Teaching Portfolio

Ashley Watts

Subject: Mathematics

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Resume

Ashley E. Watts

EDUCATION

University of Florida, Department of Mathematics, *Gainesville, Florida* **GPA**: 4.00/4.00
Master of Arts in Teaching Mathematics **July 2020**

University of Florida, Department of Mathematics, *Gainesville, Florida* **GPA**: 3.74/4.00
Bachelor of Science in Mathematics; Minor: Business Administration **May 2018**

Northwest Florida State College, *Niceville, Florida* **GPA**: 3.86/4.00
Associate of Arts in Mathematics **May 2015**

TEACHING EXPERIENCE

Instructor of Record, College Algebra, *University of Florida Promise Program* **Summer 2019-Present**

- Instructor for students in the UF Promise Program, a program designed for low performing, remedial, and/or first generation college students
- Designed course calendar, syllabus, and lecture notes
- Implemented a grading scale according to mastery-based learning
- Organized and presented daily lectures and held weekly office hours to enhance student learning
- Administered and proctored exams and lab activities, graded all assignments and exams
- Overall evaluation of instructor: 5.00/5.00 [15 evaluations]

Teaching Assistant, *University of Florida* **Fall 2018-Present**

- Taught 3 sections of Precalculus Algebra with Trigonometry (Fall 2018), 2 sections of Calculus 1 (Spring 2019), and online segment of Precalculus Algebra with Trigonometry (Fall 2019)
- Held weekly discussion classes to review homework exercises and further explain concepts learned in lecture
- Created and administered weekly quizzes to assess student knowledge
- Proctored exams and quizzes, graded weekly quizzes and free response exam questions
- Collaborated with course coordinator to design discussion classes that aligned with lecture material and expectations

LEADERSHIP AND INVOLVEMENT

Missions Team Assistant, *Projects for Haiti* **February 2016-May 2017**

- Participate in weekly missions meetings to send a team of 60 students to Cap-Haitian, Haiti
- Enhanced procedures by implementing a Google document to manage tax deductible letters to donors
- Traveled to Cap-Haitian, Haiti in February 2016 to promote sustainable development and teach Vacation Bible School at a local church

Camp Counselor, *Camp Crestridge for Girls* **June 2016-July2016**
Ridgecrest, North Carolina

- Provided supervision, direction, and leadership in a cabin of ten high school aged girls while serving as a role model in all areas of daily living
- Designed and executed daily schedule and activities while guiding campers in their personal growth
- Communicated with parents in regards to camper experience and well being

Friends of Children Everywhere Volunteer, *Casa Bernabe Orphanage* **June 2014, July 2015**
Carretera El Salvador Fraijanes, Guatemala

- Instructed mathematics lessons to a 4th grade class at the local elementary school and successfully communicated with the students despite language barriers
- Tutored a 3rd grade student in mathematics and evaluated his growth over a one week period

TECHNICAL SKILLS

- Programming languages and mathematical packages: Matlab, LaTeX, Desmos, GeoGebra

Teaching Philosophy

Learning in mathematics happens through discovery, inquiry, and reflection. I favor the use of discovery-based learning to actively engage students and improve the development of their mathematical knowledge. Through discovery learning, students not only become more engaged in the learning process, they also learn more effectively because they discovered the ideas on their own. Assessments in discovery learning provide students with an additional learning opportunity while also treating mistakes as part of the learning environment. By making discoveries on their own, students develop "soft skills" such as metacognition, critical thinking, communication, and teamwork. Developing these soft skills in students equips them for success in life outside the classroom, such as in the workforce.

How I Implement Discovery Learning: ACE Teaching

I implement instructional practices that promote discovery learning through the ACE Teaching Cycle, which consists of **A**ctivities, **C**lassroom Discussion, and **E**xercises. The ACE Teaching Cycle begins with a hands-off activity that allows students to arrive at their own conclusions and engage with others, with the intention of sparking curiosity. Through the activities, students work together to discover and build concepts toward the mathematical norm. After completing the activity, we move into a classroom discussion, which formalizes and consolidates the concepts students discovered through the activity. During class discussions, I ask questions and rely on student participation, rather than traditional lecture classrooms. Consequently, students are in charge of their own learning process and develop a more concrete mathematical knowledge. After arriving at conclusions through the activities and class discussions, students then complete homework exercises and supplemental practice. The exercises serve the purpose of reinforcing the concepts that were developed during class discussion.

