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# MATH 2330

## FUNCTIONS & MODELING

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**COURSE PREREQUISITES:** Prerequisite: C or better in MATH 2425; C or better in SCIE 1101 or SCIE 1234 or concurrent enrollment.

**COURSE DESCRIPTION:** Students engage in explorations and lab activities designed to strengthen and expand their knowledge of the topics found in secondary mathematics. Students collect data and explore a variety of situations that can be modeled using linear, exponential, polynomial, and trigonometric functions. Activities are designed to have them take a second, deeper look at topics they should have been exposed to previously; illuminate the connections between secondary and college mathematics; illustrate good, as opposed to typically poor, sometimes counterproductive, uses of technology in teaching; illuminate the connections between various areas of mathematics; and engage them in serious (i.e., non-routine) problem solving, problem-based learning, and applications of mathematics. While there is some discussion of how the content relates to secondary mathematics instruction, the course primarily emphasizes mathematics content knowledge and content connections, as well as applications of the mathematics topics covered. This course is part of the UTeach program.

**COURSE OBJECTIVES:** In revisiting secondary mathematics, prospective mathematics teachers are expected to:

- Deepen and broaden function-related mathematical content knowledge from school algebra to calculus by exploring relevant topics in an inquiry-based learning situation.
- Make connections between college mathematics and secondary school mathematics.
- Build preliminary knowledge of professional and state mathematics curriculum standards.
- Use reflective and collaborative learning and develop a stronger sense of professionalism and leadership.
- Create efficient seekers of content knowledge.
- Explore and learn appropriate use of technology in the mathematics classroom.

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**FALL 2018**

T/TH 2:00-3:20 in PKH 309

Instructor: **Dr. J. Álvarez**

E-Mail: james.alvarez@uta.edu

Phones: 817-272-5047 (office)

817-272-3261 (math dept)

Office: PKH 404

Office Hours: M 2-3, T 3:30-4:30 & by appt.

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Website: <http://www.uta.edu/faculty/alvarezja>

Blackboard: <https://elearn.uta.edu>

Faculty Profile:

<http://www.uta.edu/profiles/james-epperson>

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**TEXTBOOK (Optional):**

*Functions in Mathematics: Introductory Explorations for Secondary School Teachers*

M. Daniels & E. Armendariz

(ISBN-13: 978-1609271688)

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**MATERIALS:**

- TI-84+ Calculator
- Binder(s) and paper for keeping class handouts and work.
- Optional: Grid Paper and Colored Pencils

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GRADES	
Exam I	25%
Exam II	15%
Final Exam	15%
Homework & Labs	20%
Midterm Project	10%
Journal and Portfolio	10%
Attendance/Engagement and Contribution	5%
Total	100%

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## ELECTRONIC COMMUNICATION STATEMENT:

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**CLASS FORMAT:** I will conduct the course in a seminar-style format with few lectures. I will normally act as a “moderator” while you (the students) present exercises and justifications to one another. I will answer appropriate questions and steer discussions into productive channels.

You will engage in explorations and lab activities designed to strengthen and expand your knowledge of topics grounded in secondary school mathematics. You will collect data and explore a variety of situations that can be modeled using linear, exponential, polynomial, and trigonometric functions. The activities are designed to take a second, deeper look at topics studied previously; illuminate the connections between secondary and college mathematics; illustrate good, as opposed to typically poor, sometimes counterproductive, uses of technology in teaching; illuminate the connections between various areas of mathematics; and engage you in non-routine problem solving, problem-based learning, and applications of mathematics. While there is some discussion of how the content relates to secondary mathematics instruction, the course primarily emphasizes mathematics content knowledge and connections, as well as applications of the mathematics topics covered.

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## DETAILS ABOUT THE COURSE

Grades will be assigned using the following scheme (approximate):	90-100	A
	80-89	B
	70-79	C
	60-69	D
	59 or Below	F

**LATE WORK:** In general, late work will not be accepted. One half of the assigned points will be deducted for work that is submitted after the due date if there is a legitimate and documentable excuse.

**ATTENDANCE:** At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance.

Since the majority of this work relies upon group work done during class time, regular attendance is critical. You are expected to be in class, on time, each day. Students missing class for a University Event, religious reason, or other ‘pre-scheduled’ reason must contact the instructor prior to the event and discuss reasonable accommodations. Everyone begins with 100 attendance points. Three points will be *deducted* for each absence. If you contact the instructor prior to the beginning of class (and receive confirmation of receipt of message), only one point will be deducted for that day’s absence. One point will be *deducted* for each tardy after the first. If you leave class early, or choose not to participate, points will be *deducted* accordingly.

