

Graduate Credit Requirements

PRDV 73124 TERC: *Investigations 3* in the K-5 Classroom

Course Title: PRDV 73124 TERC: *Investigations 3* in the K-5 Classroom

Number of Credits: 3

Instructor of Record: Karen Economopoulos

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Course Information

- **Dates & Times:**
 - July 24-July 27, 2018, 8 am – 4 pm
 - August 10, 2018 - All required assignments submitted to instructor
 - August 23, 2018 - Grades posted
- **Location:**
 - EDCO Collaborative, 36 Middlesex Tpke., Bedford, MA
- **Format:**
 - This is a 4-day intensive Institute which includes an expected 1.5-2 hours of reading and 1.5 hours of writing time per night during the 4 Institute days and following week. Additional reading is required in order to support the 11-page (minimum) paper which is due **no later than August 10, 2018.**
 - Attendance at all sessions is a mandatory requirement for graduate credit. Full participation in all sessions is expected of all students enrolled for Graduate credit.

Course Schedule (4 days)

Day	Session 1	Session 2	Session 3
1	Counting & The Number System	Math Practices in <i>Investigations</i>	Grade Level
2	Add/Sub 1	Geo./Meas.	Grade Level
3	Add/Sub 2	Fraction Concepts	Grade Level
4	Mult./Div.	Comparing Fractions	Grade Level

Course Requirements for Graduate Credit

In addition to attending all sessions and completing the assigned daily homework for the workshop, participants who are taking the workshop for Graduate Credit will also be responsible for the following:

- Complete all additional readings; these readings are available on-line (links provided), or in the *Implementing Investigations* Grade level books (part of each Grade Level curriculum set)

- Respond to all Read and Reflect written assignments. Responses to these assignments will be submitted by **August 3, 2018**, one week after the final day of the Workshop. Each written reflection should be clearly labeled with topic and question(s)
- Write an 11-page (minimum) paper; typewritten, double-spaced, free of grammatical and spelling errors, submitted no later than **August 10, 2018**
- Submit all assignments via Google Classroom

Course Assignments:

Counting and the Number System

Additional Readings

- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Grade K, Counting and Cardinality and Grades K–5, Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. <https://tinyurl.com/CCSS-CC-OA>
- Common Core Standards Writing Team. (2015, March 6). *Progressions for the Common Core State Standards in Mathematics (draft). Grades K–5, Number and Operations in Base Ten*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. <https://tinyurl.com/CCSS-NOBT>
- *Implementing Investigations in Grade <1>* (for your grade level)

Read and Reflect

- **Read:** Progressions for CCSSM *Counting and Cardinality in Kindergarten* pp. 4-5.
- **Read:** Progressions for CCSSM *Grades K–5, Number and Operations in Base Ten*: pp.2-20.
- **Consider:** How did the Counting and Place Value session support and illustrate particular aspects of the progression of learning?
- **Read:** *Mathematics in Grade <1>* (pp.60-end) in Part 3 of the Implementing Guide for your grade level. You will be referencing this essay for subsequent assignments.
- **Written Reflection:** Think about your work with K-5 students. Which aspects of Counting and Place Value are relevant for the grade level you teach? What are some of the important foundational skills that need to be in place in order for students to successfully engage in understanding these concepts?

Math Practices in Investigations

Additional Readings

- Russell, S.J and Schifter D. *Investigations 3: Making Sense of and Persevering with the Mathematical Practices* Pearson. <https://tinyurl.com/INV3-MPs>
- *Implementing Investigations* guide (for your grade level)
- Illustrative Mathematics. (2014, February 12). Standards for Mathematical Practice: Commentary and Elaborations for K-5. Tucson, AZ. <https://tinyurl.com/MPElaborations>

Read and Reflect

- **Read:** *Investigations 3: Making Sense of and Persevering with the Mathematical Practices* Pearson
- **Read:** *Investigations* and the Mathematical Practices pp. 44-47 in the *Implementing Investigations in Grade <1>* (for your grade level).
- **Select** one of the Math Practices that you are interested in learning more about.
- **Read:** the essay for your chosen Practice in the Standards for Mathematical Practice: Commentary and Elaborations for K-5.
- **Written Reflection:** Summarize in your own words, your understanding of your selected Math Practice (MP). Reflect on and describe, an example of how the selected MP, was enacted or could be

enacted in your grade level. How do you/will you support the development of and student enactment of this MP? What resources in *Investigations* will you draw on to support your work and work of your students?

