Math 3403 Geometric Structures Spring, 2016

Instructor: **K. Dearinger**
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Office Hours: Tues: 9:20AM – 12:20PM (or by appointment)

Required Textbook and Manipulatives

- **Textbook:** *Geometric Structures – An Inquiry Based Approach for Prospective Elementary and Middle School Teachers* by Doug Aichele and John Wolfe. **This Textbook may NOT be purchased over the internet or purchased "used."**
- **Manipulatives:** Scissors, compass, protractor, ruler, mira (or equivalent) and calculator

You should bring your textbook and manipulatives to every class.

Grading

Four components will be used in determining your final course grade:

1. 3 Hour Exams (100 points each)	300 points
2. Daily Activities, homework, quizzes.	100 points
3. Projects (2)	50 points
4. Final Exam (100 pts recorded twice	200 points
Total Possible Points	**650 points**

Minimum total points needed for semester grade:

582 - A (90%)
517 - B (80%)
452 - C (70%)
387 - D (60%)

1. Hour Exams: A student shall be offered reasonable accommodation in the event that he or she misses a major assessment activity for a valid and documented reason. Three 100-point hour exams will be given during the semester. Dates for these exams will be announced in class at least one week before the exam date. **Absolutely no make-up exams** will be given for any reason. If one exam is missed, the score on the final will replace the missed exam score ONLY IF YOU REQUEST AND OBTAIN APPROVAL FROM ME IN ADVANCE of the exam (when possible) and only for **very serious and unavoidable conflicts**. If this condition is not satisfied, a grade of zero will be recorded for the missed exam. If you must miss a second exam, it will be an automatic zero.

2. Daily Activities, Homework, Quizzes: A homework assignment (usually 4 to 6 activity pages) will be given for nearly every class. The assignment is due the next class meeting and some of the pages may be collected to be graded. That is, some of the assigned activity pages will be collected frequently. It is very important that you work the pages before coming to class for two reasons. First, some may be turned in for a grade and second, these activity pages will provide a basis for the discussions in class. Occasionally, I will give a short quiz instead of collecting activity pages. Quizzes will be announced and unannounced. During the semester there will be **approximately** 12 of these graded activity papers and/or quizzes. You MUST be present to turn these in. Each one will be worth 10 points and I will use your best 10 scores for your Homework/Quiz grade (100 points max). This means that if you miss an assignment, homework or quiz, it will be one of the scores that is dropped, if possible.

3. Projects: There will be two projects due throughout the course of the semester. These projects will be announced in class and completed either individually and/or in study teams. Part of these projects may include a journal kept by each student. **No late or make-up projects will be accepted**. These journals and projects will be discussed when they are assigned.

4. Final Exam: A 200 point, **comprehensive final exam** will be given. The date and time of the final exam is set by the University and cannot be changed**.**
If you are in the 12:30 class, your FINAL EXAM will be Tuesday, May 3, at 10 AM.
If you are in the 2:00 class, your final exam will be Tuesday, May 3, at 2:00 PM.
If you are in the 3:30 class, your final exam will be Thursday, May 5, at 2:00 PM.
All finals are in the regular classroom.

5. Please remember: **All work must be shown on all problems unless impossible**. If you "think it," you should show it.

Electronics: NO electronics are allowed in the classroom. Use of electronics may result in an absence or a request to leave the classroom.

Missed Exams, Quizzes, Daily Activities

Absolutely no make-up exams, quizzes, or daily activities will be given regardless of the reason. Also, no late or make-up homework, or daily activities will be accepted. A **missed quiz, homework, or daily activity** will be one of the scores that are dropped. A **missed project** will be an automatic zero. If one **exam is missed**, the percent on the final exam may be used to replace that score only if you request and obtain approval and only for very **serious and unavoidable** conflicts. If this condition is not satisfied, a grade of zero will be recorded for the missed exam. If a second exam is missed, it will receive an automatic 0.