For example, while teaching College Algebra, I designed an activity on Real and Complex Numbers that aligned with ACE teaching and ultimately promoted discovery learning. The activity was formatted to have students categorize a carefully chosen set of numbers and come to the realization that numbers can be grouped based on unique properties. In the exact order they were given, the numbers I asked my students to categorize are as follows:

$$-\frac{8}{2}, \frac{8}{2}, \frac{0}{5}, \frac{5}{0}, \sqrt{4}, \sqrt{-4}, \frac{4}{16}, \frac{2}{4}, \pi, 1.24, \sqrt{3}, -\sqrt{3}, \frac{2}{\pi}, \frac{\pi}{2}$$

I chose the numbers to not be simplified so that students would first simplify before grouping them into categories. I additionally chose the numbers to be listed in a specific order. For instance, $\frac{0}{5}$ and $\frac{5}{0}$ are right next to each other with the hopes that students wouldn't just identify them as reciprocals, but to look deeper and discover that, in the Real Numbers, one can be simplified and that the other cannot. By completing the activity, students themselves established what the unique properties of Real and Complex Numbers may be, and thus acquired the foundation needed to participate in the classroom discussion. The discussion then focused on formalizing the distinct properties of Real and Complex Numbers, which prepared them for their homework exercises. For instance, one student grouped the rational numbers and defined this group as "fractions." During discussion, I was able to guide student thinking

and formalize their definition of “fraction.” After formalizing their concepts during class discussion, students were able to go home and complete their homework. Their homework exercises primarily consisted of categorizing numbers according to the formalized definitions learned in class.

Additional Learning Opportunities Through Discovery Learning:

Discovery learning through the ACE Teaching Cycle serves as a means of informal assessment because it primarily provides learning opportunities for students. All three stages of the ACE Teaching Cycle can be used as an informal assessment opportunity through which students expand their mathematical knowledge while also providing me with an insight of student thinking. Assessments in discovery learning through the ACE Teaching Cycle enable students to experience productive failure. During class discussions, students are encouraged to share their conclusions discovered from the activity, whether they are “right” or “wrong.” If students arrive at a misconception, I am able to correct their thought process and probe them to understand why they were wrong. In this way, “failure” provides students with an additional opportunity to learn from their mistakes and enhance their mathematical understanding. While completing the homework exercises, students are allowed an unlimited number of attempts to answer a question, until they arrive at the correct solution. This allows students to realize they are doing something wrong and provides an opportunity to learn from and correct their mistakes. Thus, the homework exercises turn into a learning opportunity through productive failure while also reinforcing the concepts learned during class.

Skills Developed Through Discovery Learning:

Discovery learning in my classroom instills social and metacognitive skills in my students. Metacognitive skills developed through discovery learning include critical thinking and productive argumentation. Discovery learning forces students to reflect on what they know and what they don’t know, and hence requires metacognitive skills. Discovering concepts using prior knowledge requires students to actively participate in the cognitive process of recollection, which will help alleviate common “learn then forget” tendencies. In a traditional classroom setting, students are told what they should know and how to arrive at certain conclusions, but are not given the opportunity to come to this realization on their own. Critical thinking is developed when students reflect on their past knowledge, organize their cognitive processes, and recognize patterns. Through discovery learning, students further develop critical thinking skills when they connect their prior knowledge to new problems so that they can construct possible conclusions on their own. By making this connection, students are able to participate during class discussions using productive argumentation. That is, students use the connections they make between their prior knowledge and new problems to back up their claims. Developing these soft skills in students prepares them for struggles they may face in their future classrooms, workforce, or even personal life. Thus, metacognitive skills students develop from discovery learning are useful for career advancement and social interactions.

On the other hand, social skills developed through discovery learning include teamwork and communication. By using their metacognitive skills, students are able to communicate

misunderstandings to their peers and exchange ideas, thus fostering an efficient classroom environment. Through this process, students are collaborating to explore ideas and possible solutions in an effort to draw mathematically sound conclusions with an independent mind.

