Math 175: Calculus of One Variable I
Division of Arts and Sciences Fall 2012
Syllabus/Course Outline

Instructor: Betty Knick
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Office Hours: 11:30 – 3:00 M-F Textbook site: www.calcchat.com/book/Calculus-7e
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Text: *Calculus with Analytic Geometry*, 7th edition by Ron Larson, Robert Hosteller, & Bruce Edwards, New York: Houghton Mifflin, 2002.

Materials: Textbook
Scientific Calculator (non-programmable); (TI-30X IIS good < $20)
3-ring binder with college ruled loose-leaf paper and dividers for organization
Graphing paper (uniformed squares); highlighter
Pencils required for all work submitted for grade, black pens, small straight edge, erasers

Credit Hours: 3 (Lecture hours: 3)
Class Meeting Times: Section B2 – M/W & every other F- 9:30 am to 11:00 am
Section B2 – T/Th & every other F – 9:30 am to 11:00 am

Prerequisites: A placement recommendation for MTH 175 and four units of high school mathematics including Algebra I, Algebra II, Geometry and Trigonometry or equivalent. (Credit will not be awarded for more than one of MTH 173, MTH 175 or MTH 273.)

Course Description: Presents differential calculus of one variable including the theory of limits, derivatives, differentials, antiderivatives and applications to algebraic and transcendental functions. Designed for mathematical, physical, and engineering science programs.

Course Objectives: Upon completion of this course, the student should:

1. Demonstrate an understanding of basic mathematical skills used in calculus.
2. Understand and communicate clearly and effectively the principles of calculus, using proper vocabulary and nomenclature.
3. Apply the principles of calculus to solve applied problems in mathematics, as well as in other disciplines.
4. Use mathematics in a technological environment.
5. Develop effective study skills in order to master course content and objectives.
6. **SCHEV Competencies:** Quantitative Reasoning, Scientific Reasoning, Critical Reasoning
7. **DCC Educational Objectives:** Critical Thinking, Computational and Computer Skills, Understanding Science and Technology

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Methods of Instruction: This course will involve the student in an active learning process. As a result, a combination of instructional methods will be utilized. Interactive lectures with problem-solving sessions will be an integral part of this course. Calculators: The use of graphing calculators will **NOT be allowed for any proctored quizzes, tests or the final exam.** The use of scientific calculators will be allowed only at instructor discretion. It is strongly recommended that calculators not be used when completing homework.

Learning Objectives:

1. Demonstrate ability to sketch and recognize basic algebraic and transcendental functions.
2. Sketch the graph of one or more equations and state graphical information displayed.
3. Write equations of lines given particular conditions.
4. Interpret slope as a ratio or as a rate in a real-life application.
5. Use function notation to represent and evaluate a function stating its domain and range using proper interval notation and apply to real life situations.
6. Identify different types of transformations of functions.

7. Classify functions, recognize combinations of functions, and evaluate composite functions.
8. Interpret mathematical models for real-life data and fit a linear, quadratic, or trigonometric model to real-life data.
9. Demonstrate the ability to solve higher level equations and absolute value equations.
10. Demonstrate an understanding of what calculus is about, how it compares to precalculus, and how both the tangent line and area problem are basic to calculus.
11. Estimate a limit using a numerical or graphical approach.
12. Know different ways a limit can fail to exist.
13. Know and use the formal definition of a limit; complete a **ε-δ** proof.
14. Evaluate a limit analytically by applying the properties of limits, dividing out and rationalizing techniques, and the Squeeze Theorem.
15. Develop and use a strategy for finding limits.
16. Demonstrate an understanding of continuity at a point, on an open interval, or on a closed interval, and apply the properties of continuity.
17. Determine and evaluate one-sided limits.
18. Understand and use the Intermediate Value Theorem.
19. Determine infinite limits from the left and from the right; apply infinite limit properties.
20. Find and sketch the vertical asymptotes of the graph of a function.
21. Find the slope of the tangent line to a curve at a point.
22. Use the limit definition to find the derivative of a function.
23. Understand the relationship between differentiability and continuity.
24. Apply the Constant Rule, Power Rule, the Constant Multiple Rule, and/or the Sum and Difference Rules to find the derivative of a function.
25. Find the derivatives of the sine and cosine functions.
26. Use derivatives to find rates of change. Understand the velocity and position functions.
27. Apply the Product Rule and Quotient Rule to find the derivative of a function.
28. Find higher-order derivatives of a function.
29. Understand and apply the Chain Rule to find the derivative of a composite and trigonometric function.
30. Find the derivative of a function using the General Power Rule.
31. Simplify the derivative of a function using algebra.
32. Ability to distinguish between functions written in implicit and explicit form.
33. Use implicit differentiation to find the derivative of a function.
34. Find related rates and use related rates to solve real-life problems.
35. Understand the definition of extrema of a function on an interval and relative extrema on an open interval. Find the extrema on a closed interval.
36. Understand and use both Rolle's Theorem and the Mean Value Theorem.
37. Determine intervals on which a function is increasing or decreasing.
38. Apply the First Derivative Test to find relative extrema of a function.
39. Determine intervals on which a function is concave upward or concave downward.
40. Find any points of inflection of the graph of a function.
41. Apply the Second Derivative Test to find relative extrema of a function.
42. Determine finite and infinite limits at infinity and state the horizontal asymptotes, if any, of the graph of a function.
43. Analyze and sketch the graph of a function without the aid of a calculator, stating all pertinent information about the sketch.
44. Demonstrate the ability to solve applied minimum and maximum problems (optimization).
45. Approximate a zero of a function using Newton's Method.
46. Understand the concept of a tangent line approximation.
47. Compare the value of the differential, *dy*, with the actual change in y, Δy.
48. Estimate the propagated error using a differential.
49. Find the differential of a function using differentiation formulas.

