COURSE: Math 1301 – College Algebra (3 – 3 – 0)

CATALOG DESCRIPTION: College-level topics in algebra including variation, systems of equations, nonlinear inequalities, functions and their graphs, lines, quadratic equations and functions, complex numbers, polynomials, exponential and logarithmic functions, the algebra of functions, and applications related to these topics. (MATH 1314)

PREREQUISITE: *A grade of C or better in MATH 1300, or TSIA2 score meeting college readiness in Mathematics, or TSIA2 MATH complete, or TSIA2 MATH exempt. For current TSIA2 College Readiness scores, please see https://www.uhd.edu/testing/Pages/testing-tsia.aspx*

AUDIENCE: This is a freshman-level mathematics course, which requires a background consisting of two years of high school mathematics or MATH 1300.

PURPOSE: This course provides the background in algebra, and skills for visualizing and communicating mathematical concepts necessary for further study in college-level mathematics and its applications. It satisfies the general education core requirement for mathematics.

LEARNING OUTCOMES:

I.	**Department:** At the completion of the course, the student should be able to
	1. Interpret and use functional notation, express concepts and properties in functional notation, recognize and apply different types of functions including linear, polynomial, exponential and logarithmic.
	2. Determine key properties of functions from various representations, convert among the representations, and recognize common properties of different functions.
	3. Solve linear, quadratic and absolute value equations and inequalities, interpret solutions.
	4. Interpret numerical data and construct simple models, interpolate and extrapolate data, evaluate the meaning of results.
	5. Use graphing utilities to graph functions, solve equations, visualize and interpret data.
	6. Demonstrate mathematical reasoning skills and skills for presenting mathematical concepts and arguments.
II.	**University Quality Enhancement Plan:** At the completion of the course, the student should be able to
	A. Model problems using elementary mathematical tools such as functions, relations, and equations.
	B. Manipulate and examine these models effectively 1. Determine key properties of functions and relations from various representations 2. Evaluate function notation properly 3. Convert functions and relations between various representations 4. Solve equations, inequalities, and linear systems

	C. Reason appropriately from models to draw conclusions 1. Categorize functions and relations into various families by the type of expression or other key properties 2. Recognize important common properties of function and relation families
	D. Interpret results intelligently in the problem context 1. Apply key properties of functions and relations to answer practical questions 2. Interpret function notation properly
	E. Use mathematics as a language to communicate ideas efficiently 1. Use function notation properly 2. Use set notation properly
III.	**State of Texas:** The objective of the mathematics component of the core curriculum is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.
	Exemplary Educational Objectives:
	1. To apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations.
	2. To represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically.
	3. To expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments.
	4. To use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results.
	5. To interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them.
	6. To recognize the limitations of mathematical and statistical models.
	7. To develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines.

GENERAL EDUCATION CORE LEARNING OUTCOMES:

THECB objective	At the completion of the course, the student should be able to:
Communication Critical Thinking Empirical/Quantitative Reasoning	**1.** Describe and communicate mathematical information verbally, numerically, graphically, and symbolically.
Critical Thinking Empirical/Quantitative Reasoning	**2.** Use appropriate mathematical techniques to model situations from a variety of settings, including real-world applications in generalized mathematical forms.
Critical Thinking Empirical/Quantitative Reasoning	**3.** Interpret mathematical models, such as formulas, graphs, tables, and schematics, and draw inferences from them.
Critical Thinking Empirical/Quantitative Reasoning	**4.** Discern relationships and patterns in quantitative data to arrive at informed conclusions.
Critical Thinking Empirical/Quantitative Reasoning	**5.** Utilize appropriate technology to enhance mathematical thinking and understanding, to solve mathematical problems, and to judge the reasonableness of the results.

GENERAL EDUCATION CORE VS. COURSE LEARNING OUTCOMES

Core Outcome	Course outcome 1	Course outcome 2	Course outcome 3	Course outcome 4	Course outcome 5	Course outcome 6
1	X		X		X	X
2	X		X	X		
3	X			X		
4		X	X	X		X
5	X				X	

TEXTBOOK: *College Algebra with Modeling and Visualization*, Sixth Edition, by G. Rockswold, Pearson, 2018 (Book bundled with MyLab Math)

Textbooks available in the UHD bookstore are bundled with a student access code for MyLab Math, a comprehensive mathematics program that algorithmically generates and automatically grades online homework assignments and quizzes. It provides online access to many publisher services as well as a complete electronic version of the textbook. The UHD MS Department MATH 1301 Coordinator Course for online homework assignments and quizzes is available to copy into your MyLab Math account. *Please contact Tim Redl (REDLT@UHD.EDU) for the current semester's master course information.* **Instructors must require MyLab Math assignments (homework and quizzes) and count these assignments equivalent to a regular test grade.** Training and handouts for instructors to use MyLab Math as well as handouts to copy for students are available from the MyLab Math website and from the UHD Algebra Student web page at http://cms.uhd.edu/qep/algebra. For students to use MyLab Math, they must purchase access from either the UHD bookstore or online at http://www.mymathlab.com.