Conclusion:

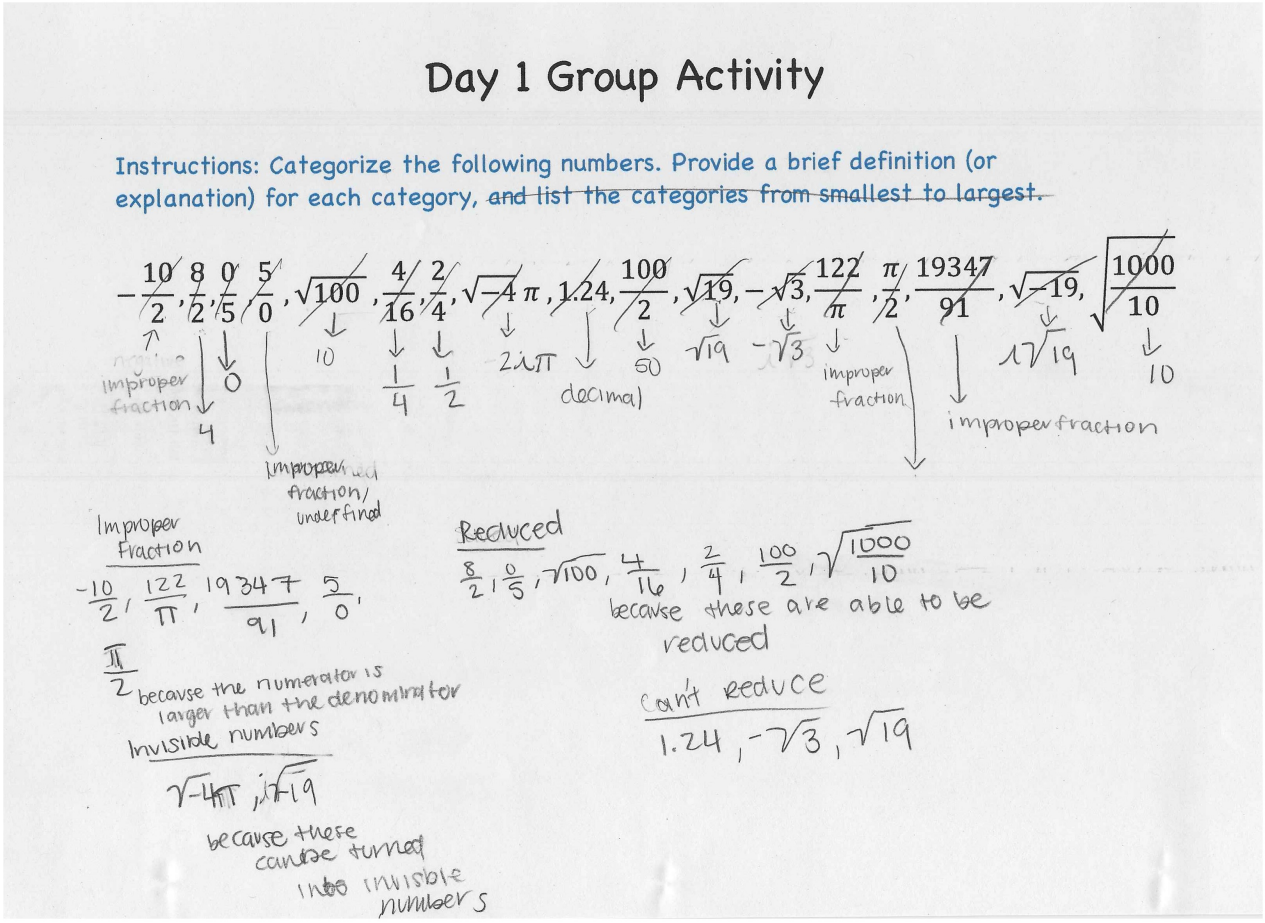
My teaching philosophy centers around engaging students and helping them reflect through discovery learning. I promote discovery learning in my classroom through the ACE teaching cycle, which allows students to become actively engaged in the learning process. Assessments in discovery learning provide students with an additional learning opportunity and encourage productive failure. In addition to productive failure, teaching through discovery learning develops metacognitive and social skills in my students. It is my belief that discovering learning creates an atmosphere that both challenges and engages students, enhancing the overall classroom environment.

