

University of Alabama at Birmingham
MA 513-2C Patterns, Functions, and Algebraic Reasoning
Fall 2023 T-Th 11:00-12:15 HHB Rm 226

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Office Hours: 2:00-4:30 on Wednesday Room 4039 University Hall OR make an appointment with me to meet either in person or via Zoom

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 (MA513 2C) in the subject line of your email for a faster response. I look forward to meeting with you on campus or virtually via Zoom by appointment at a mutually convenient time.

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.

This class will be conducted in person, on campus, on the days and times listed in the course schedule. Safety measures must be followed as required by the University.

This course helps fulfill the math requirements for ECE and ELE majors and is required for mathematical reasoning students. It may not be used to fulfill the general studies math requirement of UAB. MA102 (Intermediate Algebra) should be considered as a prerequisite.

Course Description

The focus of this course will be to help enhance your mathematics background so that you may teach a rich K-8 grade curriculum as specified by the National Council of Teachers of Mathematics' *Principles and Standards for School Mathematics* and the *Alabama State Course of Study: Mathematics*. **This course will be taught differently from perhaps any mathematics course you have ever taken.** It is guided by UAB's participation and collaboration in the Greater Birmingham Mathematics Partnership. This is a joint venture between UAB (Schools of Education, Engineering, and Dept. of Mathematics), Birmingham Southern College, the Mathematics Education Collaborative (MEC), and several local school systems. The project has its foundations in the work of Dr. Ruth Parker of MEC and the constructivist view of learning. Constructivism is a theory of teaching and learning based on the work of Jean Piaget. It emphasizes the learner taking an active role in constructing her/his own learning as the learner interacts within an environment.

The goal of this course is that you become mathematically powerful students and that you become *competent* and *confident* problem solvers. The content and experiences in this course will lead you toward this goal. My role as the instructor will be to provide guidance and support as *you* make sense of mathematics. True understanding will only come when *you* make sense of a situation. My role is not to tell you everything about the subject, nor is it to answer all of the questions that will arise as you engage in problem solving. You will at times experience confusion and perhaps frustration. This is a natural part of the learning process. I will try to help *you* reflect and work your way out of confusion before your frustration becomes debilitating to your learning. Don't be afraid of wrong answers. Sometimes learning occurs by multiple attempts down wrong paths until you find a correct path.

You will learn while working in groups and as an individual as you solve problems. Engaging with others in collaborative problem solving will help you see several ways of solving a problem and

appreciate a variety of points of view. In groups, you are not to 'teach' someone how to solve a problem and you are not to direct others to think in a certain way. Each person must think for her/himself and make sense of the situation. For many problems, I will insist that you not be satisfied with simply finding one way to solve a problem. Instead, I will push you solve problems in multiple ways. **While getting the right answer is a goal in solving a problem, understanding how you got to the answer is also important, as is being able to communicate your understanding to others.** While collaborative learning is desired, you are at the same time individually accountable for learning the material.

The content of the course will include problem solving experiences, inductive and deductive reasoning, patterns and functions, and some concepts and applications of geometry. The patterns and functions examined will include linear and quadratic relations, as well as some functions of a higher order such as cubic or exponential functions. This is not a course in the usual formal methods of algebra as you may know it. You won't be doing extensive polynomial manipulations. Instead, you will be developing algebraic thinking and reasoning.

Learning Outcomes

1. Apply inductive and deductive reasoning to problems.
2. Identify and solve problems involving patterns that form linear and quadratic functions.
3. Create and thoroughly explain expressions for patterns involving summations and/or figurate numbers.
4. Apply a variety of problem-solving strategies in order to solve both geometric and word problems involving patterns.
5. Identify patterns on Pascal's Triangle. Write an expression that works for multiple patterns identified.
6. Identify properties of geometric figures and apply these in problems.
7. Demonstrate knowledge of concepts of number and number relationships, number systems, number theory, estimation, and computation in the context of problem solving.
8. Communicate mathematical ideas orally and in writing including making mathematically convincing arguments.
9. Demonstrate a positive disposition toward persistence and reflection in doing mathematics.
10. Demonstrate the ability to interact within groups, and with the class as a whole, while demonstrating cognizance of working with students at different levels.

