

**COURSE SYLLABUS**  
**Math 284, Section 01**  
**FUNCTIONS AND GRAPHS**  
**CREDIT HOURS: 3**  
**Fall 2007**

**Classroom and Schedule:** Lee Drain Building, Room 424,  
Tuesdays and Thursdays, 11:00 a.m.-12:20 p.m.

**Instructor information:**

Dr. Dustin L. Jones

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Many other times available by appointment, email, or simply dropping by

**COURSE DESCRIPTION:** This course continues the mathematics course sequence for elementary teachers who are pursuing a mathematics minor. This course may be applied only toward elementary school teacher certification. Students are expected to practice communications skills and participate in hands-on activities, including the use of math manipulatives and technology. Topics will include National and Texas standards for teaching linear, polynomial, logarithmic, and exponential functions. Throughout the course, the five themes recommended by the NCTM Principles and Standards (problem solving, reasoning, communication, connections, and representation) will be emphasized. Students will also participate in class discussions and group work during this course. A TI-83+ or TI-84 graphing calculator is required for this course. **Prerequisite:** Math 184 and Math 185 with a grade of C or better.

**COURSE OBJECTIVES:** Upon completion of this course, students will be able to:

- Make, test, validate, and use conjectures about patterns and relationships in data presented in tables, sequences, and graphs.
- Give appropriate justification of the manipulation of algebraic expressions.
- Illustrate the concept of a function using concrete models, tables, graphs, and symbolic and verbal representations.
- Use transformations to illustrate properties of functions and relations and to solve problems.
- Demonstrate an understanding of the connections among linear functions, proportions, and direct variation
- Determine the linear function that best models a set of data.
- Analyze the relationship between a linear equation and its graph.
- Use linear functions, inequalities and systems to model problems.
- For both linear and quadratic functions, use a variety of representations and methods (e.g., numerical methods, tables, graphs, algebraic techniques) to solve systems of equations and inequalities.
- Demonstrate an understanding of the characteristics of linear models and the advantages and disadvantages of using a linear model in a given situation.
- Use a variety of methods to investigate the roots (real and complex), vertex, and symmetry of a quadratic function or relation.
- Demonstrate an understanding of the connections among geometric, graphic, numeric, and symbolic representations of quadratic functions.
- Analyze data and represent and solve problems involving exponential growth and decay.
- Demonstrate an understanding of the connections among proportions, inverse variation and rational functions.
- Understand the effects of transformations such as  $f(x \pm c)$  on the graph of linear and nonlinear functions  $f(x)$ .
- Apply properties, graphs, and applications of nonlinear functions to analyze, model, and solve problems.
- Understand how to use properties, graphs, and applications of nonlinear relations including polynomial, rational, radical, absolute value, exponential, logarithmic, trigonometric, and piecewise functions and relations to analyze, model and solve problems.

**Required Materials:**

Connally, E., Hughes-Hallet, D, Gleason, A., et al. (2004). *Functions, Modeling, and Change* (2nd Edition). Hoboken, NJ: John Wiley & Sons.

A TI-83+ or TI-84 graphing calculator is required for this course.

Up-to-date course information will be posted on Blackboard. **Please check Blackboard regularly.**

**MATERIAL TO BE COVERED:**

Chapter 1	Functions, Lines, and Change
Chapter 2	Functions, Quadratics, and Concavity
Chapter 3	Exponential Functions
Chapter 4	Logarithmic Functions
Chapter 5	Transformations of Functions and Their Graphs
Chapter 6	Trigonometric Functions
Chapter 8	Compositions, Inverses, and Combinations of Functions
Chapter 9	Polynomial and Rational Functions

Other material may be covered as time permits.

**ATTENDANCE AND PARTICIPATION:** Regular and punctual attendance is expected of every student. As a prospective teacher, you must demonstrate your reliability and conscientious attitude by your faithful attendance. Any student who is more than 30 minutes late to class will be counted absent. Tardies will count against your attendance record, at the rate of 3 tardies equaling one absence. If absent or tardy, you are still responsible for all material covered in class, and you will need to check with a classmate about what was discussed. Serious health or family problems that are well documented will be handled individually.

In addition to attending class faithfully, students are expected to put forth their best effort in this class. This includes, but is not limited to, actively participating in class discussions and activities. By way of contrast, unprofessional behaviors (such as sleeping, texting, studying for other classes, or other off-task behaviors) will not be tolerated.