Attendance Score (BONUS): (50 points maximum): Attendance will be taken during each class session. As a future teacher, professionalism is expected; therefore, attendance in this course is important. You must be fully participating in class to be considered present. Sleeping, reading the paper, texting, or otherwise not being fully participating in class will result in an absence. Determining "full participation" will be left to the discretion of the instructor. Since this score is for "extra credit" only, there are **no excused absences** so notes or documentation are not necessary. Your attendance score is determined by your total days absent from class. The rules governing the attendance score are shown below.

1. You must be present for the ***entire* class** session in order to be counted as present. If you come in **more than three minutes late or leave early, you may be counted absent.**
2. You must **sign the roll** to be considered present. This is YOUR responsibility. Failure to sign the roll will result in an absence and cannot be disputed at a later date.
3. Because this score is for extra credit only, there are **no "excused" absences** for any reason, including university-sponsored activities and illness. **Please** do not bring notes or letters to excuse your absence.
4. The instructor has complete discretion in awarding attendance points. If you are sleeping during class, or are otherwise not participating in class (including texting, reading a paper, etc.), you may be counted absent.
5. The **attendance score is optional** and is meant to reward students for good attendance. A low class attendance score (due to excessive absences) will ***not* lower** your overall grade. . However, from experience, it is not uncommon for students to regret an absence at the end of the semester, so I STRONGLY suggest that you avoid ANY absences.
6. You will be given 50 attendance points at the beginning of the semester. You will receive one "free" absence, with no points deducted. For each absence after that, you will have 4 points deducted from your attendance score.
7. If a person has no absences at all, four additional bonus points will be added to the 50 points for class attendance.

Replacing an Exam: You may replace the lowest of the first three exam scores or half of your final exam score, provided it improves your letter grade, with points awarded to you as follows.

Half of your lowest exam score + Your attendance points = Low Exam Replacement Score

Example: John's lowest exam score is 59 and he has 2 absences. John's points are calculated as follows:

Half of John's lowest test score	30 (half of 59 is 29.5, rounded up to 30)
Attendance points	46 (first absence is "free", so 50 - 4 · 1= 46)
Total	76

John's lowest exam score of 59 will be replaced with a score of 76.

General Comments

This course is intended primarily for elementary education and early childhood education majors. The course is no longer an upper division A-designated General Education course. If you are enrolled in this course and your major is not one of the above, you should check with your advisor as soon as possible to verify that you will receive credit for this course for your major and/or degree.

This class will not be a typical lecture-style learning experience; instead, students will be asked to discuss problems with each other, as well as their solutions, in order to understand the concepts involved. Because this course is highly dependent on classroom involvement, your effort, creativity, and involvement will determine how much you get out of the course.

This course is intended to model the National Council of Teachers of Mathematics (NCTM) Curriculum Standards and NCTM Professional Standards. It is in this sense that we consider the course to be "inquiry-based". Read Appendix I and Pages *xi-xiii* in your textbook to better understand what this means.

Study Teams

After the first class period, you will be placed in a study team. It is expected that your study team will not only work together on projects, but also discuss and collaborate on the assignments which will be assigned for each class. Throughout the semester, your study team will serve as a key resource towards understanding the course material. In fact, certain projects will be team projects and a portion of your grade on the project will be determined by how well your team works together. It is your responsibility to see that all members of the team contribute their fair share. However, it is still essential that all work you present to the instructor is "your own." Work which is copied from a classmate is considered academic misconduct and will be treated as such. In addition, your study team will be your resource if you miss class. Contact someone in your group to find which sections were covered and are due the next class period.

The class is to be driven by student-to-student discussion of mathematical ideas. For this reason, any questions related to subject matter should first be brought up to your study team and then to other study teams and the class as a whole. *The instructor will not be addressing questions which were not presented to other class members first.*

Student Class Number

When the drop and add period is over and the roll is official, each student will be assigned a Student Class Number. This will be a sequential number indicating your alphabetical order in the class. This number is extremely helpful to me in sorting and organizing your papers, handing back papers and recording grades. Once this number is assigned, you should remember it and put it on **all your papers**, **circled** in the **upper right hand corner**.

