

Mathematical Functions and Modeling

MATH 1223-01 and MATH 1223-023 Credit hours
3 Credit hours
Fall, 2019
NSW 204
9:00-9:50, MWF and 10:00-10:50, MWF
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Office Hours: as posted on blackboard

OC Mission Statement

Oklahoma Christian University is a higher learning community that transforms lives for Christian faith, scholarship, and service.

Departmental Mission Statement

The mission of the Department of Mathematics is to prepare graduates who will be the mainstay of these disciplines and of society for the 21st century.

Statement of Faith and Learning

“Mathematics is the alphabet with which God has written the universe” – Galileo.

“It is the glory of God to conceal a matter; to search out a matter is the glory of kings.” – Proverbs 25:2

An understanding of mathematics is necessary to fully appreciate the elegance, symmetries, and patterns that we see in God’s creation. The ability that each of us has to think, reason, and solve problems is a gift from the creator. This course will help each student develop those mathematical abilities, which in turn will make each student a more productive member of the kingdom.

Course Description

Study of equations and functions (linear, polynomial, rational, exponential, logarithmic) from various perspectives (symbolic, verbal, numerical, graphical). Technology will be used for graphing functions, solving equations, and modeling data using regressions. This course is designed for students in business, computer science, mathematics, nursing, science, or social science majors.

Course Objectives

At the conclusion of the course the learner will be able to:

1. Interpret functions using real-world contexts by translating across multiple representations, including symbols, tables, graphs, and words.
2. Identify and analyze families of functions, including linear, polynomial, rational, exponential, and logarithmic functions.
3. Determine key characteristics of functions, including global properties and local patterns of change, and interpret their meanings in context, including asymptotes, concavity, end behavior, extrema, increasing/decreasing intervals, and turning points.

4. Combine and modify existing functions to create new functions, including composition of functions, cost, revenue, and profit functions, transformation of functions, and regression analysis.
5. Apply algebraic techniques and digital resources to create, analyze, and interpret appropriate models (either functions or systems of equations) of real-life phenomena.

Mapping of Course Objectives to Departmental and University Goals

Course Objective	*Assessment Tool	Program Objective(s)	University Objective(s)
1. Interpret functions	Tests Homework Quizzes	Knowledge Problem Solving	Information Literacy Structured Reasoning Critical and Creative Thinking
2. Identify and analyze	Tests Homework Quizzes	Knowledge Problem Solving Communication	Information Literacy Structured Reasoning Critical and Creative Thinking Effective Communication
3. Determine characteristics	Tests Homework Quizzes	Knowledge Problem Solving	Information Literacy Structured Reasoning Critical and Creative Thinking
4. Combine and modify	Tests Homework Quizzes	Knowledge Problem Solving	Information Literacy Structured Reasoning Critical and Creative Thinking
5. Apply algebraic techniques	Tests Homework Quizzes	Knowledge Problem Solving Communication	Information Literacy Structured Reasoning Critical and Creative Thinking Effective Communication

Course Content

A. Functions

1. Functions Given by Formulas
2. Functions Given by Tables
3. Functions Given by Graphs
4. Functions Given by Words

B. Graphical and Tabular Analysis

1. Tables and Trends
2. Graphs
3. Solving Linear Equations
4. Solving Nonlinear Equations
5. Inequalities
6. Optimization

C. Straight Lines and Linear Functions

1. The Geometry of Lines
2. Linear Functions
3. Modeling data with Linear Functions
4. Linear Regression
5. Systems of Equations

D. Exponential Functions

1. Exponential Growth and Decay
2. Constant Percentage Change
3. Logarithmic Functions

E. A Survey of Other Common Functions

1. Logistic Functions
2. Power Functions
3. Combining and Decomposing Functions
4. Quadratic Functions
5. Higher-Degree Polynomials and Rational Functions

F. Rates of Change

1. Velocity
2. Rates of Change for Other Functions
3. Estimating Rates of Change

Course Requirements & Grading Standards:

Homework: The most important aspect of this course is the time you spend working problems to learn the methods presented in class. Every problem-solving technique you will need will be demonstrated by your professor in class, but watching someone do mathematics doesn't help you solve problems any more than watching someone play guitar helps you become a musician. You will be given homework over every section covered in class that will be due the next class period. Each homework set is worth 2 points. This will be collected and graded for completeness.

