Course Outline for: MATH 1520 Calculus 2

A. **Course Description:**
1. Number of credits: 5
2. Lecture hours per week: 5
3. Prerequisites: MATH 1510 (C- or better); OR
   AP Calculus AB test score of 3-5
   AP Calculus AB sub score of 3-5 with Calculus BC test score of 1-2; OR
   AP Calculus BC test score of 3
4. Corequisites: None
5. MnTC Goals: Goal 4 Mathematical/Logical Reasoning

Calculus 2 builds upon the foundational concepts introduced in Calculus 1 and delves deeper into the properties and applications of integration. It also covers infinite sequences and series; introduction to differential equations; calculus of polar coordinates and parametric equations. The mathematical applications of the content will involve topics that are found in science, engineering, economics, and ecology.

B. **Date last reviewed/updated:** April 2024

C. **Outline of Major Content Areas:**
1. Integration Techniques.
2. Applications of Integration.
3. Calculus of Polar Coordinates.
4. Infinite Series.
5. Differential Equations.

D. **Course Learning Outcomes:**
Upon successful completion of the course, the student will be able to:
1. Evaluate integrals using antiderivatives, substitution, integrations by parts, partial fraction decompositions, trigonometric substitutions, and tables. (Goal 2a, 2c; 4c, 4d)
2. Model selected applied problems such as arc length, moments and center of mass, volume, hydrostatic pressure and force, work, future value with continuous payments, measures of central tendency, and measures of dispersion. (Goal 2a, 2b, 2c; 4a, 4b, 4c, 4d)
3. Approximate definite integrals numerically using methods such as Midpoint Rule, Trapezoidal Rule, and Simpson's Rule.
4. Identify and evaluate improper integrals. (Goal 2c; 4b, 4c, 4d)
5. Apply calculus to investigate curves defined by parametric equations and polar coordinates. (Goal 4a, 4b, 4d)
6. Examine convergence of infinite numeric series using standard tests.

7. Examine convergence of power series.
8. Represent functions using power series techniques and Taylor's series. (Goal 2c; 4a, 4c, 4d)
9. Approximate functions using Taylor polynomials and estimate errors.
10. Apply basic techniques for solving elementary differential equations. (Goal 2d; 4a, 4c, 4d)

E.   Methods for Assessing Student Learning:
Methods for assessment may include, but are not limited to, the following:
1. In-class testing
2. Take-home testing
3. Assignments
4. Quizzes
5. Attendance
6. Group or individual projects
7. Research

F.   Special Information:
Instructors will often require some type of technology. This may include the use of one or more of a graphing calculator or computer algebra tools (such as the TI-89, MAPLE, Mathematica, or Wolfram Alpha).