METHOD OF EVALUATION: Departmental policy requires that:

1. A maximum of four and a minimum of three in-class tests and a comprehensive departmental final exam must be given. The final exam must be taken by all students and cannot be edited by the instructor.
2. All major tests should be announced at least one week in advance.
3. The final exam must be proctored (even for online and hybrid courses) and counts 1/3 of the course grade.
4. The final course average will be used to assign the final course grade as follows:
   90 – 100 → "A"
   80 – 89 → "B"
   70 – 79 → "C"
   60 – 69 → "D"
   0 – 59 → "F"

The following case is an exception: If the final exam score is less than 50, the student will receive an "F" for the course regardless of his or her average.

5. Neither an open book nor a take-home major test may be given.

6. An equivalent version of a test may not be distributed to students before a major test. Any review sheet should be comprehensive and the student should not feel that classroom notes, homework or the text may be ignored in favor of the review sheet. The department furnishes a review sheet for the final exam and conducts open review sessions. Information on the availability of the review sheet and sessions will be given near the end of the semester. Video of a past review session is available for students online at the UHD Algebra Student web page at http://cms.uhd.edu/qep/algebra.
7. Instructors are required to count homework as a meaningful fraction of the overall course grade, approximately equivalent to one regular test. There are two comprehensive collections of homework assignments available. The online homework program consisting of algorithmically-generated, automatically-graded problems, one set for each section covered in the syllabus, is available through the publisher-sponsored MyLab Math web site at www.mymathlab.com; and the textbook homework list consisting of the suggested reading assignments and textbook exercises, one set for each section covered in the syllabus, is available from the department (see the separate sheet Math 1301 Suggested Homework). Either of these homework collections should provide sufficient preparation for the final exam, however, **Instructors must require MyLab Math assignments (homework and quizzes) and count these assignments equivalent to a regular test grade.** It is strongly suggested that MyLab Math assignments be due at least on the day of the exam on which they are covered, if not earlier. *Please contact Tim Redl (REDLT@UHD.EDU) for more information.*
8. Instructors are encouraged to set aside a small amount of time each week (approximately 30 minutes) to have students work in groups during class on textbook exercises and test preparation exercises. Additional class activities are also available for viewing and printing in the Course Tools → Document Sharing section in MyLab Math. You are encouraged to use and grade these activities as you find appropriate, and may include a group component as a small fraction of the students' final grade. *Please contact Tim Redl (REDLT@UHD.EDU) for more information.*
9. Each student is expected to purchase or otherwise have access to a scientific or graphing calculator throughout the semester and will be allowed to use a calculator on the final exam. At the instructor's discretion, the student may be required to purchase or otherwise have access to a graphing calculator. The instructor may determine their own policy regarding the use of graphing calculators on homework, tests, and the final exam. Each instructor must include and evaluate activities in class that use graphing utilities, such as graphing calculators or software (see Departmental Policy #3 below).
10. Effective Fall 2013, UHD implemented a Class Attendance & Administrative Drop Procedure for all classes. In accordance with this new policy, faculty members are required to monitor attendance for the first 10 class days of the semester for all of their classes, and include the following statement in their syllabi:

    "*Failure to attend class (face to face), engage course material (technology delivered classes only; or make contact with faculty to explain absence by the 10th class day of the semester will result in being administratively dropped from the course. This action may affect your enrollment status and/or your financial aid eligibility.*"

- During the first 10 class days of the semester faculty members should alert students if they do not appear on the official roll and require the students to complete the registration process.
- After the first 10 class days but no later than the 12th class day (Census Day), faculty members are to notify the Registrar about students whose names appear on the roll but never attend class.
- At the final grading period, faculty members are to notify the Registrar of students who stop attending class by entering the date the student last attended class on the class grade roster.

Administrative Drop Criteria

Students that have not attended class, engaged in the first assessment (technology delivered classes only) nor made contact with the faculty member to explain the absence by the end of the 10th class day of the semester will be administratively dropped from the course.

