

## Term Information

Effective Term Autumn 2014

## General Information

Course Bulletin Listing/Subject Area Mathematics  
Fiscal Unit/Academic Org Mathematics - D0671  
College/Academic Group Arts and Sciences  
Level/Career Undergraduate  
Course Number/Catalog 1136  
Course Title Measurement and Geometry for Teachers  
Transcript Abbreviation Meas. Geom. Teach  
Course Description This course is the second in a two semester sequence for teachers of elementary and middle grade students. This course focuses on concepts of measurement and geometry, including modern and historical perspectives.  
Semester Credit Hours/Units Fixed: 5

## Offering Information

Length Of Course 14 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Lima, Mansfield, Marion, Newark, Wooster

## Prerequisites and Exclusions

Prerequisites/Corequisites A grade of C- or above in 1135.  
Exclusions

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code 27.0101  
Subsidy Level Baccalaureate Course  
Intended Rank Freshman, Sophomore

## Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

## Course Details

### Course goals or learning objectives/outcomes

- Understand concepts of length, area, volume and angles, units of measurement, precision and error.
- Understand concepts of lines, angles, and geometric figures in two and three dimensions.
- Fluency with derivation and application of area and volume formulas.
- Understand geometric constructions and transformations in coordinate and coordinate-free geometry.
- Understand how to use algebra to solve problems in geometry.
- Familiarity with the concepts of theoretical and experimental probability.
- Identify major historical developments in measurement and geometry, including contributions of significant figures and diverse cultures.

### Content Topic List

- Measurement.
- Planar Shapes.
- Polyhedra.
- Plane Geometry.
- Transformations in the Plane.
- Linear Equations and Graphs.
- Algebra and Linear Equations.
- Probability.

## Attachments

- 1136-syllabus.pdf: Syllabus  
*(Syllabus. Owner: Husen,William J)*
- UGSC support of Math#12E243.doc: Concurrence  
*(Concurrence. Owner: Husen,William J)*
- rationale.pdf: Course Rationale  
*(Other Supporting Documentation. Owner: Husen,William J)*

## Comments

## Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Husen,William J	11/19/2013 12:53 PM	Submitted for Approval
Approved	Husen,William J	11/20/2013 09:42 AM	Unit Approval
Approved	Hadad,Christopher Martin	11/20/2013 10:27 AM	College Approval
Pending Approval	Vankeerbergen,Bernadette Chantal Nolen,Dawn Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole Hanlin,Deborah Kay	11/20/2013 10:27 AM	ASCCAO Approval

**Catalog Description.** This course is the second in a two semester sequence for teachers of elementary and middle grade students. This course focuses on concepts of measurement and geometry, including modern and historical perspectives.

Credits: 5

Prereq: A grade of C- or above in 1135.

**Textbook.** Beckmann: *Mathematics for elementary teachers*

**Recommended supplemental texts:**

Aichele-Wolfe: *Geometric Structures: An Inquiry-Based Approach for Prospective Elementary and Middle School Teachers*

Parker-Baldrige: *Elementary Geometry for Teachers*

**Extended Description.** The course consists of fundamental topics in Euclidean geometry starting with measurement. This includes the concepts of length, area, volume, angles, units of measurement, precision and error.

The basic properties of two and three dimensional geometric shapes and their relationships are a central part of the course. Special emphasis is put on geometric reasoning through problem solving, including unknown angle, length, area, and volume. The course also covers topics on transformations in the plane, symmetries, congruence, and similarity. Some geometric constructions and basic geometric proofs are included.

Additional topics include an introduction to functions and equations, primarily in the linear case, and a brief introduction to probability.

**Grading.** A student's grade will be based on the student's performance on homework, quizzes, midterm and final exams. Homework and quizzes will count for 30% of the course grade, midterms will count for 35% of the course grade, and a final exam will count for 35% of the course grade.

**Learning goals.**

- Understand concepts of length, area, volume and angles, units of measurement, precision and error.
- Understand concepts of lines, angles, and geometric figures in two and three dimensions.
- Fluency with derivation and application of area and volume formulas.
- Understand geometric constructions and transformations in coordinate and coordinate-free geometry.
- Understand how to use algebra to solve problems in geometry.
- Familiarity with the concepts of theoretical and experimental probability.
- Identify major historical developments in measurement and geometry, including contributions of significant figures and diverse cultures.

**Outline.** Roughly 13 weeks of content, leaving 1 week for exams. This is a general guide, and may need to be adjusted as we test the course.

