University of Alabama at Birmingham
MA 411/511 7P Integrating Mathematical Ideas
Spring 2022 Wednesdays 5:00-7:30

Instructor: Tami Puchta, Ed.S.
Contacts: tpuchta@uab.edu   205-533-2902
Office: University Hall Rm 4039
Office Hours: Wednesdays 1:00- 4:30 pm OR please email me to schedule a mutually
                      convenient time to meet on campus or via Zoom.

This class will be conducted on campus. Students should reserve the days and hours listed on Blazernet for class attendance.

Preferred Method of Contact: Email is my preferred method of contact if you have questions. Please expect a response within 24 hours on weekdays and a slower response on weekends. Include the course number and section in the subject line of your email for a faster response.

Text & Supplies: There is no official textbook for this course. You will need graph paper, a ruler, colored pencils or pens, and a way to organize handouts from class.

Prerequisites. You are expected to have taken MA 125, MA 313, and at least one of MA 314, 315, 316, or 317. If you do not meet these prerequisites, please see the instructor before continuing.

Course Description:
 This course serves as the capstone course for the Mathematical Reasoning track. It will help students achieve an integrated working grasp of mathematical ideas, engage students in inquiry and reflection in the learning and practice of mathematics, help students develop a productive disposition in tackling mathematical problems, and develop the ability to communicate mathematics and mathematical ideas at all levels, both verbally and in writing.

   The course will continue the inquiry-based learning environment of other courses in the Mathematical Reasoning track. The course will integrate ideas from number, algebra, geometry, probability, and statistics. In doing this the student will gain understanding and ability in plausible reasoning, conjecture, and justification in the study of patterns and models, functions, and use of technology. The course will emphasize the use of functions as mathematical models, the various ways of representing functions, and the power and uses of these representations in different contexts. Inquiry-based learning will pervade the course. Students will be expected to communicate mathematics verbally and in writing through small group, whole group, and individual interactions.

While collaborative learning is desired, you are at the same time individually accountable for learning the material.

Topics
   The course will include the following topics, divided among five fundamental categories. It is important to realize that these topics cannot be treated each in isolation, but only in relation to each other. Therefore, this should not be read as a timeline of the course.

 (I.) Reasoning
- Deductive reason and its prime importance for mathematics
- Mathematically convincing arguments (leading to mathematical proofs)
- Inductive reasoning
- Reasoning by analogy

- Plausible reasoning
- Developing ability to make educated guesses
- Developing critical ability

(II.) Patterns and Models
- Seeking and finding patterns in data, geometry, pictures, algebra, probability, and numbers
- Conjecture and plausible reason in finding significant patterns
- Functional relations based on patterns
- Building algebraic models from geometric and numerical patterns
- Exact and approximate representations

(III.) Relations and Functions
- The function concept and the notions of dependence; dependent and independent variables, domain and range.
- Multiple ways to represent a function, the questions they help us answer, advantages and disadvantages of each, and transforming one type of representation into another. Among the representations examined are:
- Verbal descriptions of functions
- Graphical representations
- Numerical/tabular data
- Algebraic representations (mathematical formulas)
    - Functional notation and its uses
    - Discrete and continuous variables
    - Continuous and discontinuous functions
    - Piecewise defined functions
    - Comparison of functions
    - Slope and rate of change
    - Transformations and combinations of functions
    - Special types of functions, with practical, everyday examples of each:
- Linear functions, slope and intercept (extensive and varied approaches to these, with many examples of sources)
- Piecewise linear functions
- Quadratic functions
- Higher order polynomial functions
- Rational functions
- Exponential and logarithmic functions
- Trigonometric functions and periodic or repetitive phenomena or behavior
- Functions not fitting into any standard mathematical category, and how to deal with them

(IV.) Communication: Writing and Speaking
- Communication of mathematics verbally and in writing
- Mathematics is not just a collection of techniques, but is a structured body of knowledge essential to the modern community and to science
- Writing is essential to mathematics, in proofs, explanations, descriptions, and in communication to others (e.g., teaching) and to ourselves
- "If you can't explain it, you don't fully understand it"

Course requirements:

1. Attendance and active participation in all sessions. Significant points are deducted from your participation grade for absences. Official university activities, documented illness, and jury or military duty are excused. Because active group participation is an essential component of this course, **missing 25% of classes or more with unexcused absences will result in a grade of F for this course.**

2. Complete individual menus of problems, group tasks, reflections, and homework problems. If you must miss class, it is expected that you will complete any missed group work or tasks from the missed class.
3. Actively participate in course discussions.
4. Complete an in-class Midterm performance assessment near the middle of the semester and a Final performance assessment at the end of the semester.
5. Develop a final Mathematics Portfolio. Full directions and expectations for this assignment will be available on Canvas and discussed in class.
6. Have a positive and productive disposition toward yourself, your classmates, and mathematics. Be respectful of fellow classmates and the instructor.