Course Outline:

1. **Preparation for Calculus**
   Graphs
   Linear Models and Rates of Change
   Functions and Their Graphs
   Fitting Models to Data

2. **Limits and Their Properties**
   A Preview of Calculus
   Finding Limits Graphically and Numerically
   Evaluating Limits Analytically
   Continuity and One-Sided Limits
   Infinite Limits

3. **Differentiation**
   The Derivative and the Tangent Line Problem
   Basic Differentiation Rules and Rates of Change
   The Product and Quotient Rules and Higher-Order Derivatives
   The Chain Rule
   Implicit Differentiation
   Related Rates

4. **Applications of Differentiation**
   Extrema on an Interval
   Rolle's Theorem and the Mean Value Theorem
   Increasing and Decreasing Functions and the First Derivative Test
   Concavity and the Second Derivative Test
   Limits at Infinity
   A Summary of Curve Sketching
   Optimization Problems
   Newton's Method
   Differentials

Student Evaluation:

To obtain a measure of student understanding of material presented the following assessment methods will be used:
Four major tests (90 mins. each)
Announced and/or unannounced quizzes (partial class time)
Written Assignments dealing with applications/in-depth concepts
Projects (1) and random homework checks

Grading: The following grading scale will be followed**:**

A for 90 – 100; B for 80 – 89; C for 70 – 79; D for 60 – 69; F for less than 60 (or W according to the DCC withdrawal policy).

Calculation of Final Course Grade:

Quizzes – 20%
Written Assignments & Projects – 15%
Exams/Tests – 40%
Final Exam – 25%

Class Guidelines:

- **Attendance-** Attendance is expected for all classes. It is the responsibility of the student to notify the instructor of a legitimate absence for a test and plans for make-up. **E-MAIL ME anytime YOU ARE ABSENT.**

- **Be Prompt-** All students are expected to be on time. (Bonus Participation Points: 1/3 to 1/2 bonus point per class held is awarded to students who are present, on time, AND remain the duration of the class with maximum of 6 points per grading period). Any student missing more than 7 days of class instruction may have their college grade lowered by one letter grade with the Director having the option to excuse a student when documented; mitigating circumstances prevent the student from attending class. **For DCC attendance policy:** Students missing 25% or more of the total time allocated for classes and/or labs may be administratively withdrawn from the course upon recommendation of the instructor.

Students administratively withdrawn prior to completion of 60% of the classes will be issued a W; after that point, students will be issued a grade of F.

- **Be Prepared-** Bring all required materials and completed assignments to class daily. *Students are expected to read over text material **prior** to coming to class and check HW for which answers are available.*

- **Be Respectful**- Class time is to be fully utilized for the benefit of the student. Read material, stay on task, and exhibit a scholarly manner. Use appropriate manners, be courteous to all, and have respectful use of equipment. It is very important that computers are used according to handbook guidelines. Do your part to maintain a non-disruptive learning environment including turning off any cell phones and pagers during lecture. Students whose conduct hinders the academic achievement of others will be referred to the Director and subject to disciplinary action**. No electronic devices or food are allowed in class; bottled drinks are permissible. All cell phones/pagers are to be TURNED OFF prior to entering class and concealed.**

- **Follow Student Handbook and Honor Code**- It is the student's responsibility to read and commit to PGS guidelines as stated in the Student Handbook. *Each written assignment submitted for a grade must have the pledge written out and signed.* Assignments without the *appropriate* honor pledge will not be graded.

