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	1135
Course Title	Number and Operations for Teachers
Transcript Abbreviation	Num. Op. Teach.
Course Description	This course is the first in a two semester sequence for teachers of elementary and middle grade students. This course focuses on concepts of numbers and arithmetic operations, 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 1075; or credit for 1074, 75, or 104; or Math Placement Level R or above; or ACT math subscore of 22 or higher that is less than 2 years old.
Exclusions	Not open to students with credit for 106.

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

- Conceptual understanding of positive and negative whole numbers and the meaning of fractions.
- Conceptual understanding of positive and negative whole numbers and the meaning of fractions.
- Fluency in arithmetic with fractions and decimals using both elementary reasoning and standard algorithms.
- Understand and solve proportion problems using both elementary reasoning and fraction arithmetic.
- Familiarity with the concepts of divisibility, multiples, and their applications.
- Identify major historical developments in number and operation, including contributions of significant figures and diverse cultures.

Content Topic List

- Counting numbers, decimals.
- Meaning of fractions.
- Meaning of addition and subtraction.
- Meaning of multiplication.
- Multiplying.
- Meaning of division.
- Meaning of ratios, rates, proportions.
- Number theory.

Attachments

- 1135-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 12:52 PM	Submitted for Approval
Approved	Husen,William J	11/20/2013 09:42 AM	Unit Approval
Approved	Hadad,Christopher Martin	11/20/2013 10:26 AM	College Approval
Pending Approval	Vankeerbergen,Bernadette Chantal Nolen,Dawn Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole Hanlin,Deborah Kay	11/20/2013 10:26 AM	ASCCAO Approval

Number and operations for teachers (1135)

Catalog Description. This course is the first in a two semester sequence for teachers of elementary and middle grade students. This course focuses on concepts of numbers and arithmetic operations, including modern and historical perspectives.

Credits: 5

Prereq: A grade of C- or above in 1075; or credit for 1074, 75, or 104; or Math Placement Level R or above; or ACT math subscore of 22 or higher that is less than 2 years old. Not open to students with credit for 106.

Textbook. Beckmann: *Mathematics for elementary teachers*

Extended Description. This course covers the concepts of whole numbers (positive and negative), place value (base-ten and alternate bases), decimals, and fractions. Some content on irrational numbers appears at the end, and this is extended in *Algebra and coordinate geometry for teachers* (2137).

The four arithmetic operations are covered both conceptually and algorithmically. Attention is given to ensuring that students can perform the algorithms correctly and explain why they give accurate answers.

Lastly, the course covers the concepts of proportions and how they are related both to multiplication/division and to fractions. Factors, divisibility, and some elementary number theory complete the course.

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.

- Conceptual understanding of positive and negative whole numbers and the meaning of fractions.
- Fluency in multi-digit arithmetic for whole numbers using both elementary reasoning and standard algorithms.
- Fluency in arithmetic with fractions and decimals using both elementary reasoning and standard algorithms.
- Understand and solve proportion problems using both elementary reasoning and fraction arithmetic.
- Familiarity with the concepts of divisibility, multiples, and their applications.
- Identify major historical developments in number and operation, including contributions of significant figures and diverse cultures.

Outline. Roughly 14 weeks total; midterms to be inserted as appropriate. This is a general guide, and may need to be adjusted as we test the course.

[1 week] Counting numbers, decimals
- alternate bases
- negatives
- history of zero
- history of place value systems

[2 weeks] Meaning of fractions
- equivalent fractions
- comparing fractions
- percents as fractions

[2 weeks] Meaning of addition and subtraction
- commutative and associative properties
- column addition and subtraction algorithms
- column addition and subtraction algorithms in alternate bases

[2 weeks] Meaning of multiplication
- commutative and associative properties
- distributive property
- single-digit multiplication
- column multiplication algorithm
- column multiplication algorithm in alternate bases
- historical algorithms

[1 week] Multiplying
- fractions and decimals
- negative numbers
- powers and scientific notation

[2 weeks] Meaning of division
- division and fractions
- the long division algorithm
- fraction division from two perspectives
- decimal division

[2 weeks] Meaning of ratios, rates, proportions
- ratio problems and division
- ratios and fractions
- proportion story problems

[2 weeks] Number theory
- factors and multiples
- divisibility, LCM, GCF
- rational and irrational numbers

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

BLENDED 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.

Date: November 19, 2013.

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 18th Avenue
Columbus, OH 43210

Dear Dr. Husen:

The Undergraduate Studies Committee of the Department of Teaching and Learning met on Friday, November 14th 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,

Mollie V. Blackburn, Ph. D.
Professor
Vice-Chair of Undergraduate Studies
Department of Teaching and Learning
College of Education and Human Ecology
The Ohio State University
200 Ramseyer Hall
29 West Woodruff Avenue
Columbus, OH 43210-1172
(w) 614-247-7310
Blackburn.99@osu.edu