

**Sharpsville Area High School**  
**Mathematics Department**  
**University of Pittsburgh Business Calculus (MATH 0120)**  
**2014 – 2015**  
Course Outline and Requirements

**I. COURSE INFORMATION**

**INSTRUCTOR:** Mr. Sarver, M.Ed, M.S.  
**CLASSROOM:** Room 92  
**TUTORING HOURS:** Available by appointment  
**PHONE:** (724) 962-7864  
**EMAIL:** [zsarver@sharpsville.k12.pa.us](mailto:zsarver@sharpsville.k12.pa.us)  
**COURSE TEXTS:** Berresford, G. and Rockett, A. (2013). *Brief Applied Calculus*, 6<sup>th</sup> Ed. Boston, MA: Brooks/Cole, Cengage Learning.

**COURSE MATERIALS:**

- Textbook
- Pencils (should be brought to class each day)
- Three-ring binder (should be brought to class each day)
- Lined paper in your binder
- Access to a computer outside of class will be beneficial

**II. COURSE DESCRIPTION**

This course is designed for students in business, economics, and other social sciences. It introduces the basic concept of limit and its application to continuity, differentiation, integration, maximization, minimization, and partial derivatives. Applications to the social sciences, especially business and economics, are stressed. The calculus of trigonometric functions is not covered.

**III. COURSE STRUCTURE**

This course will be structured as a college level mathematics course – since it is one! The class will consist of lecture and practice during class. Approximately three classes per week will be predominantly lecture with practice. The other two class meetings will be a time for practice and assessment. It is imperative for you to prepare for a lesson prior to class time. In order to do this you will need to read the textbook section, make notes of your own, and use the textbook provided power point presentations. At times, the flipped classroom model may be incorporated.

**IV. TECHNOLOGY**

You will be permitted to use a TI-84 graphing calculator during class. However, you will not be permitted to use the calculator on assessments. This is done in order to prepare you for the final exam. Consequently, it is strongly recommended that you use your calculator only when absolutely necessary.

Also, a class website with important information links, homework assignments, quizzes and course documents will be maintained at <http://zsarver.wix.com/sharpsvillesarver>. Please contact

me with any questions in regards to accessing this site. Finally, outside projects throughout the year may require students to use various technologies as they complete their projects; appropriate adjustments will be made when necessary.

## V. STUDENT LEARNING OBJECTIVES

Upon completing the course, students will be able to:

1. Find limits of functions presented as graphs, tables, or algebraic expressions.
2. Use the concept of limit to define the derivative of a function.
3. Differentiate functions involving powers, exponentials, and logarithms.
4. Apply the concepts of differentiation to solve optimization problems.
5. Use the derivative to hand sketch the graphs of functions involving powers, exponentials, and logarithms.
6. Find indefinite integrals of functions involving powers, exponentials, and logarithms.
7. Find definite integrals of appropriate functions.
8. Apply the definite integral to solve problems.
9. Find partial derivatives of functions of two variables.
10. Apply the method of Lagrange multipliers to solve constrained optimization problems.

## VI. COURSE EXPECTATIONS

1. You could be earning college credit for this course. As a result, you will be expected to act in a responsible manner and prepare for this course as a college course.
2. Students are expected to be attentive in class, to ask questions when necessary, and to participate in all assignments.
3. It is very important to understand the material as it is covered (If you are lost the first semester, you are sunk the second semester). It is helpful to read ahead in the textbook – as boring as that sounds! There will be regular assignments of “reading and taking notes” in advance of covering material in class. This is a difficult task at the beginning of the year as students have very little experience with this; however, becoming proficient at this task may prove to be the most useful knowledge gained in high school.
4. It is imperative that you have the prerequisite skills necessary to complete the calculus of this course. If you need to review this material please do so outside of our regular class time.
5. It is also a great idea to continually review previous notes, homework assignments, tests, and quizzes (any previous material could “pop-up” at any time).
6. If a student has read the text, attended class, asked questions, and is still having difficulty with the material, I want to help; I am available before and after school.
7. Assignments must be made up in as many days the student was absent (2 days out means the student has 2 days to make up work). As per the student handbook: “Make up work for extended absences, which is defined as four (4) or more days, must be arranged immediately upon return to school and completed within five (5) school days.”

## VII. WARNING

***Based on my past experience teaching this course please read and re-read this warning as many times as necessary for it to make sense. If you plan to or can see yourself getting “senioritis” you should reevaluate your desire to take this course. Though this class does not have trigonometric functions, it is still a college level course and will require effort that reflects this. Exams are a significant portion of your final grade – both for Sharpsville and***

*the University of Pittsburgh. It is imperative that you put in the necessary work throughout the course in order to give yourself a chance to earn college credit.*

## VIII. ASSESSMENT TECHNIQUES

Your grade will be comprised from three major assessment techniques. The derivation of grades is as follows:

1. Exams 50%
  - You will have one exam per nine weeks. This will occur at, or near, the end of each marking period.
  - Exams will include all material since the previous exam.
2. Quizzes 30%
  - These will usually follow a section of the textbook or relatively few objectives.
  - Quizzes may range in point-value from 10-30 points. These will typically be 20 points.
3. Homework 20%
  - Homework is required to practice the concepts and algorithms involved in Calculus.
  - Assignments will be given frequently.
  - Homework will be collected and graded for accuracy. There will be specific problems that will be assigned for these graded assignments. You will typically have several days to complete homework that will be collected.