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 will result in a grade of F for this course.**
2. You may collaborate on solving Menus 1 and 2 tasks. However, it is imperative that you are able to solve problems on your own on the exam. A good guideline is that after you have solved a problem, you should feel confident that you are able to explain your solution to the class.
3. Complete individual menus of problems, group tasks, 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.
4. Complete article reviews and other readings. Directions and expectations for these assignments are on Canvas or given in class.

5. Actively participate in course discussions.
6. Complete an in-class Midterm performance assessment near the middle of the semester and a Final performance assessment at the end of the semester.
7. Develop a final Mathematics Portfolio. Full directions and expectations for this assignment will be available on Canvas and discussed in class,
8. 513 Only - Complete a final mathematics task to be included in your Portfolio. This task will be distributed in class and is in addition to the Portfolio tasks described on Canvas.
9. Have a positive and productive disposition toward yourself, your classmates, and mathematics. Be respectful of fellow classmates and the instructor as you share ideas.

Course Policies

Grading

Students earn their grade in the course as shown in the table below. Points accumulated will be recorded in CANVAS.

Since participation is an essential component of this course, missing more than 25% of classes will result in a grade of F for this course.

| Assignments | Percent of Final Grade | Points Value (out of 480) | | Percent Earned | Final Grade |
|----------------------------|------------------------|---------------------------|--|----------------|-------------|
| Math Menus (2) | 20 | 48 each | | 92-100 | A |
| Article Reviews | 7.5 | 18 each | | 82-91 | B |
| Midterm | 25 | 120 | | 72-81 | C |
| Mathematics Portfolio | 12.5 | 60 | | <72 | F |
| Participation/Attendance** | 7.5 | 36 | | | |
| Final | 27.5 | 132 | | | |

Rounding policy: Students with good attendance who have submitted all required assignments are eligible to have their final grades rounded up from 0.5.

Late Assignment Policy: Late assignments are eligible for a 10% deduction of original points for each day that they are late, up to 3 days. You must have a legitimate reason to receive a deadline extension, and you should contact your instructor as soon as you know that you will not be able to meet the deadline. If you contact your instructor at the last minute, you may not be granted an extension.

**** The participation score is intended to recognize those who put forth a maximum effort and demonstrate persistence in problem solving.** The instructor will use her best professional judgment in awarding the 7.5% for this item based on a student's full participation in class activities, attempts at completion of challenging tasks, and may be influenced by a student's attempts or non-attempts at dessert items from the menu problems. **Five percent will be awarded to students who: have few or no absences (and make up the work for any absences), actively participate in all group and independent tasks, demonstrate persistence in pursuing challenging problems and tasks, show craftsmanship in solving problems and seek to extend their thinking on problems, stay on task without reminders during class activities, show the ability to work independently on tasks, demonstrate the ability to work with others on tasks without providing too much assistance, complete all required tasks on the menus and give good faith attempts at some of the desserts on the menus.** If in the judgment of the instructor a student fails to meet all of the

above, the instructor will assign a score between 0 and 5% with appropriate credit given for partial successes in meeting course goals. The instructor's decision here is based on her professional experience and is the final judgment on this item.

Time Commitment

You are expected to spend a substantial amount of time working through the course activities and assignments every week. Please know that time management and self-motivation are key components for success in this course and courses in general. Most students who take this course find it beneficial so please keep an open mind. This class meets 2 times per week for 75 minutes each time. In addition to class time, you should spend about 6 hours per week reading, studying, preparing for class discussions, and/or completing assignments and assessments

Exams

An online midterm and a final are scheduled for this class. The midterm will occur during a regular class time and the final will take place on August 12. Make-up exams will be scheduled only when requested within the first week of the term for a valid and verifiable reason or in case of an extreme emergency.

Working in Groups:

There will be group tasks in which you will collaborate with other students to submit a solution to a task. At the end of some project/tasks, you will be required to fill out a group self-evaluation form to evaluate other team members' contributions to the project.