ACE Teaching Activity

As discussed in my teaching philosophy, I favor the use of discovery-based learning through ACE Teaching. I implemented the following activity on Real and Complex Numbers, where I had students categorize a carefully chosen set of numbers. The activity was given before our classroom discussion. My goal was to have students come to the realization that numbers can be grouped based on unique properties and to discover what these properties may be. I chose some of the numbers to not be in simplest form, with the hopes that students would first reduce these numbers. I additionally chose the numbers in a specific order. For instance, $\frac{5}{0}$ and $\frac{0}{5}$ are listed next to each other so that students would compare the fractions and realize that $\frac{0}{5}$ reduces to 0, while $\frac{5}{0}$ cannot be reduced in the Real and Complex Numbers.

Reflection

After completing the activity, students began to construct the concept of categorizing Real and Complex Numbers based on different properties. The classroom discussion that followed focused on formalizing the specific properties of each subgroup. I noticed that my students were more involved in the classroom discussion because they already constructed much of the knowledge needed to participate. For instance, many categorized the fractions, which we then were able to formalize as "rational numbers."



This particular group of students first simplified the numbers, as I hoped they would. They additionally listed $\frac{5}{0}$ as being undefined. They then categorized the numbers into four main categories: improper fractions, reduced numbers, numbers that could not be reduced, and invisible numbers. During discussion we then were able to formalize these groups. For example, during discussion we talked about how their category of "invisible numbers" are formalized as Complex Numbers, specifically Pure Imaginary. This lead into discussing what distinguishes each subgroup of Real and Complex Numbers. During discussion, we also talked about how these subgroups can be listed from "smallest to largest," which this group did not do in their activity.

Sample Quiz

I gave the following quiz to my Precalculus Algebra with Trigonometry discussion class during Fall 2018. The purpose of the quiz was to assess student understanding of properties, such as period and vertical asymptotes, of the graph of tangent functions. The quiz additionally assessed student understanding of inverse trigonometric functions. The quiz reinforced the concepts that students learned during lectures that week and gave me insight to their depth of understanding.
At the beginning of each week, the course coordinator of Precalculus emailed me to let me know which topics to include on the quiz. I then created quizzes based on these topics that resembled homework questions.

Reflection

From the following quiz, I was able to see that this student understood properties of the graph of the tangent function. However, the student did not fully understand inverse trigonometric functions. In question 2, this student wrote things such as $\sin^{-1}\theta = \csc\theta$, which signified that they did not fully grasp the concept. I then was able to see where this particular student needed help so I could further reinforce the concepts learned in class.

Student does not fully understand inverse Sine functions.

MAC1147 Section 3097
QUIZ 9
11/15/2018

Student drew a good visual and got back on the right track, but ultimately did not answer the question correctly.

Name: _____

1. Find the period and 2 vertical asymptotes for $y = \frac{1}{4}\tan(x + \frac{\pi}{4})$.

Period = $\frac{\pi}{b}$, $b = 1$

$x + \frac{\pi}{4} = \frac{\pi}{2}$, $x = \frac{2\pi}{4} - \frac{\pi}{4}$, $x = \frac{\pi}{4}$

$x + \frac{\pi}{4} = -\frac{\pi}{2}$, $x = -\frac{2\pi}{4} - \frac{\pi}{4}$, $x = -\frac{3\pi}{4}$

Period = π
V.A = $\frac{\pi}{4}$, $-\frac{3\pi}{4}$

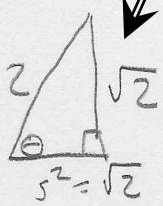
2. Find the exact value of $\arcsin\frac{\sqrt{2}}{2}$

$\sin^{-1}\frac{\sqrt{2}}{2}$

$\sin^{-1} = \csc$

$\sin\theta = \frac{\sqrt{2}}{2} = \frac{opp}{hyp}$

$\csc = \frac{hyp}{opp} = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$



$s^2 = \sqrt{2}$

$4 = 2 + s^2$
$2 = s^2$
$\sqrt{2} = s$

11/4 -2

$\arcsin\frac{\sqrt{2}}{2} = \frac{2}{\sqrt{2}}$ or $\frac{2\sqrt{2}}{2}$

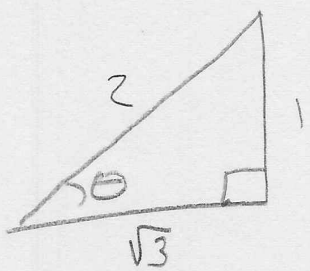
3. Find the exact value of $\csc\left(\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$