The grading scale for this course will coincide with the standard 90-80-70-60 grading scale for Sharpsville High School. **Please note that this will be only for your report card grade for Sharpsville High School. Your grade for Pitt will be calculated differently.** It is as follows:

*University of Pittsburgh Grading:* Upon completion of this course, you have a University of Pittsburgh transcript to include Math 0120 (Business Calculus). Your grade for this course will be calculated as follows:

1. Pitt Exam 45%
  - There will be 3 exams given at various times throughout the year. You will have 80 minutes to take these exams. They are separated into 2, 40 minute portions.
2. Sharpsville Grade 25%
  - Your 4 nine weeks grades will be averaged together, weighted equally, to obtain this portion of your grade.
3. Final Exam 30%
  - Written by University of Pittsburgh math professors. The exam is administered at the high school during our final exam period.

### **Business Calculus Syllabus Acknowledgement**

I completely understand the classroom policies and procedures outlined in Mr. Sarver's course outline. In addition, I commit myself to upholding those standards and, consequently, becoming a productive member of our learning environment. Further, I understand that in order to receive college credit that I must complete all registration materials and submit payment of \$225 by Tuesday, September 16, 2014. Moreover, I understand that I do not simply receive transferable college credit for taking this course, but rather, I must earn at least 70% from the University of Pittsburgh in order for my credit to transfer to most schools.

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Student' Signature

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Date

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Parent's/Guardian's Signature

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Date

\*\*\* Return this form with both signatures by Friday September 5, 2014.

# Math 0120 Schedule and Practice Problems

1.1 Real numbers, inequalities, and lines	#8,9,14,18,24,25,29,32,39,42,44,46,58,61,64
1.2 Exponents	#6,15,26,29,35,38, 56,77,78,86,90
1.3 Functions	#2,3,8,10,17,22,26,29,30,34,49,50,66,75,80
1.4 Functions, continued	#1,4,8,16,21,25,28,40,52,55,66,71,75,84
2.1 Limits and continuity	#2,15,17,24,28,34,35,39,44,46,49,55,56,64,72
2.2 Rates of change, slopes, and derivatives	#2,7,9,20,23,27,30,42,44,60,61
2.3 Some differentiation formulas	#6,12,16,20,24,26,30,32,35,38,48,50,52,63
2.4 The Product and Quotient Rules	#4,11,14,23,26,30,35,38,42,48,51,52,55,62
2.5 Higher-order derivatives	#1,6,7,9,16,19,26,32,34,38,39,54,56
2.6 The Chain Rule and the Generalized Power Rule	#3,8,16,17,24,31,34,38,41,46,55,57,58,62,68,70
2.7 Nondifferentiable functions	#1,2,3,4,5,12
3.1 Graphing using the first derivative	#1,2,3,4,9,12,16,19,24,32,36,44,47,53,59,66,67
3.2 Graphing using the first and second derivative	#6,8,13,18,20,21,27,29,44,50,53,57,71,83
3.3 Optimization	#2,5,7,14,17,21,23,26,36,37,40,45,46,51
3.4 Further applications of optimization	#1,3,4,6,8,9,12,18,22
3.5 Optimizing lot size and harvest size	#1,4,5,8,9,10
3.6 Implicit differentiation and related rates	#3,10,12,17,18,20,22,25,28,30,34,43,51,53,58,63,66
4.1 Exponential functions	#9,10,11,14,16,18,19,24,28,34,36,39,46
4.2 Logarithmic functions	#1,4,10,11,15,19,21,28,32,38,43,50,60
4.3 Differentiation of exponential and logarithmic functions	#2,4,8,10,13,18,22,26,28,30,34,37,42,43,58,61,62,79
4.4 Relative rates and elasticity of demand	#3,6,9,14,17,21,24,29,32,36
5.1 Antiderivatives and indefinite integrals	#5,10,15,20,23,30,32,33,40,43,46,48,55
5.2 Integration using logarithmic and exponential functions	#3,6,8,11,14,17,22,25,28,34,36,37,44,45,49,54,58
5.3 Definite integrals and area	#3,4,14,21,22,25,28,34,38,45,50,56,60,66,71,75,82,86,90,106,111
5.4 Average value and area between curves	#3,6,10,22,29,33,37,44,46,57,63,64,66,67
5.5 Consumers/producer surplus and income distribution	#4,6,10,12,13,14,16,21
5.6 Integration by substitution	#2,7,13,16,24,29,32,33,36,39,42,50,53,60, 66,69,73
6.1 Integration by parts	#8,9,12,16,22,26,29,34,38,41,46,48,53,56,59
6.2 Integration using tables	#4,10,16,26,34,36,63,67
7.1 Functions of several variables	#6,8,14,20,24,27,32,35,36,37
7.2 Partial derivatives	#8,10,15,16,18,21,24,26,30,33,36,43,46,50
7.3 Optimizing functions of several variables	#2,5,8,16,19,21,25,26,29,36
7.3 Optimizing functions of several variables	
7.5 Lagrange multipliers and constrained optimization	#3,7,9,10,11,15,20,22,27,30,31,40
7.5 Lagrange multipliers and constrained optimization (cont)	