University of Alabama at Birmingham
MA 313 FB *Patterns, Functions, and Algebraic Reasoning*
Summer 2020 MTWR 10:10-11:40 AM

Instructor:	**Abinash Nayak, Ph.D.**	
Contacts:	**nash101@uab.edu**	205-934-2154
Office:	University Hall Rm 4005	By appointment

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 course helps fulfill the math requirements for ECE and ELE majors and is required for mathematical reasoning students. It <u>may not be used to fulfill the general studies math requirement of UAB</u>. MA 102 (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 teams, in pairs, and as an individual as you solve problems. Listening to others as you engage in collaborative problem solving will help you see a variety of points of view and several ways of solving a problem. 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. Define and use a variety of mathematics terms and concepts.
2. Apply inductive and deductive reasoning to problems.
3. Identify patterns in mathematics.
4. Solve problems involving patterns that form linear and quadratic functions.
5. Apply problem solving strategies such as guess and check, working backwards, solve a simpler problem, etc. to a variety of problems.
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. Solve a variety of math problems related to concepts taught in grades K-8.

Course requirements

1. **Attendance and active participation in all sessions. Two or more unexcused absences will lower your final grade. 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. You may collaborate on solving the homework problems (Menus 1 and 2). 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. Full directions and expectations for these assignments are on Canvas.
5. Complete an in-class Midterm Performance Assessment near the middle of the semester and a Final Performance Assessment at the end of the semester.
6. Develop a Final Mathematics Portfolio. Full directions and expectations for this assignment will be available on Canvas.
7. 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 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
Math Menus (2)	24
Participation/Attendance*	5
Article Reviews/ Discussion	10
Midterm	24
Mathematics Portfolio	10
Final	27

Percent Earned	Grade
90-100	A
80-89	B
70-79	C
65-69	D
64 and below	F

* 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 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 his/her professional experience and is the final judgment on this item.

Course Policies

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.

Exams
A make-up exam will be scheduled only when requested within the first two days of the term for a valid and verifiable reason or in case of an extreme emergency.

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 taken** at the beginning of each class period and recorded. Always sign in as documentation of your attendance and punctuality. It is your responsibility to talk with your peers regarding what you missed, ask classmates to turn in your assignments, etc. You will be held responsible for content during your absence**.** 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
UAB Faculty expects all members of its academic community to function according to the highest ethical and professional standards. You are expected to be aware of, and rigorously adhere to UAB code of conduct with regard to academic honesty and inter-personal relations.

Academic dishonesty and misconduct includes, but is not limited to, acts of abetting, cheating, plagiarism, copying homework, fabrication, and misrepresentation. Candidates are expected to honor the UAB Academic Code of Conduct as detailed in the most current *UAB Student Catalog.*.

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.

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.

NOTE: This syllabus is subject to changes announced in class.