Administrative drops from courses will be processed by the Registrar by the recommendation of the faculty member based on the following criteria:

- For face-to-face classes - the student has not attended class nor made contact with the faculty member to explain the absence by the end of the 10th class day of the semester
- For a technology-delivered course - the student has not engaged the course material or made contact with the faculty member to explain the absence by the first assessment or by the 10th class day of the semester.

After the first 10 class days but no later than the 12th class day (Census Day), the faculty member will electronically certify the class roster identifying students who meet the aforementioned criteria.

The Registrar will notify the students that they are being dropped from the class and then follow the required procedures to drop student with an effective date one day prior to the start of the first day of class.

SOME DEPARTMENTAL POLICIES REGARDING THIS COURSE:

1. Each instructor MUST cover all course topics by the end of the semester. The departmental final exam is comprehensive and questions on it can deal with any of the course material. The department furnishes a final exam review sheet and conducts final exam review sessions. More information is sent out near the end of the semester.
2. Each student should receive a copy of the departmental Student Syllabus for this course and an instructor information sheet indicating contact information, office hours, and course grade computation on the first day of class. The department student syllabus is available in the department office and at http://cms.uhd.edu/qep/algebra
3. Each instructor must include and evaluate activities that use graphing utilities, such as graphing calculators or software. These activities are needed to satisfy the use of technology learning outcome. Some online homework problems assume the use of graphing utilities. Suggested activities are listed in the Course Content below.

4. Each instructor must include short answer problems (non-multiple choice) on their tests. These problems are needed to satisfy the written communication learning outcome; they will also appear on the final exam.
5. As part of assessment of the Mathematics Core, each instructor must assign a department-provided Signature Assignment for students to complete and upload to Blackboard by the end of the semester. The instructor will then upload all student work to a Blackboard archive page for future assessment. The Signature Assignment should count for between 5% and 10% of the course grade.
   Contact Bonnie Blumberg (NADLERB@UHD.EDU) for details.

TIPS FOR ACHIEVING A HIGHER FINAL EXAM AVERAGE:

1. Count homework equivalent to a regular test grade.
2. Use the online gradebook available in MyLab Math, to allow students to continuously monitor their course average.
3. Early in the semester take your students to the Center for Math & Statistics in N925 for student orientation.
4. Set firm due dates for homework assignments.
5. Remind students frequently about homework and due dates via email and in class. A convenient time to review a student's homework grade is when he/she turns in an exam.
6. Use online review quizzes in MyLab Math for test prep and part of the course grade.
7. An online Algebra Review assignment is available in MyLab Math. You may want to assign this for extra credit early in the semester.
8. Set aside a small amount of time each week to have students work in groups during class activities from the Course Tools → Document Sharing section in MyLab Math.
9. The textbook has excellent application examples; discuss as many of these as possible.
10. Stress the use and interpretation of mathematical notation, especially function notation.
11. Stress the interpretation of the slope of a line in context.
12. Because it is difficult to properly practice function graphing skills online, be sure to provide sufficient opportunities for students to draw graphs. In particular, students should be able to graph lines and parabolas by hand.
13. Encourage students to attend the final exam review session at the end of the semester.

RESOURCE MATERIALS: Students enrolled in MATH 1301 at UHD have access to the Center for Math & Statistics in the Academic Support Center (N925) where they may receive additional assistance with understanding concepts, improving their skills, and working on homework problems. The Center is staffed with math faculty and student assistants, and offers tutoring, use and/or checkout of course videos, use of calculators, use of computers with web access for math homework, and use/loan of mathematics book resources on a walk-in basis. The Center for Math & Statistics maintains extensive hours which are published each semester. Please encourage students to make use of available services in the Center and through the UHD Algebra Student web page at http://cms.uhd.edu/qep/algebra. MyLab Math (http://www.mymathlab.com) also provides numerous help resources such as chapter pretests, exercise examples, and self-quizzes. The Multimedia Online Library contains section lecture videos, animation examples, PowerPoint slides, test prep videos corresponding to each textbook chapter test, and a multimedia textbook. MyLab Math also supports the use of the TestGen program.

COURSE CONTENT: (Some sections or parts of sections are marked as optional and may be omitted; they will not appear on the final exam. Don't spend too much time reviewing prerequisite material. You may want to set up additional assignments for students to review outside of class time.)

