MA 314 – Geometric & Proportional Reasoning
Spring 2022

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Office: University Hall Rm 4039
Office Hours:
- Wednesdays from 12:30- 4:30 Room 4039 of University Hall **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 **unlined paper, a ruler, colored pencils or pens, a protractor, and a good compass.**

Prerequisite: MA 313/513 (Patterns, Functions, and Algebraic Reasoning)

Course Description
This course will continue the methods and inquiry-based learning environment similar to that established in MA 313/513 and is primarily intended for future or practicing elementary and secondary teachers. It will continue to focus on problem solving and making sense out of mathematics. The content focus will be around number systems and number sense, geometry, measurement, and proportional reasoning. Students will develop inductive and deductive reasoning skills and will make and explore conjectures about mathematical concepts. Justification of ideas leading toward formal proof will be developed within the course. Students will experience mathematics through hands-on investigations using manipulatives and appropriate technologies. Collaborative learning will be one of the primary modes of instruction. Students are expected to communicate mathematics verbally and in writing through small group, whole group, and individual interactions.

Course Content
- Analysis of one, two and three dimensional features of real objects
- Identification and classification of geometric figures
- Similarity and congruence
- Position and orientation, and transformational geometry
- Linear, area, and volume measurement including standard and non-standard measurement as well as error analysis
- Ratio and proportionality
- Exploration and analysis of three dimensional objects and their two-dimensional nets
- Mentally and written computation with integers and fractions
- Coordinate graphing
- Number theory (square numbers, triangular numbers, powers, properties of numbers)
- Collecting, organizing, and analyzing data
- Inductive and deductive reasoning
- Mathematically convincing arguments (leading to mathematical proofs)
- Algebraic analysis of one, two and three-dimensional growth patterns

Learning Outcomes
1. Solve a variety of math problems related to concepts taught in grades K-8.

2. Define and use a variety of mathematics terms and concepts.
3. Apply inductive and deductive reasoning to problems.
4. Identify patterns in mathematics.
5. Identify properties of geometric figures and apply these in classification schemes and problems.
6. Apply problem solving strategies such as guess and check, working backwards, solve a simpler problem, etc. to a variety of problems.
7. Find the perimeter, area, and volume of standard (polygonal) and non-standard regions/objects.
8. Apply measurement skills using non-standard measures as well as the metric and English measurement systems.
9. Demonstrate knowledge of concepts of number and number relationships, number systems, number theory, estimation, and computation in the context of problem solving.
10. Apply knowledge of ratio, proportions, similarity, and congruence in solving problems.
11. Apply transformations and the use of symmetry in solving problems.
12. Communicate mathematical ideas orally and in writing including making conjectures and expressing mathematically convincing arguments to justify claims.
13. **Demonstrate a positive disposition toward persistence and reflection in doing mathematics**.

One 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 guide and support you as *you* make sense of mathematics. True understanding will 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.

Course requirements

1. Class <u>attendance</u>, observation, and *participation* in all sessions. Two unexcused absences will result in your final grade being lowered. <u>Since group participation is an essential component of this course, missing more than 25% of classes with unexcused absences will result in a grade of F for this course.</u> Tardiness is a disruption to the learning process. Cumulative tardies may be counted as absences at the instructor's discretion.
2. Individual menus of problems, group tasks, and homework problems. Homework is primarily for reinforcement and extension of class sessions.
3. Complete article reviews and other readings.
4. Complete a Midterm Performance Exam and a Final Performance Exam in class.
5. Develop a Final Mathematics Portfolio.
6. Have a positive mental attitude toward yourself, your classmates, and mathematics. Be respectful of fellow classmates and the instructor as you share ideas.

Evaluation
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)	20
In class assignments/ Participation/Attendance*	10
Article Reviews/ Discussion	8
Midterm	25
Mathematics Portfolio	10
Final	27

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

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

*Item 2 recognizes 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 one or fewer 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, 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 on 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. <u>The instructor's decision here is based on her professional experience and is the final judgment on this item.</u>

Course Policies

Withdrawal
You are expected to be aware of official UAB withdrawal 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. <u>Please silence your cell phone so you can be fully present to the members of our class and your small groups.</u> 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. <u>Always sign in as</u> documentation of your attendance and punctuality. Tardiness to class and early departures are disrespectful to the instructor and your classmates. <u>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</u>.

Late Assignments/Revisions
All assignments are due at the indicated/assigned due date and time in Canvas unless otherwise instructed. <u>In the event the instructor will accept a late assignment, ten percent of the assignment grade will be deducted per day late</u>. 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.

Early Alert System (EAS)
Early Alert System (EAS) - The EAS is designed to help students be more successful academically at UAB. If you receive an e-mail with EAS in the title, please open it, read it, and take advantage of the support that UAB offers to all students. UAB is committed to ensuring that students receive academic support and that students are aware of the resources available that will assist them in successfully completing their degree program.

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, the 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.

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.

eLearning and Professional Studies provides numerous academic technologies and learning resources for students whose learning may be affected by COVID.

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