$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \theta$

$\frac{Adj}{hyp} = \cos\theta = \frac{\sqrt{3}}{2}$

$\csc = \frac{1}{\sin}$

$\sin = \frac{opp}{hyp} = \frac{1}{2}$



$4 = 3 + s^2$
$1 = s^2$
$1 = s$

Sample Calendar

I created the following calendar for my College Algebra class. The calendar provided my students with an idea of what topics we would cover each day in addition to the dates of exams and due dates for assignments. Since the course was mastery-based, I created the calendar with a goal of 5 exams. That way, students who needed to retake exams they did not "master" still had an opportunity to excel in the course. After deciding on 5 exams, I was able to determine roughly what lessons I would teach each day, depending on the depth and complexity of the concept. After each module, I designed group activities that served as a review and provided students with the opportunity to teach their peers.

Hurricane Dorian

My teaching experience at UF has taught me that lessons do not always go as planned, and a calendar is not something that needs to be obsessively followed. Some lessons take less time than expected while others require more time. Teaching requires the ability to adapt to these unexpected events. Because my students were quickly understanding concepts, I was about one day ahead of my calendar before Hurricane Dorian. The University cancelled classes on Tuesday, September 3 and Wednesday, September 4. Since I was already one day ahead, I only needed to compensate for one missed class. Instead of doing a group activity on Monday, September 9, I wrapped up module 3 and included the group activity in the review on Tuesday, September 10. Because my students were showing full understanding, I was able to keep the original exam date in place.

MAC 1105 Promise Calendar for Fall 2019

Exam 1 (M1-M3) September 11, Wednesday Exam 2 (3 Modules) October 2, Wednesday Exam 3 (3 Modules) November 6, Wednesday Exam 4 (3 Modules) November 20, Wednesday Exam 5 (3 Modules) December 11, Wednesday 12:30pm	November 25 - last day to drop/withdraw. Final grades are available on one.uf.edu on December 18

Monday	Tuesday	Wednesday	Thursday	Friday
19-Aug	20-Aug **Intro**	21-Aug **M 1.1**	22-Aug	23-Aug **M 1.2-1.3**
26-Aug **M 1.4**	27-Aug **M1 Activity**	28-Aug **M 2.1-2.2**	29-Aug	30-Aug **M 2.3-2.4**
2-Sep **No Class** **Labor Day**	3-Sep **M2 Activity**	4-Sep **M 3.1-3.2**	5-Sep	6-Sep **M 3.3-3.4**
9-Sep **M3 Activity**	10-Sep **Review** **Assignment 1 Due**	11-Sep **Exam 1**	12-Sep	13-Sep **M 4.1-4.2**
16-Sep **M 4.3**	17-Sep **M 4.4**	18-Sep **M4 Activty**	19-Sep	20-Sep **M 5.1-5.2** **Exam Revision 1 Due**
23-Sep **M 5.3-5.4**	24-Sep **M5 Activity**	25-Sep **M 6.1**	26-Sep	27-Sep **M 6.2-6.3**
30-Sep **M6 Activity**	1-Oct **Review** **Assignment 2 Due**	2-Oct **Exam 2**	3-Oct	4-Oct **No class** **Homecoming parade**
7-Oct **M 7.1**	8-Oct **M 7.2**	9-Oct **M 7.3**	10-Oct	11-Oct **M 7.3** **Exam Revision 2 Due**
14-Oct **M7 Activity**	15-Oct **M 8.1-8.2**	16-Oct **M 8.3**	17-Oct	18-Oct **M 8.4**
21-Oct **M8 Activity**	22-Oct **Review M1, M3**	23-Oct **Review M2, M4**	24-Oct	25-Oct **Review M5, M6, M7**
28-Oct **M 9.1**	29-Oct **M 9.2**	30-Oct **M 9.3**	31-Oct	1-Nov **M 9.4**
4-Nov **M9 Activity**	5-Nov **Review** **Assignment 3 Due**	6-Nov **Exam 3**	7-Nov	8-Nov **No class** **Veterans Day Saturday**
11-Nov **M 10.1**	12-Nov **M 10.2**	13-Nov **M 10.3**	14-Nov	15-Nov **M 10 Activity** **Exam Revision 3 Due**
18-Nov **Review**	19-Nov **Review** **Assignment 4 Due**	20-Nov **Exam 4**	21-Nov	22-Nov **Group Reviews**
25-Nov **No class** **Last day drop/withdraw**	26-Nov **No class**	27-Nov **No class**	28-Nov **No class - Thanksgiving**	29-Nov **No class**
2-Dec **Group Reviews**	3-Dec **Group Reviews**	4-Dec **Group Reviews** **Exam Revision 4 Due**	5-Dec **No class** **Reading Day**	6-Dec **No class** **Reading Day**