Quizzes: Unannounced quizzes will be given throughout the course of the semester over the homework assigned since the last quiz. These quizzes serve two purposes. The first is to hold you accountable for doing the homework. Usually, the quiz questions will be straight from the homework, not the same numbers, but the same types of questions. Secondly, it will give you a mini-test environment to see how well you understood the recent homework. Quizzes will be graded for accuracy.

Tests: Three “hour” tests will be given throughout the semester. These tests will cover the following sections:

Test 1: Chapters 1 and 2

Test 2: Chapters 3 and 4

Test 3: Chapters 5 and 6

Tests will be given using pencil and paper and will be completed in class. Each test will be worth 100 points.

Final Exam: The comprehensive final exam is required and will be given from 8:00 – 9:50 am on Wednesday, December 11th for the 9am class and from 10:10-12 noon Monday, December 9th for the 10am class. The final exam is worth 150 points.

Grading: Points will be earned in the following categories and grades will be assigned based upon the following intervals:

Category	Points possible
Homework	50
Quizzes	150
Tests	300
Final Exam	150
Total Possible	650

Course Grade	Minimum Percentage
A	90%
B	80%
C	70%
D	60%
F	Below 60%

- Your professor will keep records of all your grades and give you an Excel report with details after each test.
- Your homework will be graded for completeness. Your quizzes will be graded for accuracy. Both will be returned to you ASAP.
- Mid-term grades will reflect your average on all graded work as of the seventh week of the semester.

Materials Needed

Textbook: The textbook for this course, Functions and Change: A Modeling Approach to College Algebra; 6th Edition, by Crauder, Evans and Noell, Cengage Learning, is REQUIRED. (ISBN: 978-1-337-29125-5 (loose-leaf edition) or 978-1-337-11134-8 (hardcover)). Please bring it to class every day. The Student Solutions Manual is OPTIONAL. (ISBN: 978-1-133-36558-7).

Calculator: Students are allowed to use a TI-83, TI-84, TI-86 graphing calculator, or the equivalent, though a graphing calculator is NOT required. An inexpensive scientific calculator will meet all your needs for this course. Calculators with symbolic manipulators (TI-89, for example) will not be allowed on tests. I will notify you if it

would be to your advantage to have a graphing calculator. You will be required to clear the memory before each test.

Sources of Help

Tutoring	Student Success 405.425.5923 www.oc.edu/academics/student-success/
Research Help	Library 405.425.5312 Ask a Librarian (libanswers.oc.edu/) library.oc.edu
Information Technology	Support Central 405.425.5555 support.oc.edu/home
Blackboard Help	Link in Blackboard (usually on left side)

Course Policies:

- 1. Attendance:** In order to be successful in this class, you must be responsible. This includes faithfully being on time to class and being actively engaged in the presentation. Attendance will be taken at the start of each class period and the instructor will use your attendance record as one measure of your effort in the class at the end of the semester. Please keep in mind that people continually leaving and returning to class is distracting and can become annoying to your teacher. Please try to be on time, be engaged and stay engaged for the entire lesson.
- 2. Drop /Replacement Grades:** All tests are required, including the final, and no test scores will be dropped. However, your percentage score on the final exam can replace your lowest regular test score, provided it is not lower than your previous lowest test score.
- 3. Make-Up Tests and Quizzes:** No make-up tests or quizzes will be given. If you know that you need to be absent on the day of a test or quiz and notify me in advance, you may be able to take a test early. Missing a test without prior approval from the instructor will result in a zero for that test. This zero can be replaced by your final exam percentage.
- 4. Late Homework:** Homework turned in after it is collected in class will be late. Late homework will be accepted for half-credit up until the next class meeting, but will not be accepted any later than this. You can turn in your homework early. If you are not in class to turn in your homework on time, it should be turned in electronically prior to the beginning of class or sent with a classmate.