Cell Phones. Turn cell phones off and put them away during class. Cell phones are **not allowed out at any time** during class except under unusual circumstances and only when cleared in advance by the instructor. Remember, texting or other use of a cell phone may result in an absence for the class period.

E-mail Guidelines

My e-mail address is listed on Page 1. Please use the following guidelines when you send me an e-mail:

- All e-mails should have on the **Subject Line: Your name and when the class meets**. Ex: Jane Doe, TR 2:00
- **All issues involving grades** must be discussed in person in my office, NOT by email.
- **E-mails asking questions already answered in the syllabus** will not be answered.

University Policies

- All OSU policies and procedures will be followed in this course. It is your responsibility to know and comply with all OSU policies and deadlines. See the syllabus attachment (http://academicaffairs.okstate.edu/faculty-a-staff) for more information.
- Plagiarism, cheating on exams, quizzes and projects, and other such actions constitute academic misconduct and/or dishonesty. In this course students are expected to demonstrate complete integrity at all times. Read the University policies on academic integrity, misconduct and dishonesty at the OSU website: http://academicintegrity.okstate.edu/.

Special Accommodations for Students

If any member of this class feels that he/she has a disability and needs special accommodations, I will work with you and the Office of Disabled Student Services to provide reasonable accommodations to ensure that you have a fair opportunity to perform in the class. Please advise me of such disability and the desired accommodations as soon as possible.

AGAIN, Important Class Rules / Policies

1. Absolutely no make-up exams, quizzes or assignments will be given. See the previous information in this syllabus.
2. Absolutely no excused absences will be granted, regardless of the reason (remember….attendance counts as bonus). This policy will be firmly applied with no exceptions. Sickness, accidents, emergencies, personal/family issues, funerals, weddings, job interviews, semester break plans, requirements for another course, military obligations, and even University-sponsored / approved absences are all not accepted. Points that enhance your grade cannot not be given for a student who is not here.
3. Semester grades are not negotiable. Course grades will be assigned based solely on total points earned in the course subject to the Attendance Policy. Course grades will be firmly and equitably assigned with no curving. Minimum total points needed are 607-A (90%), 540-B (80%), 472-C (70%), 405-D (60%). Scholarships, grade requirements, graduation, etc. are not considered when assigning grades in this course.

Any changes in this syllabus will be communicated to you in class by the instructor.

Course Outline

Math 3403 – Geoemtric Structures

Text: Geometric Structures, An Inquiry-Based Approach for Prospective Elementary and Middle School Teachers by Douglas B. Aichele and John Wolfe

The schedule below accounts for 32 class meetings of a course meeting twice a week for a 16 week semester. The topics are listed, in general, by weeks. There are four built in days for recaps, "catch up" days, special projects or activities and review for the final exam.

WEEK 1
Course Overview
Warm-Up Activities, 0.1-1 and 0.3
Appendix 1 (read)
1.0 Introduction (read)
1.1 Parallel Line Grid – Triangle Angle Sum
1.2 Envelope Fold – Triangle Angle Sum
1.4 Polygon Angle Sum
1.5 The Angles of a Polygon

WEEK 2
1.8 Angle Sums and Angle Relationships
1.9 Four Kinds of Related Angles
3.0 CD – Introduction (read)
3.1 Introducing CD's – Two Basic Constructions
3.2 CD Problem – A Parallel Line
3.3 CD Problem – The Median
3.4 CD Problem – An Equilateral Triangle
3.5 CD Problem – A Square
1.11-1 & 2 Parallel Lines: How to Recognize Them
1.13 Convex: Different Ways to Make Sense of It
1.14a Angle Problems, Version A

