# Differential Calculus

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**Course Description**
MTH 251 is a first-term calculus course that includes a selective review of precalculus followed by development of the derivative from the perspective of rates of change, slopes of tangent lines, and numerical and graphical limits of difference quotients.  The limit of the difference quotient is used as a basis for formulating analytical methods that include the power, product, and quotient rules.  The chain rule and the technique of implicit differentiation are developed.  Procedures for differentiating polynomial, exponential, logarithmic, and trigonometric functions are formulated.  Analytical, graphical, and numerical methods are used to support one another in developing the course material. Opportunities are provided for students to work in groups, verbalize concepts with one another, pursue guided project activities, and explore concepts and applications using technology.  Use of a programmable graphing calculator is required.

**Objectives:**  Upon successful completion of this course, the student will be able to:
1. understand the definition of the derivative as the limit of the difference quotient for a function.
2. be able to use the definition of the derivative to find derivatives of certain elementary functions.
3. find derivatives numerically utilizing technology.
4. visualize and interpret derivatives graphically.
5. understand and use the derivative of a function as a function in its own right.
6. understand the development and use of procedures for differentiating polynomial, exponential, logarithmic, and trigonometric functions, including the inverse sine & inverse tangent functions.
7. use the power, product, quotient, and chain rules to find derivatives of functions.
8. use the technique of implicit differentiation to find derivatives of implicitly defined functions.
9. find equations of tangent lines to the graphs of functions at specific points.
10. understand local linearity and that the tangent line to the graph of a function at a specific point is the best  linear approximation for the function at that point.
11. use linear approximation to estimate function values.
12. use the methods and techniques of differential calculus to solve a variety of application problems, including optimization and related rate problems.
13. use a programmable graphing calculator as an effective tool in confirming analytical work and obtaining numerical and graphical results related to differential calculus.

**Required Materials**
1. *Calculus, Single Variable*, 3rd edition, by Hughes-Hallett, Gleason, et al. We will cover selected sections from Chapters 1, 2, 3, and 4 of the text.
2. A programmable graphing calculator:  the TI-83 Plus or TI-84 Plus is recommended.
3. Graph paper.  A graph paper notebook would work best.

**Class Format**
Most classes will begin with a warmup.  The warmups will be turned in on Fridays with your other work.  If you are absent ask your classmates what the warmup was and complete it.  During warmup

time, attendance will be taken.  After the warmup, we will go over homework questions, then proceed to new material.  There will be quizzes or in-class assignments on some days instead of new material.

**Homework and Class Work**
Homework and class work are extremely important parts of your learning.  Math is a very interactive discipline where practice is vital to your understanding.  You will turn in these assignments every Friday (or last day of the week).  When time is given in class to work on class work or homework you are expected to be working on it.  This means you will be working on Calculus and no other subject.  Since my class is Calculus you will lose credit for the assignment given if you are working on another subject's work.

**Tests and Quizzes**
On the last day of every week we will have either a test or a quiz.  You will be allowed to use notes on most of the quizzes but not on the tests.

**Late Work**
Homework and class work will be collected on the last day of each week.  If you are absent on that day you will turn it in the first day you get back.  If you are absent during the week you need to request an extension from me.  Otherwise you will turn in your assignments on the last day of the week.  Late work will be accepted within one week of the due date for half credit.  If you miss a test or quiz you have one week from your return to make it up.  Otherwise you will receive 25% reduced credit for every week beyond the first week of your return.

**Grading**
You will be assigned a letter grade on your transcript based on the following breakdown: 70% of your grade will be based on tests, 15% on quizzes, and 15% on homework and other assignments.

**Attendance Policy**
I am required to submit attendance online within the first ten minutes of class.  If you come to class after the ten minutes are up, you will be required to go to the front office to get an admit slip.

**Electronics Policy**
Cell phones are a distraction to your learning.  If I see them out during class, I will give you a choice to give them to me for the period or to leave for the class.

**Getting Help**
1. Come to office hours.
2. Consult with classmates and form study groups – math doesn't have to be a solitary struggle.
3. Get help from a free or paid tutor.
4. Consult your lesson notes which will be posted to my website.

Si necesita más información en Español sobre esta clase, por favor comuníquese con María Ladona al 541-790-5151 o por correo electrónico schaad_ma@4j.lane.edu.