Exam 5 - December 11, Wednesday 12:30 pm

Sample Syllabus

In the Spring of 2020, I will be the Instructor of Record for Trigonometry. I designed the following syllabus for Trigonometry, which I will utilize in the Spring. The syllabus provides students with an overview of course policies, assignments, and grading. As you can see in the syllabus, grades in the course will come from homework assignments, quizzes, midterm exams, and exam revisions. Since everyone has a bad day now and then, I allow two quizzes to be dropped and one exam to be dropped. After reading the syllabus, my students should understand what will be expected of them throughout the semester.

MAC1114 Trigonometry Spring 2020

Instructor: Ashley Watts
Office: LIT 403
Email: ashleyewatts@ufl.edu
Office Hours: TR 3rd Period (9:35am-10:25am)
Meeting Time and Location:
Section 2691: TR 2nd Period (8:30am-9:20am), LIT 205
Section3019: TR 5th Period (11:45am-12:35pm), MAT 012

Course Description
This course is the sequel to MAC1140 Precalculus Algebra and serves as an introduction to Trigonometry. In this course, we will cover Chapters 4 and 5 in Larson's textbook. Topics will include a basic introduction to trigonometric functions, graphing trigonometric functions, inverse trigonometric function, and analytic trigonometry. A detailed description of the course content goals and objectives can be found on Canvas.

Textbook
The required text for this course is:
Larson, Ron. Precalculus. Cengage Learning. 7th edition (2007). ISBN: 978-0618643448
Throughout the semester, I will assign homework from the textbook. You only need a copy (digital or physical) of the textbook, YOU DO NOT NEED TO PURCHASE AN ACCESS CODE. The homework will prepare you for quizzes and exams.

Homework
Periodically throughout the semester I will assign homework that will serve as additional practice on lecture material. Homework sets will be collected the class period before each exam and a few problems will be selected to be graded.

Quizzes
There will be 12 in-class quizzes throughout the semester with 1-3 questions each. The quizzes will generally be scheduled every Thursday (sometimes Tuesday and Thursday) and will further review material covered in class that week. The quizzes will closely resemble homework questions, so it is imperative that you keep up with homework. At the beginning of every week I will send an email letting you know what material you will be accountable for on the quiz. *The two lowest quiz scores will be dropped.*

Exams
There will be 4 exams throughout the semester. *The lowest exam score will be dropped and there will be no cumulative final exam.* The dates of exams and other important dates can be found in the course calendar.

Exam Reflections
After each exam you will have the opportunity to reflect on your mistakes and turn in revisions for credit. Exam reflections are required, worth 2% each, and are graded on completion. Due dates for each reflection can be found in the course calendar.

Lectures

Lecture note shells can be found on the Canvas page. At the end of each week, I will post the filled in notes. If you want to succeed in this course, it is crucial that you show up to class and take notes. The lectures will prepare you for the homework assignments and quizzes.

Attendance, Late, and/or Missed Work Policies

The University attendance policy is as follows: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Attendance is required for this course:

- 0-3 unexcused absences 10%
- 4-6 unexcused absences 5%
- More than 6 unexcused absences 0%

I will not accept late homework. An excused absence will allow you to make up exams within one week. Use the following link to send verified documentation for an excused absence: https://care.dso.ufl.edu/instructor-notifications/

Grading

The breakdown of the course grade is as follows (please note that I do round to the one's place, for example an 89.1% would be an 89% and thus would count as an A-):

- Attendance: 10%
- Homework (4 sets @ 5% each): 20%
- Quizzes (highest 10 @ 1% each): 10%
- Exams (3 @ 18% each): 54%
- Exam Reflections (3 @ 2% each): 6%

Students must earn a grade of C or higher in courses taken to fulfill the University's math requirement. The UF grades and grading policy can be found here: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Grade	Percentage
A	90%-100%
A-	87%-89%
B+	83%-86%
B	80%-82%
B-	77%-79%
C+	74%-76%
C	70%-73%
C-	67%-69%
D+	64%-66%
D	60%-63%
D-	57%-59%
E	0%-56%

Canvas

You can access Canvas by going to https://ufl.instructure.com/ and then using your Gatorlink username and password to login. I will post updates, filled in lecture notes, practice exams, homework assignments, and more to the Canvas page.

