Date: 21.8.20

Calculus (with Precalculus) 1: 88731

Type of course:	lecture/recitation	**Hours/credits:**	4.0
Academic year:	(2019-20) תשפ"א	**Semester:**	1 (Fall)

Prerequisites: Algebra 2 and a passing grade (75) on an Algebra Gateway Check verifying readiness for Precalculus.

Course objectives:
- Refreshing knowledge of the properties of functions and their graphs
- Understanding the definitions of categories of algebraic functions and the characteristics and properties of each category
- Understanding the concepts of limits, derivatives and anti-derivatives
- Achieving computational proficiency with limits and derivatives using their arithmetic properties
- Graphing algebraic functions using algebraic and calculus-theoretic properties; drawing conclusions from these graphics
- Developing conceptual understanding and technical proficiency with using algebraic functions as models in optimization applications
- Understanding exponential functions and modeling with these functions (with emphasis on applications to COVID-19)

Overview of the two-semester sequence: In this two-semester sequence students will learn the material typically taught in a Precalculus course followed by a Calculus 1 course for social sciences taught sequentially. However, the material from these traditional courses is integrated.

Course description: The first semester in the two-course sequence focuses on the calculus of algebraic functions. It begins with a review of functions and graphs. We use basic (non-composite) algebraic functions to develop the main ideas of differential calculus: limits, continuity, derivatives. Anti-derivatives are introduced as well. We next explore applications of the properties of algebraic and calculus-theoretic properties of functions to graphing and modeling. Exponential functions are introduced at the end of the semester. (Note: The chain rule and implicit differentiation are introduced in the second semester.)

The Process of the Course:
The course consists of three hours of lecture, integrating symbolic manipulation software as needed, and a one-hour question/answer recitation.

Requirements and grade components:
- Attendance/participation (10%)
- Homework/attendance (10%)
- Quizzes (20%)
- Final Exam (60%)

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Schedule:

Topic	Required Reading
Review of Algebra 2	Taalman 0.2, 0.3 (Independent review)
Numbers, functions and graphs	Taalman 0.1, 0.4, 0.5
Operations on functions: • Transformations • Arithmetic operations • Composition	Taalman 0.5, 0.6
Limits and continuity • Evaluating limits using graphs and tables • Algebra techniques for computing limits • Continuity • Infinite limits • Indeterminate forms	Taalman Chapter 1
Understanding algebraic functions graphically • Using a graph to determine an algebraic expression for a function • Rough sketches of algebraic functions • Analyzing graphs	Taalman Chapter 4
Derivatives • Introduction • Formal definition • The derivative function • Tangent lines • Leibniz notation • Basic derivatives • The arithmetic of derivatives • Introduction to antiderivatives	Taalman Sections 2.1-2.3
Applications of derivatives • Graphs of basic (non-composite) algebraic functions • Optimization	Taalman Sections 3.1-3.4
Exponential functions: • Transcendental functions • Basic exponential functions Ab^x • Transformations and graphs of exponential functions • Modeling with exponential functions • Definition of e • Expressing an exponential function as Ae^{kx}	Taalman Sections 5.1, 5.2, 5.4 (exponential functions)

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Bibliography:

Required Textbook*:*

- Taalman, Laura, *Calculus I with integrated Precalculus First Edition.* Macmillian, 2013.

Recommended purchase/rental options:

- **Purchase/rent a printed edition; purchase an electronic edition from Amazon:**
  https://www.amazon.com/Calculus-integrated-Precalculus-Laura-Taalman/dp/1429240733/ref=sr_1_1?dchild=1&keywords=taalman+calculus+precalculus&qid=1598001671&sr=8-1
  Renting an electronic edition through Amazon is not recommended

- **Rent an electronic edition from WebAssign.net:**
  Enter course key: **biu.il 7868 8360**