WEEK 3
1.14b Angle Problems, Version B
1.15 More Angle Problems
1.18 Possible or Not?
2.0 Introduction (read)
2.1-1&2 Checking Properties of Quadrilaterals
2.2 Properties of Quadrilaterals
2.3 Marking Quadrilateral Properties
2.4 Properties of Diagonals of Quadrilaterals
2.5-1&2 Checking Quadrilaterals by Folding
2.6 Read Carefully: Every Word Counts
2.9a Problems: Properties of Quadrilaterals A
2.9b Problems: Properties of Quadrilaterals B

WEEK 4
5.0 Introduction (read)
5.1 How Much Space in a Triangle
5.2 Areas on a Geoboard
5.3 Two Ways: Cut-Up and Take Away
5.5 Julie's Way
5.6 Which Ways Work for These Figures?
5.7 Areas: How Many Ways?
5.8 Area Problems: First Try
5.9 A Sampling of Area Problems

Week 5: Possible Review and Exam 1 at this time

WEEK 6
Read 7.0 Introduction – Similarity and Slope
7.1 Slope or Steepness
7.2 Slope: Parallel or Perpendicular
7.3 Slope Problems: Page 1
7.4 Slope Problems: Page 2
7.5 Linear Equations, Tables of Values and Slopes
7.6 Similar Figures and Their Properties
7.7 Similar Figures and Proportionality
7.8 Measuring Proportions

WEEK 7
Read 10.0
10.1 Basic Straightedge and Compass Constructions
10.2 Straightedge and Compass – Parallel Lines
10.3 Examples: Reasoning for Construction Problems
10.4 Reasoning for Construction Problems
Back to Paper Folding:
3.6 Circumscribing a Circle
3.7-1&2 Inscribed Circle
3.8 Balance Point of a Triangle
Using the information learned in 3.6-3.8:
Use a straightedge and compass to construct:
1) The Circumcenter of a Triangle using three types of triangles (acute, right, obtuse)
2) The Incenter of a Triangle using the three types of triangles.
3) The Centroid of a Triangle using the three types of triangles.

WEEK 8
Read 8.0 Pythagorean Theorem and Perimeter
8.1 Right Triangles of Squares
8.4 Slant Lengths on a Geoboard
8.5 Geoboard Perimeters
8.6 Three Special Triangles
8.7 Pythagorean Theorem: First Try
8.8a Perimeter and Right Triangle Problems A
8.8b Perimeter and Right Triangle Problems A

WEEK 9: Possible Review and Exam 2 at this time

WEEK 10
Two Handouts on Congruence
11.2 Congruence Conditions for Triangles and CPCT
11.3 Justifications by Congruence Conditions
11.4a Problems: Congruence Conditions Version A

WEEK 11
9.3 Area and Perimeter of Circles and Sectors
9.4 Area Problems with Circles, First Try
9.5 Area and Perimeter of Circles
9.6 Inscribed Angles of Arcs of Circles
15.0 Introduction to Symmetry
15.3 Orientation: One or Two Sides
15.4a Symmetry, Version A
15.4b Symmetry, Version B

WEEK 12
16.0 Introduction The Four Symmetries
16.1 Four Actions: Slide, Flip, Turn, and Glide-flip
16.2 Four Symmetries
16.4 Four Actions of Symmetries
16.5 Combinations of Reflections
16.6 Actions: Which of the Four Types?
16.7 Rotations and Glide-Reflections: Point-Image Segments, Glide/Refl. Line

WEEK 13
16.9 CD Problem: Find the Center of Rotation
16.10 Cd Problem: Find the Glide/Refl. Line
4.4 Prisms
4.7 Pyramids
4.11 Volumes of Prisms, Pyramids and Spheres
4.15a Solid Geometry Problems, Version A

WEEK 14: Possible Review and Exam 3

This leaves four class periods for recaps, “catch up” days, special activities or projects and review for the final exam.