Students with Disabilities

1. Register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation.

2. Email ashleyewatts@ufl.edu your accommodation letter, along with any additional information.
3. Register for the exams through the DRC (if you get extended time) to ensure testing accommodations are met.

This should be done as early as possible in the semester. However, you can submit your accommodation letter to the instructor at any point in the semester.

Academic Honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://catalog.ufl.edu/ugrad/1617/advising/info/student-honor-code.aspx) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.

Campus Resources

U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
Sexual Assault Recovery Services (SARS): Student Health Care Center, 392-1161.
University Police Department: 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/

Extra Help

Teaching Center Math Lab: Located at SE Broward Hall (and LIT 215). Offers free, informal tutoring: https://teachingcenter.ufl.edu/tutoring/
Private Tutors: A list of qualified private tutors for hire is available here: https://math.ufl.edu/files/tutorlistSummerBC19.pdf

Online Course Evaluation:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/.

Detailed Course Description
This course is designed as the sequel to MAC1140 Precalculus Algebra and serves as a comprehensive introduction to Trigonometry. After taking this course, students will understand the fundamentals of trigonometry and analytic trigonometry. This course will cover:

- Radian and degree measure
- The unit circle
- Right triangle trigonometry
- Trigonometric functions of any angle
- Graphs of trigonometric function
- Inverse trigonometric functions
- Using and verifying trigonometric identities
- Solving trigonometric equations
- Sum and difference formulas
- Multiple-angle formulas
- Product-to-sum formulas

This course is the sequel to MAC1140 Precalculus Algebra and is designed to prepare students for MAC2311 Calculus 1 (MAC1147 Precalculus Algebra with Trigonometry may be used as a substitute).

Research-based Pedagogy

As an educator, I strive to continually adapt my lessons and instructional techniques through research-driven pedagogy. While teaching College Algebra, I began studying cognitive psychology based instructional practices and I implemented lessons based on my findings. My techniques coincide with Ed Dubinsky's APOS Theory, a framework for the mental constructions of actions, processes, objects, and schemas. My research-driven pedagogy follows the process that Dubinsky proposes: theoretical analysis, design and implementation of instruction, and observations through assessments.

Radical Function Activity

While teaching College Algebra, I designed an activity that assessed student's understanding of radical functions. I began this process by developing a theoretical analysis of the concept. That is, I studied the mental constructions a student would make to develop an understanding of radical functions. I then designed and implemented a lesson based on the theoretical analyses. After instructional treatment, I collected data through activities and follow-up interviews. The activities were designed to assess student's relational understanding, understanding of both why and how, of radical functions. After collecting the data, I analyzed student responses and was able to see the depth of understanding and misunderstanding. With the results, I can now repeat the process by going back to a theoretical analysis in an effort to refine my instructional practices. Having a research based pedagogy allows me to continually adjust lessons based on student understanding and common misconceptions.

Name: _____

Concept: Domain of Radical Functions

Question 1: Create a possible radical function for each of the following domains:

a) $\left[\frac{2}{3}, \infty\right)$

b) $\left(-\infty, \frac{2}{3}\right]$

c) $[k, \infty)$

d) $\left(-\infty, -\frac{a}{b}\right]$

In class, students were taught how to find the domain of a radical function, given a specific function. This activity was designed so they would have to "work backwards" to create a function with the given domain. Students who fully understood the domain of radical functions were able to use their prior knowledge to construct these functions.

In addition, questions were scaffolded from concrete to abstract to allow students to develop a robust understanding of radical functions.

Question 2: (reflection question) Write a general list of steps to create a function with a given domain.

Through the reflection question, I was able to see the thought process among my students. By seeing how students are thinking about domain, I can refine my lectures in the future.

In addition, students were encouraged to reflect on their own understanding and refine their process of creating a function with this question.

Helpful Links

The following links will direct you to my math department website in addition to video lectures.

Video Lecture Links:

https://www.educreations.com/lesson/view/solving-quadratic-equations-by-factoring/50726464/?ref=link

https://www.educreations.com/lesson/view/fall-2018-final-exam-16/50241375/?ref=link

Math Department Website:

https://people.clas.ufl.edu/ashleywatts/