**If at any time you have questions, please do not hesitate to ask.**

However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients “begin attendance in a course.” UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

**HELP OUTSIDE OF CLASS:** My office hours are listed on the first page of this syllabus. These are times when I will be available, in my office, to discuss the material/homework/tests. No appointment is necessary for those times. If, however, those times are inconvenient for you, then please make an appointment with me for another time (e.g., e-mail me stating the times you prefer). Please use the subject heading “**MATH 2330 Student Question**” when sending an e-mail and identify yourself (full name) in the communication.

**Personal Technology Use:** Cellular phones should either be switched off or set to silent mode during all class meetings. Cellular phone use will not be permitted during class; however, at times with permission, cell phones may be used for applications such as a cell-phone-based graphing calculator or online mathematics technology tool. If you must take an important phone call, please leave the classroom. Cellular phone use is prohibited during exams (this means you may not use your phone as a calculator!!). If you have a watch, or other device, that beeps please turn this off during class meetings as it is disruptive for other students. **As class time for this course focuses on interpersonal interactions, students must request permission to use a laptop or tablet during class. This permission may be revoked should the student choose to use the device inappropriately.**

**Tests/Labs/Homework:** There will be frequent homework assignments, labs, and exams to test your knowledge of the concepts covered in class. Tests and labs will be in class; homework is to be completed outside of class time.

- We will work on explorations in class almost every class meeting. You are expected to write up the explorations we work in class by the next class meeting. In general, I will not grade these explorations, but I will call students to the board to present work or provide explanations based upon these. Thus, failure to come to class with your write-ups will result in my lowering your participation grade by three points. I may determine preparedness by collecting all explorations on a particular day and checking for completion or by observing preparedness based upon your presentations.
- You will be expected to keep a journal and a portfolio of the explorations from class for each unit. Your portfolio will also include “Homework Prep-work” assignments that accompany some of the lessons in class. These “Homework Prep-work” assignments are submitted via Blackboard and then submitted in hard-copy form with your portfolio. Each missing or late Blackboard submission (on Prep-work assignments) will result in a 2% reduction of your portfolio grade and a 3% reduction in your class participation grade. Journal entries will be typically assigned at the end of each class and due via BlackBoard (submitting a pdf scan of your handwritten work is fine) before the next class meeting. Each missing or late journal entry in Blackboard will result in a 2% reduction of your portfolio grade. The hard copies of journal entries will then be compiled by you as part of your portfolio. The portfolio will consist of your written work on the explorations and occasional summaries of assigned readings or reflections on the class explorations. Each portfolio will be graded on a holistic grading rubric.
- There will be no make-up exams or make-up labs. For extenuating circumstances with documented evidence, options other than receiving a zero for the missed exam or lab will be considered.

## Course Schedule<sup>1</sup>:

Day		Date	Topic or Activity
1		23-Aug	First-day handouts; Lesson 1: Solving Problems
2		28-Aug	Lesson 1: Solving Problems (continued). <b>Homework (Prep-work):</b> Conic Sections Prep Work (submit via Blackboard by 2pm Aug 30 <sup>th</sup> ) and bring hard copy to class on Aug 30 <sup>th</sup> .
3		30-Aug	Lesson 2: Conic Sections
4		4-Sep	Lesson 3: Qualitative Look at Graphical Representations
5		6-Sep	Lesson 3: Qualitative Look at Graphical Representation (continued)
		7-Sep	CENSUS DATE
6		11-Sep	Lesson 4: Examples of real world relationships between quantities Lesson 5: What is a function?; <b>Homework 1</b>
7		13-Sep	Lesson 5: What is a function? (continued)
8		18-Sep	Lesson 5: What is a function? (continued)
9		20-Sep	Lesson 6: Functions and Equations <b>Homework (Prep-work):</b> Lesson 6: 6.4a-6.4e (submit via Blackboard by 2 p.m. Sep 25 <sup>th</sup> ) and bring hard copy to class on Sep 25 <sup>th</sup> .
10		25-Sep	Lesson 6: Functions and Equations (continued) <b>Homework (Prep-work):</b> Lesson 7 Prep Work (submit via Blackboard by 2 p.m. on Sep 27 <sup>th</sup> ) and bring hard copy to class on Sep 27 <sup>th</sup> .
11		27-Sep	Lesson 7: A Familiar Function from a Different Point of View Homework: Lesson 8 Prep Work (submit via Blackboard by 2 p.m. on Oct 2 <sup>nd</sup> ) and bring a hard copy to class on Oct 2 <sup>nd</sup> . <b>Homework 1 DUE</b>
12		2-Oct	Lesson 8: Spring Mass Lab <b>Homework (Prep-work):</b> Lesson 9 Prep Work (submit via Blackboard by 2 p.m. on Oct 4 <sup>th</sup> ) and bring a hard copy to class on Oct 4 <sup>th</sup> .
13		4-Oct	Lesson 9: Sequences and Triangular Differences; <b>Homework 2</b>
14		9-Oct	Lesson 9: Sequences and Triangular Differences (continued) Lesson 10: Functions Arising from Patterns
15		11-Oct	Lesson 10: Functions Arising from Patterns (continued) <b>Homework (Prep-work):</b> Lesson 11 Prep Work (submit via Blackboard by 2 p.m. on Oct 16 <sup>th</sup> ) and bring a hard copy to class on Oct 16 <sup>th</sup> . <i>Midterm Assignment posted (due Nov 15<sup>th</sup>)</i>
16		16-Oct	Lesson 11: Indistinguishable Function Transformations and Function Patterns; <b>Homework 2 DUE</b>
17		18-Oct	Using Statistical Regression to fit a function to bivariate data
18		23-Oct	<b>EXAM 1; Portfolio on Unit 1 DUE</b>
19		25-Oct	Residual plots and application; <b>Homework 3.</b>
		29-Oct	Last Day to Drop Classes - by 4 p.m.
20		30-Oct	Terminal Speed Lab
21		1-Nov	Modeling Functions from Data: Data with Matrices; <b>Homework 3 DUE</b>