- **Assignments-** Any written work should be neatly completed on college ruled loose-leaf paper, in a vertical format, labeled and dated. Lines should be skipped between problems. Enough *work must be shown* to follow the logical thought process, even if a calculator is used, this includes showing any formula used and appropriate substitutions. **Graded assignments must be completed and turned in by 7:45 am.** Group projects are to be completed using a collaborative effort…two brains are better than one. It is extremely important that students complete homework/class work assignments promptly and **have problems checked for which answers are provided**. Test and quizzes will include an understanding of the definitions and problems throughout the text. Study partners are encouraged for homework assignments and missed lectures.
  REQUIRED: Any student, who fails to turn in a graded assignment, must complete & sign a pink slip stating: the assignment, reason chose not to complete the assigned work and date to be turned in if accepted late. Failure to do so will result in loss of all bonus points for the grading period(s) and denied acceptance of late work.

- **Class Participation**- Each student is expected to be attentive, to *ask questions*, and to interact positively and appropriate in the classroom environment. If you are having difficulty, please ask question during class or arrange for tutorial assistance promptly.
  Each student is expected to be on task, complete all assignments timely, have homework checked when possible, and to always show respective, orderly, conduct even when unsupervised.

- **Examinations** – Dates for major test/exams will generally be announced at least one week in advance. Additional time will not be given to students arriving late and must be completed in the allotted class time. *Students are responsible for having a non-graphing, non-programmable scientific calculator (if permissible), pencils, and loose-leaf paper. **For certain tests this will be the only calculator allowed.*** The use of any unauthorized calculator will result in a zero for that assignment.

- **Make-up work** - It is the student's responsibility to request missed work and turn in assignments timely. Students are encouraged to have a classmate to call for missed HW assignments or notes and check their email/class web page. In Class Tests/Quizzes will be taken during the **next class meeting the student is present**. Since this means students will miss instructional time it is imperative that every attempt is made to be present on testing days. Discuss any extenuating circumstances with your instructor promptly.
  Work due on the date of an absence must be e-mailed, faxed, or delivered to the teacher. **No Take Home Test/Written Assignment will be accepted late.** Other late work may be accepted at the sole discretion of the instructor and, if accepted, will be penalized ten percent for each school day late.
  For planned/prior approved absences assignments should be completed **prior** to the absence unless other arrangements are made with the instructor. It is the student's responsibility to notify the instructor of these events and request work in a timely matter.

- **Snow or Delayed Class Schedule** – Always check your email/Blackboard promptly. Complete the next assignment on tentative HW sheet as available; or read the next section in text and complete odd problems should no new posting be available. Delayed class weather schedules follow Pittsylvania County announcements.

- **PGS handbook policies will be followed**. It is the student's responsibility to read and understand the handbook issued. PGS policies are incorporated as part of this syllabus.

- **Materials to be turned in at the Final Exam:** Any materials issued that are the property of PGS, Practice Exam and **all graded papers.**

IMPORTANT DATES FOR THE SEMESTER

Th - August 9	Classes begin F 8/10 will be a M/W class
M - Sept. 3	Holiday (no classes)
F - Sept. 7	DCC credit: Last day to drop a course to receive full tuition refund
Th - Sept. 20	End MP1
T - October 30	DCC: Last day to withdraw without mitigating circumstances (W)
M – Nov 5	End MP2
T - November 6	Teacher Workday (no classes)
November 21 - 23	Holiday (no classes)
Dec. 17 – Dec. 20	Final Exams
Friday, December 21	Exam Make-ups, End MP3; 1st Semester
Tutorial Sessions by appt.	Make prior arrangements with teacher (available times:7 am – 7:40)

Dates subject to change due to inclement weather

DCC TUTORING AND AVAILABLE ASSISTANCE:

An open computer lab is available at DCC for student use for work related to course assignments. Personnel are available in the lab if assistance is needed. The lab is located in the DCC Learning Assistance Center (LAC) located in the upper-level of the Whittington W. Clement Learning Resources Center. Check DCC website for tutoring hours. The LAC phone number is 434-797-8404.

The LAC has equipment, materials for student use, and tutors to help you. Tutoring is provided by appointment for individuals and small groups. **Contact the Tutoring Center at (434) 797-6432 or email dcctutoringcenter@dcc.vccs.edu.**..