UNITS WITH APPROXIMATE TIME	TEXT REFERENCE
Unit I - Introduction to Functions and Graphs (7 hours) Sets of numbers; visualization of data; relations, functions, and their representations; the Midpoint Formula; function notation and its practical interpretation; types of functions and their rates of change; interval notation; where a function is increasing and decreasing; percent change (appears in Section 1.1 and in Appendix D). Optional: Setting the viewing window on a graphing calculator; Making a scatter plot and line graph on the graphing calculator (Section 1.2, Examples 14, 15, 16); Representing a function on a graphing calculator (Section 1.3, Example 7). Appendix A: Collaborative Activity for Chapter 1: Rise in Sea Level (pages AP-1 – AP-2)	Sections 1.1 - 1.4 (In Section 1.1, cover percent change (an additional three pages of text on percent change appear after Section 1.1 in the eBook) but omit scientific notation. In Section 1.2, omit mean, median, Distance Formula, and Circle Equation. An additional three pages of text on the Midpoint Formula appear after Section 1.2 in the eBook. In Section 1.4, omit average rate of change and difference quotient.)
Unit II - Linear Functions and Equations (7 hours) Linear functions and models; equations of lines; linear equations; intercepts and their practical interpretation; linear inequalities; piecewise-defined functions; absolute value equations; absolute value inequalities (optional); direct variation. Optional: Applying the intersection of graphs method of solving equations (Section 2.2, Example 7); Locating a zero of a function on a graphing calculator (Section 2.3, Example 4); Solving absolute value equations with technology (Section 2.5, Example 4). Appendix A: Collaborative Activity for Chapter 2: Errors in Real Life (pages AP-2 – AP-4)	Sections 2.1 - 2.5 (An additional five pages of text on using Wolfram Alpha appear after Section 2.1 in the eBook. In Section 2.3, omit solving linear inequalities graphically and numerically. In Section 2.4, omit the greatest integer function. Absolute value inequalities will not be covered on the final exam.)
Unit III - Quadratic Functions and Equations (7 hours) Quadratic functions and models; quadratic equations and problem solving; quadratic inequalities; complex numbers. Optional: Solving equations with technology (Section 3.2, Example 7); Solving inequalities with technology (Section 3.4, Example 3). Appendix A: Collaborative Activities for Chapter 3: Modeling Weather, Shooting a Basketball Foul Shot (pages AP-4 – AP-6)	Sections 3.1 - 3.4 (An additional two pages of text on finding a function formula for a parabola and systems of equations appear after Section 3.1 in the eBook.)

Unit IV – More Nonlinear Functions and Equations (7 hours) Nonlinear functions and their graphs; polynomial functions and models; fundamental properties of polynomials; the Fundamental Theorem of Algebra. In Section 4.6, discuss rational functions and models as time permits. In Section 4.7, discuss inverse variation (and polynomial and rational inequalities only as time permits). Optional: Finding extrema on the graphing calculator (Section 4.1, Example 3). Appendix A: Collaborative Activity for Chapter 4: Waiting in Traffic (pages AP-6 – AP-8)	Sections 4.1 - 4.2, 4.5 - 4.7 (In Section 4.5, omit the Conjugate Zeros Theorem and Polynomial Equations with Complex Solutions.)
UNIT V - Exponential and Logarithmic Functions (7 hours) Combining functions with algebraic operations; decomposing functions; inverse functions and their representations; inverse function notation and its practical interpretation; exponential functions and models; logarithmic functions and models; properties of logarithms; exponential and logarithmic equations. Instructors are strongly encouraged to have students use calculators during this unit. In Section 5.7, discuss constructing nonlinear models only as time permits. Optional: Graphing an inverse function (Section 5.2, Example 7; AP-11); Solving an exponential equation graphically (Section 5.6, Example 8). Appendix A: Collaborative Activities for Chapter 5: Understanding Interest, Choosing a Modeling Function (pages AP-8 – AP-11)	Sections 5.1 - 5.6 (In Section 5.3, omit compound interest and continuously compounded interest. An additional three pages of text on steady percent change appear after Section 5.3 in the eBook. Also see Appendix D.) Section 5.7 (optional)
Signature Assignment (1 hour) As part of assessment of the Mathematics Core, each instructor must assign a department-provided Signature Assignment for students to complete and upload to Blackboard by the end of the semester. The instructor will then upload all student work to a Blackboard archive page for future assessment.	Contact Bonnie Blumberg (NADLERB@UHD.EDU)

GENERAL UNIVERSITY POLICIES: All students are subject to UH-Downtown's Academic Honesty Policy and to all other university-wide policies and procedures as they are set forth in the UH-Downtown University Catalog and Student Handbook.

STATEMENT ON REASONABLE ACCOMMODATIONS: UH-Downtown complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504

and ADA guidelines, UHD strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a documented disability requiring academic adjustments/auxiliary aids, please contact the Office of Disability Services, One Main St., GSB314, Houston, TX 77002. (Office) 713-221-5078 (Website) www.uhd.edu/disability/ (Email) disabilityservices@uhd.edu