Hours may vary. For online students who have paid a fee to register for the class, the online tutoring service Tutor.com will be available for a specific number of hours (designated for each class, additional hours may be available upon request); beyond the set number of hours for the class, students may wish to pay for further Tutor.com tutoring on their own.

Class Attendance and Tardy Policy:

A withdrawal for academic reasons and/or absenteeism may be issued by the instructor up to the last date for withdrawal as specified in the academic calendar. Exception: Students enrolled for the third time are not to be withdrawn.

Consistent and timely attendance correlates directly with successful learning. In the School of Arts and Sciences, students could be withdrawn by the instructor if they miss more than a total of four (4) class hours. Individual instructors may publish their own attendance policies. It is highly recommended that students understand the significance of the last day to withdraw with a grade of W.

Attendance is vital to success in this course. Ideally, you should attend all classes. Tardiness and earlyouts are also very detrimental to your work and disruptive to other students' concentration. Students with excessive absences, tardiness, and /or early-outs may be withdrawn from the class. Be aware that a withdrawal in any course may impact your financial aid or scholarship status. In the event of an absence, you are required to cover the day's lesson.

Course Requirements:

<u>Assignments</u>- Exercises will be assigned for each section of the textbook that is discussed in class. The purpose of these assignments is to help you develop an understanding of the concepts discussed. It is your responsibility to keep up with assignments even in cases of absences.

<u>Quizzes</u>- Occasionally, quizzes will be given at the start of a class meeting. No make-ups will be given.

<u>Tests</u>- Tests will be given during the semester to determine your level of understanding. No make-ups will be given. A missed test will be assigned a grade of '0'. See course calendar for dates.

<u>Final Exam</u>- A final examination will be given at the end of the semester. This exam can serve as a replacement grade for any student wishing to replace a low or missing test score. See course calendar for specific date and time.

Grading:

The semester grade can be computed by adding the points you have earned from homework assignments, quizzes, and tests, then dividing by the total number of points possible.

Grading Scale:

90 - 100% = A 80 - 89.99% = B 70 - 79.99% = C 60 - 69.99% = D 0 - 59.99% = F

DISCLAIMER: Course policies, procedures, and schedule may be changed at any time at the discretion of the instructor. You will be advised of any changes in writing.