

Math 262X Course Content and Final Exam Content Prepared by Jim Massa, Fall 2003

Text used is: *Introduction to Mathematical Analysis* by Hauessler & Paul, 10th ed.

Chapter:	Topic with description	Time spent
11	<ul style="list-style-type: none"> Limits and continuity. The concepts of limits is examined in great detail. Limits at a point, at infinity are covered. Techniques for analyzing limits are explored. Continuity is also discussed. The criteria for continuity is examined, as well as examining continuity graphically. 	4 hours
12	<ul style="list-style-type: none"> The derivative. Introduction to the derivative is covered. Applying the difference quotient is covered. The concept of the derivative is examined with applications as well as the historical basis for the development of the derivative. Rates of change is also examined. All the differentiation rules and techniques are covered in great detail - product, quotient, chain rule, etc. Business applications are discussed, e.g. marginal revenue, marginal cost, marginal revenue product among others. 	8 hours
13	<ul style="list-style-type: none"> In this chapter, other derivation techniques are covered. These include derivatives of exponential and logarithmic functions, implicit differentiation, higher order derivatives and the technique of logarithmic differentiation. Whenever possible, business applications are explored and discussed. As many business functions can be described via a transcendental function, this is a rather pertinent section, and great emphasis is made here. 	8 hours
14	<ul style="list-style-type: none"> In this chapter, the derivative is used to determine the shape of functions, curve sketching. The first and second derivative tests are used to determine relative and absolute extrema and concavity. Determining asymptotes are also covered 	4 hours
15	<ul style="list-style-type: none"> Optimization problems are examined in great detail with emphasis placed on business related problems via the use of the derivative tests. Students are introduced to the use of differentials. The concept of Elasticity of Demand is covered in detail. 	6 hours
16, 17.1	<ul style="list-style-type: none"> Integration: the indefinite and definite integrals are covered. Initial conditions are also examined. Various techniques of integration are covered including u substitution and integration by parts. Summation is covered and how this related to area and the definite integral. Everything is put together into the Fundamental Theorem of Calculus. Finding area between curves is explored. The concepts and techniques learned are applied to business concept, e.g., finding the revenue function or total revenue, finding the cost function or total cost. Finding the consumer surplus and producer surplus is examined using the concept of finding area between curves. 	10 hours
19.1-19.8	<ul style="list-style-type: none"> Multivariate calculus: in this chapter, exploration is given to functions of several variables. Students learn about partial differentiation, where one derivates with respect to one variable while treating the others as constants. Again, the different techniques of differentiation are covered as they apply to partial derivatives. Implicit partial differentiation is also covered. As typical, business applications are examined, e.g., joint cost functions. After this, study is focused on higher order partial derivatives, including mixed partial derivatives, chain rule for partials. Next, students learn to find relative extrema involving several variables. The Discriminant is explained and how it is used to determine relative extrema and saddle points. This technique is applied directly to business related situations, e.g., what levels of production of various product types will maximize profit. The last required topic is Lagrange multipliers. The concept of Lagrange multiplier is developed and how this is used to find constrained extrema. Then, business applications are explored utilizing this concept. Finally, if there is time, multiple integrals are covered. This is applied directly to business applications, e.g., finding the total cost or total revenue involved for increasing the production level of 2 products. 	12 hours

Topics typically covered on the final:

- 1) limits and continuity
- 2) differentiation and integration
- 3) optimization problems for ordinary and multivariate functions
- 4) analysis of functions and their graphs
- 5) applications of derivatives and integrals, including chain rule
- 6) partial derivatives
- 7) Lagrange multipliers
- 8) apply objectives 1-7 to business applications and concepts