Americans with Disabilities Act

If you have a diagnosed disability and need special accommodations, please notify Ms. Katy Roybal (425-1876) before or immediately after your first scheduled class meeting. After your disability has been verified, your instructor will work with you, with Ms. Roybal, and with the Office of the Vice President of Academic Affairs to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this course.

Anti-Harassment and Discrimination Policy (Title IX)

Oklahoma Christian University is a Christian community that has committed itself, unequivocally, to ensuring a working and learning environment in which the dignity of every individual is respected and a campus environment that is free of unlawful harassment, which includes sexual assault or misconduct. OC’s Anti-Harassment and Discrimination Policy (see the OC Student Handbook) is compliant with Title IX, which states, “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.” Discriminatory and sexual harassment is unchristian and uncivil behavior. It is a breach of community, which expresses disrespect, exploits and undermines relationships based on trusts, and interferes with learning and productive work.

Students are encouraged to immediately seek available assistance and report incidents of harassment to either the Title IX Coordinator or one of the Title IX Deputy Coordinators listed below:

Title IX Coordinator	Ms. Tamie Willis	405.425.5320	tamie.willis@oc.edu
Title IX Deputy Coordinator – Student Services	Ms. Lisa Herndon	405.425.1820	lisa.herndon@oc.edu
Title IX Deputy Coordinator – Housing	Mr. John Ortiz	405.425.5932	john.ortiz@oc.edu
Title IX Deputy Coordinator – Female Employees	Dr. Gail Nash	405.425.5345	gail.nash@oc.edu
Title IX Deputy Coordinator – Male Employees	Dr. Charles Rix	405.425.5379	charles.rix@oc.edu

Students have access to confidential services through OC’s Counseling Center and the Spiritual Life office.

OC Counseling Center 405.425.5250

Spiritual Life

Jeff McMillon, Dean of Spiritual Life 405.425.5919

Summer Lashley, Ethos Director 405.425.5908

Inclement weather policy

If an exam is scheduled on a day when OC closes due to inclement weather, the exam will be postponed to the next scheduled class meeting. If OC closes due to inclement weather on the date of the final, the final will be cancelled and your grade will be calculated based upon the grades you have earned previous to this date in the course. In either event, your professor will confirm these plans via Blackboard and/or e-mail.

Emergency statement

In case of an emergency, faculty, staff, and students who have signed up for OC Campus Messenger (oc.edu/notify) will be notified by text, email, or Twitter. If the emergency occurs during class, the instructor will inform the students present of the appropriate procedures.

Oklahoma Christian University Policy on Academic Honesty

Cheating

Cheating on an examination, assignment, roll sheet or other course related work or activities undermines the ethics of the academy and the specific Christian purposes of Oklahoma Christian University. Accordingly, students who cheat on examinations, assignments or other course related work or activities will face serious consequences, as outlined in this policy.

Plagiarism

One particular form of cheating is plagiarism. Plagiarism is the transmission of another's ideas, words, or materials as one's own and/or the failure to credit accurately the ideas, words, or materials of another. Plagiarism also includes passing off another's work (a friend, a parent, a website) as one's own. Plagiarism undermines the ethics of the academy and the specific Christian purposes of Oklahoma Christian University. Accordingly, students who engage in plagiarism in assignments submitted will face serious consequences, as outlined in this policy.

