Elementary Mathematics Certificate
EDU 619: Numbers and Operations: K-5 Mathematical Tasks
Fall 2017

Location: Carroll University, Center for Graduate Studies, CGS Room 115
Facilitators: Dr. Kimberly White and Nathan Rosin
Office: 203A Barstow
Office Phone: 262-650-4920
Mobile Phone: 608-347-6503
Email: whitek@carrollu.edu and nrosin@carrollu.edu or njrosin@gmail.com

Elementary Mathematics Certificate candidates at Carroll University develop an in-depth understanding of mathematics: content, processes, and pedagogy appropriate for grades P-5. They engage in professional learning communities and develop leadership skills to support and facilitate effective mathematics instruction and professional growth in their schools and districts.

EDU 618: Mathematical Reasoning and Leadership for Elementary Specialists: K-5 Learning Trajectories
EDU 619: Numbers and Operations: K-5 Mathematical Tasks
EDU 627: Algebraic Reasoning: K-5 Discourse and Questioning
EDU 628: Measurement and Data: K-5 Equity and Technology
EDU 629: Geometry and Spatial Reasoning: K-5 Assessment

ELEMENTARY MATHEMATICS CERTIFICATE PROGRAM LEARNING GOALS

1. **Develop in-depth knowledge of mathematics:** candidates are confident in their knowledge of mathematics, which affects both what they teach and how they teach it

2. **Utilize research on how children learn mathematics:** candidates identify, describe, and apply mathematics-specific principles of learning theory

3. **Teach mathematics in culturally sustainable ways:** candidates manage the diversities of the classroom and school—cultural, disability, linguistic, gender, socio-economic, developmental—and use appropriate strategies to support mathematical learning of all students

4. **Incorporate Common Core Standards for Mathematics, including standards for mathematical practice and content standards:** candidates are able to evaluate mathematics tasks and curricula based on the Common Core Standards for Mathematics; candidates approach mathematics as a unified whole by applying the standards for mathematical practice throughout work in all of the content standards

5. **Choose, implement, and evaluate meaningful mathematical tasks and instructional strategies:** candidates know and apply instructional strategies that promote students’ learning and meet the needs and interests of all students

6. **Implement technology to support effective teaching and learning of mathematics:** candidates plan and use appropriate materials, including technology-based, for effective
mathematics instruction for learners at various stages of development and to meet the
needs of a diverse student population

7. **Administer and interpret assessments:** candidates construct and use varied assessments
to inform instruction, evaluate, and ensure student learning

8. **Develop leadership skills:** candidates support teachers in the use of a wide range of
curriculum materials, in the selection of appropriate options, and explain evidence-based
rationales for selecting practices to best meet the needs of all students

9. **Interact as a community of learners:** candidates demonstrate responsibility for
professional growth, performance, and involvement as an individual and as a member of
professional learning communities

**COURSE OVERVIEW**

An exploration of content and methods relevant to whole number and rational number arithmetic
in the K – 5 classroom with an emphasis on how children learn. Topics will include an
exploration of place value, arithmetic operations, fractions, decimals, percents, with emphasis on
concepts, operations, and relations among them. Attention given to error analysis of children’s
work. Focus on analysis and construction of effective mathematical tasks in teaching number
systems and operations at the K-5 level.

**COURSE LEARNING OBJECTIVES**

Candidates know and understand:

1. The structure of number systems, the development of a sense of quantity, and the
relationship between quantity and symbolic representation

2. The connections of operations, algorithms, and relations with their associated concrete and
visual representations

3. The relationship among number concepts, the number line, operations and algorithms, and
the properties of numbers

4. How to model, construct, and solve number concept problems within and outside of
mathematics

5. How number concepts, operations, and algorithms are developmental and connected
between and across all grade levels

6. How to select and design mathematical tasks that enable students to construct valid and
useful understandings of mathematics

**TEXTS**


**SUPPLEMENTAL REFERENCES**


**Additional research articles, as selected**


**COURSE ASSESSMENTS**

**Online Learning Modules:** Online learning exercises designed to deepen candidates’ understanding of mathematical content, course readings, and class discussions. Candidates choose three learning activities to complete one online module in Carroll’s learning management system, *MyCourses*. The independent study provides opportunities for candidates to critically reflect on their practice in elementary classrooms as it applies to the content of the course, with particular attention given to the course focus on Mathematical Tasks (Learning Objective 6; Learning Goals 2, 4, and 5).