<sup>1</sup> As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled. – Dr. James A. M. Álvarez

22		6-Nov	Roller Coaster Exploration
23	UNIT 3 Exploring Functions in Other Systems	8-Nov	Parametric models;
24		13-Nov	<b>EXAM 2; Portfolio on Unit 2 DUE</b>
25		15-Nov	Parametric Exploration Problems; <b>Midterm Project DUE (via Blackboard)</b>
26		20-Nov	The Golf Shot - An Exploration; <b>Homework 4</b>
27		27-Nov	Vector Lab
28		29-Nov	A Non-Standard Exploration of the Polar Coordinate System <b>Homework (Prep-work):</b> Geometry of Complex Numbers
29		4-Dec	Geometry of Complex Numbers; Complex Numbers in Polar Form and Euler Numbers; <b>Homework 4 DUE</b>
30		6-Dec	<b>FINAL EXAM 2:00-4:30 p.m.; Portfolio on Unit 3 DUE</b>

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Disability Accommodations:** UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a **letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** [www.uta.edu/disability](http://www.uta.edu/disability) or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability).

Student responsibility primarily rests with informing faculty **at the beginning of the semester and in providing authorized documentation through designated administrative channels.**

If you require an accommodation based on disability, I would like to meet with you in the privacy of my office, during the first week of the semester, to make sure you are appropriately accommodated.

**Counseling and Psychological Services (CAPS)** [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Non-Discrimination Policy:** The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit [uta.edu/eos](http://uta.edu/eos).

**Title IX Policy:** The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX) or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or [titleix@uta.edu](mailto:titleix@uta.edu).*

**Academic Integrity:** Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>. Faculty are encouraged to discuss plagiarism and share the following library tutorials <http://libguides.uta.edu/copyright/plagiarism> and <http://library.uta.edu/plagiarism/>

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#), [major-based learning centers](#), developmental education, [advising and mentoring](#), personal counseling, and [federally funded programs](#). For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

**University Tutorial & Supplemental Instruction (Ransom Hall 205):** UTSI offers a variety of academic support services for undergraduate students, including: 60 minute one-on-one tutoring sessions, Start Strong Freshman tutoring program, and Supplemental Instruction. Office hours are Monday-Friday 8:00am-5:00pm. For more information visit [www.uta.edu/utsi](http://www.uta.edu/utsi) or call 817-272-2617.

**The IDEAS Center (2nd Floor of Central Library)** offers FREE tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at [www.uta.edu/IDEAS](http://www.uta.edu/IDEAS), or call (817) 272-6593.

**Campus Carry:** Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the

University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>.

**Student Feedback Survey:** At the end of each term, students enrolled in face-to-face and online classes categorized as “lecture,” “seminar,” or “laboratory” are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback via the SFS database is aggregated with that of other students enrolled in the course. Students’ anonymity will be protected to the extent that the law allows. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit which is located at the end of the hall as we exit the classroom and turn left. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

**Important Dates:**

<b>First Day of Classes</b>	22 August
<b>Labor Day Holiday</b>	03 September
<b>Census Date</b>	07 September
<b>Drop Date</b>	29 October, by 4 p.m.
<b>Thanksgiving Holiday</b>	22 -23 November
<b>Last Day of Classes</b>	04 December
<b>Final Exam</b>	06 December, 2:00-4:30