Students that have less than three absences and regularly participate in class will earn up to 15 points.

**ASSIGNMENTS AND QUIZZES:** One of the indicators of the understanding of a concept is the ability "to state it in your own words." Communicating your understanding will be shown through your complete solutions to assigned homework problems and through written responses.

Early in the semester, we will form groups, with the intent that you will work together on the assignments. I will assign homework problems after each class meeting, and I expect you to be able to present the solutions to selected problems at the beginning of the following class. If you present a solution, you will earn up to 10 points. If someone else from your group presents a solution *and you are present at the time*, you will earn up to 5 points. You may earn up to 25 points in this way.

I will also give in-class or take-home quizzes that I expect you to complete individually. Each quiz will be worth 10 points, and I will count your best six quiz grades. That is to say, if there are more than six quizzes, I will drop the lowest scores. Because the lowest scores are dropped, **NO LATE WORK WILL BE ACCEPTED.**

**TESTS:** There will be three tests during this semester, as well as a comprehensive final exam. These tests will contain problems similar to those worked in class and contained in homework assignments. Test items will be in a variety of formats, such as multiple choice, short answer, or more extended items that require explanations.

**No make-up tests will be given** unless the student has an official University excused absence. Arrangements must be made in advance of the exam. If a student misses a test without an official excuse, the score on the final exam will be given for the first test missed. A score of zero will be given for all subsequent missed exams.

**Tentative test dates:** September 25, October 18, November 15

**Final Exam** is Thursday, December 13, 11:00 a.m.-1:00 p.m.

**COURSE EVALUATION:** Each student's grade will be based on the following:

Three tests (100 points possible for each)	300 points
Attendance	15 points
Presentation of homework problems	25 points
Quizzes (10 points possible for each, best 6 scores)	60 points
Comprehensive final exam	100 points
<b>Total possible</b>	<b>500 points</b>

**Grading Scale**

Points earned	450-500	400-449	350-399	300-349	less than 300
Course grade	A	B	C	D	F

**ACADEMIC DISHONESTY:** All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including, but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials.

**CLASSROOM RULES OF CONDUCT:** Students will refrain from behavior in the classroom that intentionally or unintentionally disrupts the learning process and, thus, impedes the mission of the university. Cellular telephones and pagers must be turned off before class begins. Students are prohibited from eating in class, using tobacco products, making offensive remarks, reading newspapers and magazines, sleeping, talking at inappropriate times, wearing inappropriate clothing, or engaging in any other form of distraction. Inappropriate behavior in the classroom shall result in a directive to leave class. Students who are especially disruptive also may be reported to the Dean of Students for disciplinary action in accordance with university policy.

**VISITORS IN THE CLASSROOM** Unannounced visitors to class must present a current, official SHSU identification card to be permitted in the classroom. They must not present a disruption to the class by their attendance. If the visitor is not a registered student, it is at the instructor's discretion whether or not the visitor will be allowed to remain in the classroom.

This policy is not intended to discourage the occasional visiting of classes by responsible persons. Obviously, however, the visiting of a particular class should be occasional and not regular, and it should in no way constitute interference with registered members of the class or the educational process.

**AMERICANS WITH DISABILITIES ACT:** It is the policy of Sam Houston State University that no otherwise qualified disabled individual shall, solely by reason of his/her handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any academic or Student Life program or activity. Disabled students may request assistance with academically related problems stemming from individual disabilities by contacting the Director of the Counseling Center in the Lee Drain Annex or by calling (936) 294-1720.

**STUDENT ABSENCES ON RELIGIOUS HOLY DAYS:** University policy states that a student who is absent from class for the observance of a religious holy day must be allowed to take the examination or complete an assignment scheduled for that day within a reasonable time after the absence. Students will be excused to travel for observance of a religious holy day. A student who wishes to be excused for a religious holy day must present the instructor with a written statement describing the holy day(s) and the travel involved. The instructor will then provide the student with a written description of the deadline for the completion of missed exams or assignments.

