Enforced Prerequisites: MTH 111 [C-] or Placement Test MPT(24) or Placement Test MPAL(060)

Course Credits: This is a 4-credit course, with three 50-minute lectures and one 50-minute recitation each week.

Catalog Description: Elementary differential calculus of polynomial, logarithmic, and exponential functions and their applications to business, management and social sciences. All courses used to satisfy MTH prerequisites must be completed with C- or better. (Bacc Core Course) PREREQUISITE: MTH 111 or Placement Test MPT(24) or Placement Test MPAL(060)

Course Description: This is a mathematics course in single variable calculus. We develop the concepts of the derivative and instantaneous rate of change and apply them to polynomial, rational, radical, exponential, and logarithmic functions. Emphasis is placed on applying the differentiation operator to functions and on interpreting symbolic, graphic and numeric data. Analysis of relative and absolute extrema and concavity is performed using first and second derivatives. Applications to business and social science models are emphasized. Economic models are created consisting of demand, cost, average cost, revenue, profit, and marginal functions. Students will be able to create and analyze these models using the tools and concepts developed in the course.

Course Content and Schedule:
- Week 1: Review of MTH 111. Slope of line; slope of a curve at a point
- Week 2: The derivative; instantaneous rate of change
- Week 3: Rules for differentiation; more on rates of change
- Week 4: Exam 1. First and second derivative tests
- Week 5: Curve sketching. Optimization
- Week 6: More optimization. Applications to finance.
- Week 7: Exam 2. Product, Quotient, Power and Chain Rules
- Week 8: Exponential functions and their derivatives. Natural log function and derivative
- Week 9: Properties of natural log function. Exponential growth and decay; compound interest

Note: Recitation sections have activities such as group work or quizzes on the weekly topics.

MTH 241 Measurable Student Learning Outcomes: A successful student in MTH 241 will be able to:
- Find the derivatives of rational, exponential and natural logarithm functions.
- Solve problems involving average and instantaneous rates of change.
- Use differentiation to solve problems in business and economics including cost, revenue, profit, and supply and demand functions.
- Use differentiation to graph polynomials and functions involving exponentials.
- Use differentiation to solve optimization problems, including maximizing revenue and profit, and minimizing cost and average cost.
- Use differentiation to solve problems involving exponential growth and decay.
- Write organized solutions to problems.

This course satisfies the Baccalaureate Core First-Year Skills in Mathematics category. It does this by

- Identifying situations that can be modeled mathematically. Both in the classroom and working on your own or in groups, you will be presented with real-world situations (principally from Business or Social...
Science) that you will analyze using techniques from this course. Homework, in-class assignments, midterms and final exams will require you to model situations or to explain why there is no mathematical model for the situation.

- **Calculating and/or estimating relevant variables and functions in a mathematical setting.** Assignments and exams will require you to calculate average and instantaneous rates of change; compute cost, revenue, profit and demand functions; apply standard rules of differentiation and use calculus to solve optimization problems.

- **Critiquing the applicability of a mathematical model or the validity of a mathematical conclusion.** Whole-class and small-group discussions will provide you with opportunities to examine the problem-solving approaches of peers and to discuss their validity. Assignments and problems on exams will ask you to decide if the result of a problem-solving process is reasonable or correct and to rate various problem-solving approaches.

**Assessment of Baccalaureate Core Course Outcomes:** For each outcome, every exam will have at least one question that specifically assesses that outcome.

**Evaluation of Student Performance:** Your grade and the measurement of your progress on the course outcomes will be based on weekly online homework, clickers and other in-class activities, along with two written midterms and a final exam.

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<tr>
<th>Assignment Type</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam 1</td>
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<tr>
<td>Exam 2</td>
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<tr>
<td>Final exam</td>
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<tr>
<td>Online homework</td>
<td>15%</td>
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<tr>
<td>Written quizzes/In-class Activities</td>
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**Learning Resources:** The required text is *Brief Calculus*, by Larry J. Goldstein, David I Schneider, David C. Lay, and Nakhle H. Asmar (2014, Second Custom Edition for Oregon State University or 2014, Thirteenth Edition) with MyMathLab access code, or other similar text selected by department. Graphing calculator.

The following sections of the textbook will be covered:

- Chapter 1: 1.1-1.8
- Chapter 2: 2.1-2.7
- Chapter 3: 3.1, 3.2
- Chapter 4: 4.1-4.5
- Chapter 5: 5.1-5.4

**Students With Disabilities:** Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Academic Honesty and Student Conduct:** You must comply with Oregon State University's *Expectations for Student Conduct*. 