Attendance and Tardiness/Early Departure Policy

Attendance every day is expected and essential to success. Please be on time to class and let me know as soon as possible if it is necessary to miss class. **Class roll will be recorded** for each class. **Since participation is an essential component of this course, missing more than 25% of classes will result in a grade of F for this course.** It is your responsibility to talk with your peers regarding what you missed, ask classmates to turn in your assignments, etc. You are responsible for content missed during your absence. Tardiness to class and early departures are disrespectful to the instructor and your classmates.

UAB Policies & Resources

Add/Drop and Course Withdrawal

- **Drop/Add:** Deadlines for adding, dropping, or withdrawing from a course and for paying tuition are published in the [Academic Calendar](#) available online. Review the [Institutional Refund Policy](#) for information on refunds for dropped courses. It is the student's responsibility to initiate add/drop procedures. Students may drop and add courses online after they have registered and until the drop/add deadline online using [BlazerNET](#).
- **Withdrawal:** To avoid academic penalty, a student must withdraw from a course by the withdrawal deadline shown in the academic calendar and receive a grade of W (withdrawn). Failure to attend class does not constitute a formal drop or withdrawal. The official course withdrawal must be completed online in [BlazerNET](#).

Academic Integrity Code

Your success while at UAB and after graduation is valued by the University. To gain and grow in the knowledge and skills needed for your future career, it is vital that you complete your own work in your courses and in your research. The purpose of the [Academic Integrity Code](#) is to support our academic mission and to maintain and promote academic integrity. All students in attendance at UAB are expected to pursue all

academic endeavors with integrity, honor, and professionalism and to observe standards of conduct appropriate to a community of scholars.

Please be sure you understand the different forms of "academic misconduct" covered by the code. Review [the FAQs about the code](#) for details.

Student Conduct Code

The purpose of the University of Alabama at Birmingham ("University") student conduct process is to support the vision, mission, and shared values of the University and the tenets of the University's creed, The Blazer Way. Through a student-focused and learning-centered lens, the process strives to uphold individual and community standards; foster an environment of personal accountability for decisions; promote personal growth and development of life skills; and care for the well-being, health, safety, and property of all members of the University community.

The [Student Conduct Code](#) ("Code") describes the standards of behavior for all students and student organizations and outlines students' rights and the process for adjudicating alleged violations. It is set forth in writing in order to give general notice of non-academic prohibited conduct. The Code should be read broadly and is not designed to define non-academic conduct in exhaustive terms. All students and student organizations are expected to conduct themselves in accordance with the Code. The current version of the Code, which may be revised periodically, is available from the Office of Community Standards & Student Accountability.

Intellectual Property

My lectures and course materials, including PowerPoint presentations, quizzes, exams, outlines, and similar materials, are protected by copyright. You may take notes and make copies of course materials for your own use. You may not and may not allow others to reproduce or distribute lecture notes and course materials publicly, whether or not a fee is charged, without my expressed written consent.

DSS Accessibility Statement

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. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact DSS to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call (205) **934-4205**, visit [their website](#), or their office located in Hill Student Center Suite 409.

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.

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.

Health and Safety

UAB is very concerned for your continued health and safety. Please consult the Students section of [UAB United](#) for up-to-date guidance because the following information is subject to change as circumstances require.

We strongly urge you to be fully vaccinated. [Here is information on the safety of vaccines and on how to get vaccinated at UAB.](#) Mask-wearing has proven to be one of the most successful mitigation strategies used to combat spread of the various variants of the COVID-19 virus.

Know the resources available to you to be successful:

[Student Assistance and 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. [Kognito](#) is a free, interactive simulation-based platform designed to help you talk with someone when you are worried about your mental health.

[eLearning and Professional Studies](#) provides numerous academic technologies and learning resources for students whose learning may be affected by COVID.

The following are the various websites describing additional student academic and technology resources:

[UAB Policies for Students](#)

[Student Academic and Support Services](#)

[Technology Resources](#)

See also the [Student Assistance & Support](#) website of Student Affairs for a description of Covid-19-related resources, including the laptop loaner program.

Syllabus: This syllabus is subject to changes announced in class and/or on Canvas.