Evaluation/Course Grades. Students earn their grade in the course as determined in the table below. Points accumulated will be recorded in Canvas. Important due dates will be listed in Canvas calendar.

Assignments	Percent of Final Grade	Points Value (out of 480)
Math Menus (2)	25	120
Participation/Reflections	10	48
Midterm	25	120
Project	5	24
Mathematics Portfolio	10	48
Final	25	120

Percent Earned	Grade
90-100	A
80-89	B
70-79	C
60-69	D
<60	F

Major Assignment Dates:
- **Menu 1: Feb 9**
- **Midterm: Feb 23**
- **Menu 2: Mar 30**
- **Project: Apr 13**
- **Portfolio: Apr 20**
- **Final Exam: Apr 27**

Cell Phones and Other Devices
Let me know in advance if there is an important reason for you to be accessible by phone during class. Please silence your cell phone so you can be fully present to the members of our class and your small groups. Other devices are not permitted in class unless otherwise approved by the instructor.

Reasonable Accommodations
UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. If you are registered with Disability Support Services, please contact DSS to discuss accommodations that may be necessary in this course. Disability Support Services can be reached at 934-4205 or www.uab.edu/dss or in the Hill Center Suite 409.

Attendance and Tardiness/Early Departure Policy
Class roll will be taken at the beginning of each class period and recorded. Always sign in as documentation of your attendance and punctuality. Tardiness to class and early departures are disrespectful to the instructor and your classmates.

Late Assignments/Revisions

All assignments are due at the indicated/assigned due date and time in Canvas unless otherwise instructed. In the event the instructor will accept a late assignment, ten percent of the assignment grade will be deducted per day late. No revisions will be possible unless requested by the instructor. If the instructor requests a revision of an assignment, the grade you receive will be an average of the first and second attempts.

Academic Misconduct

The University of Alabama at Birmingham expects all members of its academic community to function according to the highest ethical and professional standards. It will be important that you review and become familiar with the University's Academic Integrity Code.

Non-harassment, hostile work/class environment:

The UAB College of Arts and Sciences expects students to treat fellow students, their Course Instructors, other UAB faculty, and staff as adults and with respect. No form of hostile environment or harassment will be tolerated by any student or employee. In this class we will only use constructive criticism and will work to build a community of life-long learners.

Turnitin

UAB reserves the right to use electronic means to detect and help prevent plagiarism. By enrolling at UAB, students agree to have course documents submitted to www.Turnitin.com or other means of electronic verification. All materials submitted to Turnitin.com will become source documents in Turnitin.com's restricted access database, solely for the purpose of detecting plagiarism in such documents.

Title IX Statement

UAB is committed to providing an environment that is free from sexual misconduct, which includes gender-based assault, harassment, exploitation, dating and domestic violence, stalking, as well as discrimination based on sex, sexual orientation, gender identity, and gender expression. If you have experienced any of the aforementioned conduct we encourage you to report the incident. For more information about Title IX, policy, reporting, protections, resources and supports, please visit http://www.uab.edu/titleix for UAB's Title IX Policy, UAB's Equal Opportunity, AntiHarassment Policy and Duty to Report and Non-Retaliation Policy.

Know the resources available to you to be successful:

- Student Assistance & Support provides individualized assistance to promote student safety and well-being, collaboration and resilience, personal accountability, and self-advocacy. The Care Team consults and collaborates with campus partners to balance the needs of individual students with those of the overall campus community. The UAB Care Team helps find solutions for students experiencing academic, social and crisis situations including mental health concerns.
- Disability Support Services assists students with in reaching accommodations for their educational experiences at UAB that ensure that they have equal access to programs, services, and activities at UAB.

- The Vulcan Materials Academic Success Center provides tutoring, supplemental instruction, and other services that encourage goal achievement and degree completion.

- UAB Student Health Services delivers comprehensive, high quality, confidential, primary healthcare to students. Student Health provides testing services and vaccination clinics.

- Student Counseling Services offers students a safe place to discuss and resolve issues that interfere with personal and academic goals. UAB has created a new app (available in the App Store and Google Play) called B Well, that is designed to easily access resources on mobile devices and build a self-care plan.

- <u>eLearning and Professional Studies</u> provides numerous academic technologies and learning resources for students whose learning may be affected by COVID.