Penalties for Academic Dishonesty

1. On the first offense, the student will receive zero (0) credit for the examination or assignment. For forms of cheating or dishonesty other than on examinations or assignments, the Professor shall have the discretion to impose an appropriate penalty. Professors must send documentation of the first offense to the appropriate chair, the dean of the appropriate college, the VPAA, and the Dean of Students.
2. On the second offense in the same course, the student will receive an F in the course. Professors must send documentation of the second offense to the appropriate chair, the dean of the appropriate college, the VPAA, and the Dean of Students.
3. At either the first offense or second offense, the student may appeal using the process set forth in the OC Academic Policy Manual covering Grade Appeals.
4. If the student commits offenses in two or more courses, the Academic Appeals Committee, described in the OC Student Handbook and the OC Academic Policy Manual, may assign penalties for academic dishonesty in addition to the penalties assigned by the professors in the courses. The Academic Appeals Committee may impose penalties up to and including suspension from the University in instances where a student has engaged in cheating or plagiarism in two or more courses. The Academic Appeals Committee will inform the VPAA and the Dean of Students in writing of any penalties imposed by it and will report annually on its activities to the University's Academic Affairs Committee.
5. Professors should maintain the highest standards of academic honesty both in and out of the classroom. Professors must report and apply the rules regarding cheating/plagiarism to the appropriate channels. The student should be referred to the Oklahoma Christian University Covenant for principles which should guide conduct in these matters.

Electronic devices in the classroom

To minimize distractions from yourself and others, the use of all other electronic devices is prohibited during this course. This includes, but is not limited to: cell phones, iPhones, iPods, or any other music, recording or communication devices. Any of these devices that are brought to class must be put away and turned off. Students caught using these devices during class will be asked to bring them to my desk until class is completed. Repeat offenders will be asked to leave class and will need to make an appointment with me before returning to class.

Tentative Course Schedule:

8/26: Syllabus	8/28: 1.1	8/30: 1.2
9/2: 1.3	9/4: 1.4	9/6: 2.1
9/9: 2.2	9/11: 2.3	9/13: 2.4
9/16: 2.5	9/18: 2.6	9/20: Review
9/23: Test 1 (1.1 – 2.6)	9/25: Test debrief, 3.1	9/27: 3.1
9/30: 3.2	10/2: 3.3	10/4: 3.4
10/7: 3.5	10/9: 3.5, 4.1	10/11: 4.1
10/14: 4.2	10/16: 4.5	10/18: Fall Break
10/21: Review	10/23: Test 2 (3.1 – 4.5)	10/25: Test debrief, 5.1
10/28: 5.2	10/30: 5.2, 5.4	11/1: 5.4
11/4: 5.5	11/6: 5.5, 5.6	11/8: 5.6
11/11: 6.1	11/13: 6.1, 6.2	11/15: 6.2
11/18: 6.3	11/20: Review	11/22: Test 3 (5.1 – 6.3)
11/25: Test debrief	11/27: Thanksgiving Break	11/29: Thanksgiving Break
12/2: Review for Final	12/4: Review for Final	12/6: Review for Final

Homework:

1.1: 12, 18, 29, S3 – S30 (x3)	4.1: 5, 13, 14, S3 – S21 (x3)
1.2: 9, 10, 17, S3 – S30 (x3)	4.2: 3, 6, 16, S3 – S27 (x3)
1.3: 9, 10, 14, S3 – S30 (x3)	4.5: 5, 9, 15, S3 – S30 (x3)
1.4: 3, 9, 19, S3 – S24 (x3)	
	5.1: 3, 5, 17, S3 – S30 (x3)
2.1: 8, 10, 17, S3 – S30 (x3)	5.2: 7, 13, 16, S3 – S18 (x3)
2.2: 3, 7, 17, S3 – S30 (x3)	5.4: 2, 5, 18, S3 – S15 (x3)
2.3: 5, 7, 20, S3 – S30 (x3)	5.5: 6, 8, 10, S3 – S18 (x3)
2.4: 10, 14, 20, S3 – S27 (x3)	5.6: 3, 10, 17, S3 – S24 (x3)
2.5: 1, 4, 15, S3 – S18 (x3)	
2.6: 2, 8, 16, S3 – S27 (x3)	6.1: 3, 8, 10, S3 – S12 (x3)
	6.2: 4, 8, 12, S3 – S15 (x3)
3.1: 8, 16, 21, S3 – S24 (x3)	6.3: 1, 5, 10, S3 – S12 (x3)
3.2: 3, 4, 13, S3 – S27 (x3)	
3.3: 5, 6, 14, S3 – S24 (x3)	
3.4: 6, 10, 24, S3 – S21 (x3)	
3.5: 1, 6, 15, S3 – S27 (x3)	

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