**Content Assessment:** One in-class assessment to evaluate candidate’s understanding of mathematics content presented in class readings and activities. Problems may be content based or application based. Assessments will be completed independently, but will also include a collaborative element (Learning Objectives 1, 2, 3, and 4; Learning Goal 1).

**Mathematics Project Proposal:** Self-selected goal for improving mathematics instruction that aligns with the NCTM principles and/or Mathematics Teaching Practices. Candidates select a teaching focus to explore in relation to their individual professional development. Candidates will write a one-page abstract of their projects and present these at the last cohort meeting (Learning Objective 1 and 2; Learning Goals 2 and 5).

**Portrait of a Mathematician:** Assessment of individual student math attitudes and proficiency. Candidates collaborate with grade-level professional learning communities to create and organize an interview and/or task file; the case study will be implemented in the remaining courses in the Mathematics Certificate Program (Learning Objectives 2, 3, and 4; Learning Goals 2, 3, 5, 7 and 9).

**Attendance and Participation:** Participation in professional learning communities is essential to this program. Candidates will engage in mathematical tasks, class discussions, online learning activities, online discussions, lesson studies, and group projects (Learning Objectives 1-6, Learning Goal 9).

**COURSE EVALUATION AND GRADING**

Student performance will be determined by the following:

- Completion of course responsibilities (40%)
• Assignment evaluations of projects (30%)
• Candidate-self evaluation (20%)
• Content assessment (10%)

Candidates will attend an individual meeting at the end of the semester to discuss student effort, progress, and achievement. Course grades will be assigned based on the following criteria:

A     95-100
An “A” represents a professional judgment that the student’s accomplishment is superior. This work stands out in its quality of independent, critical, and creative thinking. Written work is very organized and well written. Oral presentations are effectively organized and delivered in an interesting, informative fashion. The researcher clearly grasps the salient and subtle aspects of the course content.

AB    90-94
An “AB” represents a professional judgment that the student’s accomplishment was close to superior but was lacking slightly in terms of understanding and presentation. It denotes a high quality of work just short of the highest level of achievement.

B     80-89
A “B” represents a professional judgment that the student’s accomplishments satisfy the criteria established for the course. It demonstrates competence and understanding of the course content; however, the student shows less depth, critical, and creative thinking in his or her work. Written work is satisfactory and oral presentations are effective.

C     70-79
A “C” represents a professional judgment that the student’s accomplishment minimally satisfies the criteria for awarding graduate credit. It denotes inaccuracies in understanding the course content and an inability to indicate independent, creative thinking about the issues presented in the course. It is indicative of work that is at a basic level of performance in the graduate program.

STATEMENT ON ACADEMIC INTEGRITY
The Carroll University Academic Integrity Policy is located in your student handbook. You are encouraged to familiarize yourself with it. If a student violates this policy in any way, the instructor reserves the right to impose a sanction of failure on the assignment/assessment or failure in the course. All quotes and paraphrased ideas from sources other than you must be cited APA style. If you have questions about appropriate citations, please ask.

SERVICES FOR STUDENTS WITH DISABILITIES
Students with documented disabilities that may need accommodations, or any student considering obtaining documentation should make an appointment with our Carroll University disabilities coordinator by calling 524-7335. Any student who has any emergency medical information the instructors should know of, or who need special arrangements in the need of evacuation, should make an appointment with an instructor no later than the first week of class.
MODIFICATIONS TO THE SYLLABUS AND COURSE CALENDAR
The instructor and the University reserve the right to modify, amend, or change the syllabus (course requirements, grading policy, etc.), as the curriculum and/or program require(s).