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| <p>[1.5 weeks ] Measurement</p> <ul style="list-style-type: none"> <li>• units</li> <li>• number line and length</li> <li>• area and volume</li> <li>• approximation and accuracy</li> </ul>   | <p>[2 weeks ] Transformations in the Plane</p> <ul style="list-style-type: none"> <li>• coordinates</li> <li>• translations, rotations, scaling</li> <li>• congruence</li> <li>• symmetry</li> <li>• circles and <math>\pi</math></li> <li>• approximating circle area and <math>\pi</math></li> </ul> |
| <p>[1.5 weeks ] Planar Shapes</p> <ul style="list-style-type: none"> <li>• classifying triangles, quadrilaterals</li> <li>• other polygons</li> <li>• circles</li> <li>• area formulas</li> </ul>  | <p>[2 weeks ] Linear Equations and Graphs</p> <ul style="list-style-type: none"> <li>• graphing and slope</li> <li>• proportional relationships</li> <li>• models for linear equations</li> <li>• unit rates</li> <li>• linear functions and modeling</li> </ul>                                       |
| <p>[1 weeks ] Polyhedra</p> <ul style="list-style-type: none"> <li>• prisms, cones</li> <li>• volume formulas</li> <li>• nets</li> <li>• spheres</li> <li>• duality, Platonic solids</li> </ul>  | <p>[1.5 weeks ] Algebra and Linear Equations</p> <ul style="list-style-type: none"> <li>• solving</li> <li>• proportional relationships, arithmetic sequences</li> <li>• introduction to functions with linear functions</li> </ul>  |
| <p>[2 weeks ] Plane Geometry</p> <ul style="list-style-type: none"> <li>• angles, lines</li> <li>• geometric constructions</li> <li>• informal and formal proofs with angles</li> <li>• parallel postulate</li> <li>• angle sum in triangles, other polygons</li> <li>• Pythagorean theorem</li> <li>• Pythagorean problems</li> </ul> | <p>[1.5 weeks ] Probability</p> <ul style="list-style-type: none"> <li>• theoretical and experimental</li> <li>• expected outcomes with loaded dice, etc.</li> <li>• counting combinations</li> </ul>  |

**Disability Statement.** Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone (614) 292-3307 and VRS (614) 429- 1334; webpage <http://www.ods.ohio-state.edu>.

**Academic Misconduct Statement.** It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct: <http://studentaffairs.osu.edu/resource/csc.asp>

## BLENDING MATH COURSES FOR EARLY CHILDHOOD AND MIDDLE CHILDHOOD EDUCATION MAJORS

We propose four new math courses in a sequence designed specifically for the regional campuses. The first two of these form a sequence to serve both the Early Childhood and Middle Childhood education majors:

- (1135) Number and operations for teachers
- (1136) Measurement and geometry for teachers

These contain all of the mathematics content for the Early Childhood Education major (ECE) and some additional content for the Middle Childhood Education major (MCE). Two further courses contain the additional content necessary for the MCE math concentration:

- (2137) Algebra and coordinate geometry for teachers
- (2138) Calculus and its history for teachers

History of math topics are integrated throughout the four courses.

### Rationale and additional benefits.

- Support both ECE and MCE majors at regional campuses with a minimum of low-enrollment courses.
- Address weaker backgrounds of students on open-enrollment campuses. MCE students benefit from starting with more elementary material, and ECE students benefit from seeing slightly more advanced material
- ECE students who also earn an EC 4–5 Generalist Endorsement are credentialed to teach grades 4–5 with no further math courses. The additional content in 1135–1136 will help them be more prepared for this role.
- MCE students who do not concentrate in math but earn the MC Generalist Endorsement are credentialed to teach math in grades 4–6 with no further math courses. Here too, the additional content in 1135–1136 will provide better preparation.
- Allow interested students to transition from ECE to MCE with relative ease. (Or from MCE to ECE.)
- To further mitigate low enrollment, 2137 and 2138 are independent courses, to be offered in alternating years.

**Comparison with existing program.** The first two courses, 1135/36, use the same text and cover essentially all of the content in 1125/26 and those parts of 1165/66 which overlap substantially with 1125/26. Additional history topics are added, and some topics are developed in more depth for the MCE licensure requirements.

The licensure requirements for MCE students covered in 1165/66 and 2167/68 are also covered in the full 1135–2138 sequence. Those topics of 1165/66 not covered in 1135/23 are treated mainly in 2137. The notable exceptions to this are material on functions, sine/cosine, and log/exp—these are treated in 2137. Calculus for middle-grade teachers is covered in 2137 and history of mathematics is integrated throughout the sequence.

It would not generally be possible to substitute any of the 1135–2138 courses for any of 1165/66, 2167/68, or vice-versa. The content of 1135–2138 is dramatically rearranged (although not substantially different) from that of the current MCE math sequence, so single substitutions are problematic. Rather 1135–2138 as a complete block of courses would satisfy the same requirements in the MCE major as the block 1165/66, 2167/68. Each campus would have the choice of which block to offer, depending on the needs of their students.

**BS-Ed.** These courses have been developed in consultation with the College of Education and Human Ecology and will be used by the BS-Ed. program in that college.



College of Education & Human Ecology  
29 West Woodruff Avenue  
200 Ramseyer Hall  
Columbus, Ohio 43210

November 17, 2013

Dr. William Husen  
MW 124A Mathematics Building  
231 W 18<sup>th</sup> Avenue  
Columbus, OH 43210

Dear Dr. Husen:

The Undergraduate Studies Committee of the Department of Teaching and Learning met on Friday, November 14<sup>th</sup> and discussed the proposed blended math courses for early childhood and middle childhood education majors. We expect that they will, as they proposal suggests, allow our regional campuses to offer the required courses more regularly so that students may take them when they need them. Further, these courses will strengthen the math skills of those in the major for whom this is an area of weakness. Moreover, students will, with these new courses, be able to switch from early to middle, or vice versa, without losing course credit. For these reasons, we support the proposed courses and are eager for the offering of them, should they be approved.

Sincerely,

A handwritten signature in black ink that reads "M Blackburn" with a horizontal line extending to the right.

Mollie V. Blackburn, Ph. D.  
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Vice-Chair of Undergraduate Studies  
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