COMPUTER RIGHTS AND RESPONSIBILITIES

PGSMST and the college attempt to provide appropriate computing resources to its students, faculty, and staff. The objective is to provide users with the level of computer technology to effectively perform their academic and administrative duties. The following guidelines apply to all computing resources provided by PGSMST.

- Users have the responsibility of careful and ethical use of college computing resources.
- Appropriate and responsible use begins with common sense and includes respect for the rights and privacy of other users.
- User access is granted to an individual and may not be transferred to or shared with another without explicit written authorization.
- Users have the right to expect that computers will be maintained in a safe and working manner.

- Users have the right to expect up-to-date computing resources appropriate to the teaching, learning and administrative uses of the college.
- Users have the right to expect instruction or training to properly use accessible computing resources.

PLAGIARISM/CHEATING

Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations, projects, labs, or graded work. However, it is the intent of this definition that the term "cheating" not be limited to above listed situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material so used as one's own work. Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the school/college. Plagiarism can include submitting a paper written by someone else as your own, written by means of inappropriate collaboration, written by you for another course, submitted without the permission of both instructors, purchased, downloaded, or cut and pasted from the Internet, or that fails to properly acknowledge its sources through standard citations.

A student who receives a failing grade *("F")* in a course as a result of academic dishonesty *(such as plagiarism)* may not withdraw from that course with a "W" or receive a refund. This policy applies to any student in a particular course deemed to have committed an act of academic honesty during any part of a semester, and regardless of whether he/she has turned in any graded work. Mitigating circumstances do not apply in such cases. However, a student may follow the appeal process outlined in the DCC Student Handbook to appeal the failing grade.

STUDENTS WITH SPECIAL NEEDS

"Any student with a disability or other special circumstance requiring academic accommodations or other consideration in order to successfully complete the requirements of this course is requested to identify himself/herself individually to the instructor." **"Danville Community College is committed to meeting the needs of all students and providing access for persons with disabilities. Reasonable accommodations are available to those students with diagnosed disabilities. Students with diagnosed disabilities wishing to receive specific accommodations must be registered with the Disability Services. For more information, please contact Laura Daniel, Counselor and ADA Coordinator, at 797-8572 or ldaniel@dcc.vccs.edu. "**

NOTE:

Please see me should there be any questions; **if in doubt ask**. I look forward to working with you to enhance your mathematical abilities. Feel free to discuss any concerns you may be experiencing during your free time or at the end of class. ☺

This syllabus is subject to change at the discretion of the instructor to accommodate instructional and/or student needs. It is the responsibility of the student to keep abreast of such changes.

SUCCESS =

1. **POSITIVE ATTITUDE**
2. **LISTEN**
3. **TAKE NOTES**
4. **DO HOMEWORK**
5. **CORRECT MISTAKES**
6. **PARTICIPATE**

"Failing to prepare is like preparing to fail."-football player

Suggested Study Habits for Students

• As you are reading the text or preparing homework assignments, make a note of anything you don't understand and ask about it in class.

• Take notes during class. After class, review your notes and rewrite them if necessary to fill in any missing details. If you don't understand a concept, question your instructor about it during the next class or during his or her office hours.

• As you start each chapter of the text, read *Chapter Openers* to begin to develop an understanding of what you'll learn in the chapter.

• Read the assigned material in each section before it is covered in class. After attending class, reread the assigned section to make sure that you understand the material.

• Remember that learning calculus is a step-by-step process. Always keep up with and complete your assignments because you must understand each topic in order to learn the next one.

• When you are working problems for homework assignments, show every step in your solution. Then, if you make an error, it will be easier for you or your instructor to find it.

• Work the problems in the homework assignments as though you were practicing for a test. First try to do the problems with your book and your notebook closed.

• Study with another student or small group of students, especially when preparing for a test.

• On the day of the test, allow yourself plenty of time to get to the testing location.

• Review your tests carefully, making sure you understand where and how you made errors.

• If you are having a problem, be sure to take advantage of your college's tutoring services for extra help.

Keep in mind there are no short cuts in studying calculus. To learn calculus you must practice problem solving. It is essential that you work all of the assigned problems and then some. *It is your responsibility to solve enough problems to satisfy yourself that you understand the material.* Memorization is not the same as learning and understanding. While memorization may have worked in high school, it will not work in a college-level calculus course. It is expected that you understand and apply learned concepts to similar but different problems. Second, to assists in learning and understanding, you are encouraged to study in small groups with classmates. Finally, take advantage of assistance from the professor and peer-tutors.

Core material adapted from HMClassPrep for Larson/Hostetler/Edwards, Calculus, 7th Ed. New York: Houghton Mifflin Company, 2002. (Specific teacher comments added)