**This is a tentative schedule and is subject to change. You will be advised of changes in class. You may always turn in assignments early. If you know that you will miss a test, see me in advance. I look forward to a great semester!**

<i>Day</i>	<i>Date</i>	<i>Sec.</i>	<i>Topics</i>	<i>Suggested Exercises &amp; Problems</i>
1	8/21		Introductions, syllabus, etc.	Pretest
2	8/23	1.1 1.2	Functions and Function Notation Rate of Change	p. 6: 1-10, 13-16, 26, 27, 33 p. 16: 14, 17, 18
3	8/28	1.3	Linear Functions	p. 24: 1-8, 14, 16, 29
4	8/30	1.4 1.5	Formulas for Linear Functions Geom. Properties of Lin. Functions	p. 32: 3, 6, 19, 20, 25, 30, 38 p. 41: 4, 5, 6, 9-14, 17, 23, 25, 32
5	9/4	1.6	Fitting Linear Functions to Data	p. 48: 1, 2, 3, 5, 8
6	9/6	2.1 2.2	Input and Output Domain and Range	p. 66: 1, 8, 9, 25, 26, 29, 30, 32 p. 72: 3, 9, 13, 16, 24, 27
7	9/11	2.3	Piecewise Defined Functions	p. 76: 1, 2, 4, 5, 6, 8, 11, 12, 15, 18
8	9/13	2.4	Composite and Inverse Functions	p. 82: 2, 6, 7, 9, 10, 14, 18, 23, 26, 39
9	9/18	2.5	Concavity	p. 86: 1-6, 13-19
10	9/20	2.6	Quadratic Functions	p. 92: 1-16, 31
11	9/25	<b>Test 1</b>		
12	9/27	3.1	Family of Exponential Functions	p. 112: 4, 5-10, 15, 16, 22, 25, 26, 29
13	10/2	3.2 3.3	Comparing Exp. & Lin. Functions Graphs of Exponential Functions	p. 119: 2, 6, 9, 11, 12, 19, 22, 34 p. 127: 5-8, 10, 15, 19, 38, 43
14	10/4	3.4 3.5	Continuous Growth & $e$ Compound Interest	p. 133: 1, 5, 6, 19, 20 p. 139: 1, 2, 5, 6, 8, 17-20
15	10/9	4.1	Logarithms and their Properties	p. 157: 1-14, 19, 20, 26-29, 34-39
16	10/11	4.2	Logarithms and Exponential Models	p. 164: 10, 11, 13, 14, 22, 26, 31, 36, 38, 41, 45, 50
17	10/16	4.3	The Logarithmic Function	p. 173: 1-6, 19, 20, 22-25, 28-31
18	10/18	<b>Test 2</b>		
19	10/23	5.1	Vertical and Horizontal Shifts	p. 200: 6, 8, 12, 15, 18, 21, 22, 25, 26, 34, 37
20	10/25	5.2	Reflections and Symmetry	p. 209: 7, 8, 10-13, 17, 20-24, 27, 29, 30, 32
21	10/30	5.3	Vertical Stretches & Compressions	p. 216: 6, 9, 10, 15, 16, 17, 26
22	11/1	5.4	Horiz. Stretches & Compressions	p. 223: 3, 6, 7, 10, 18, 20, 21
23	11/6	5.5	Family of Quadratic Functions	p. 231: 12, 13, 14, 26, 27, 30, 32
24	11/8	8.1 8.2	Composition of Functions Inverse Functions	p. 359: 1, 2, 8, 12, 23, 24, 31, 56, 57 p. 370: 1, 5-8, 15, 20, 22, 40, 41
25	11/13	8.3	Combinations of Functions	p. 379: 1-3, 7-9, 26, 29
26	11/15	<b>Test 3</b>		
27	11/20	Ch. 6	Trigonometric Functions	
28	11/27	9.1	Power Functions	p. 393: 7-10, 12, 26, 27, 31, 32
29	11/29	<b>NCTM Conference - Houston</b>		
30	12/4	9.2 9.3	Polynomial Functions: Long-Term and Short-Term Behavior	p. 400: 1-8, 12, 13, 19, 20, 27 p. 406: 1, 4, 10, 15, 23, 24, 29, 30, 49
31	12/6	9.4 9.5	Rational Functions: Long-Term and Short-Term Behavior	p. 413: 1-6, 12, 15 p. 420: 1-8, 17-21
32	12/13	<b>Final Exam – Thursday, 11:00-1:00</b>		