Addition/Subtraction 1 & 2

Additional Readings

- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Grade K, Counting and Cardinality and Grades K–5, Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. <https://tinyurl.com/CCSS-CC-OA>
- *Implementing Investigations in Grade <I>* (for your grade level)
- Boaler, J. (2015) Fluency without fear: Research evidence on the best ways to learn math facts. <https://tinyurl.com/youcubed-fluency>
- Russell, S. J. (2000). Developing Computational Fluency with Whole Numbers in the Elementary School <https://tinyurl.com/DevCompFluency>

Read and Reflect

- **Review:** notes and any reading(s) from the Addition/Subtraction 1&2 sessions or from grade level
- **Review** the Number and Operations section (the Number System and Addition and Subtraction) in the Mathematics essay in Part 3 of the *Implementing Investigations* guide for your grade level.
- **Read:** *Fluency without Fear* by Jo Boaler and *Developing Computational Fluency* by Susan Jo Russell.
- **Written Reflection:** Reflect on the two articles. What does it mean to be computationally fluent? How does the work that students do in the early grades support the development of computational fluency?

Geometry & Measurement

Additional Readings

- *Implementing Investigations in Grade <I>* (for your grade level)
- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Grades K–5, Geometry*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. <https://tinyurl.com/GEO-CCSS>
- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Grades K–5, Geometric Measurement*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona <https://tinyurl.com/GM-CCSS>

Read and Reflect

- **Review** notes and any reading(s) from the Geometry & Measurement session.
- **Review** the Geometry and Measurement sections in the Mathematics essay in Part 3 of the *Implementing Investigations* guide for your grade level.
- **Read:** CCSSM Progressions for Geometry pp. 2-18 and K-5 Geometric Measurement pp. 2- 27.
- **Consider:** How did the Geometry and Measurement session support and illustrate particular aspects of the progression of learning?
- **Written Reflection:** Think about your work with K-5 students. Which aspects of the Geometry and Measurement progression are relevant for the grade level you teach? What are some of the important foundational skills that need to be in place in order for students to successfully engage in understanding these concepts?

Fractions

Additional Readings

- *Implementing Investigations in Grade <I>* (for your grade level)
- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Number and Operations: Chapter 1: Fractions 3-5*, Tucson, AZ: Institute for Mathematics Education, University of Arizona. <https://tinyurl.com/NF-CCSS>
- Hollister, A. (2017, Oct. 23) Puzzling through making fraction sets. Retrieved from: <https://investigations.terc.edu/puzzling-making-fraction-sets/>
- Cochran, K. (2017, Dec. 11) The lesson? Students never cease to surprise me. Retrieved from: <https://investigations.terc.edu/lesson-students-never-cease-surprise/>

Read and Reflect

- **Review:** notes and any reading(s) from the Fractions 1 & 2 Sessions
- **Review** the Fractions section in the Mathematics essay for your grade level from Part 3 of *the Implementing Investigations* guide.
- **Review:** pp.8-12 of the CCSSM Progressions for K-5 Geometry (about fractional parts in Grades 1-2)
- **Read:** CCSSM Progressions for Fractions 3-5 pp. 2-14
- **Read:** The two Blog posts by Hollister and Cochran
- **Written Reflection:** Write a one paragraph response/reflection to each Blog. You might reflect on how the blog connects to your work with students or connects to your own understanding or confusion about fractions, or any other thoughts that were provoked by the blog.

Multiplication & Division

Additional Readings

- *Implementing Investigations in Grade <I>* (for your grade level)
- Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics (draft). Grades K–5, Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. <https://tinyurl.com/CCSS-CC-OA>
- Economopoulos, K. (2018, Jan 22). What does it mean to be smart? Retrieved from: <https://investigations.terc.edu/what-does-it-mean-to-be-smart/>
- Hollister, A. (2018, March 5) A division solution: Amazing or perplexing? Retrieved from: <https://investigations.terc.edu/division-solution-amazing-perplexing/>
- Murray, M. (2018, March 12) That seems way too big. Retrieved from: <https://investigations.terc.edu/that-seems-way-too-big/>
- Murray, M. (2018, May 21) The Hard Work of Counting by Groups. Retrieved from: <https://investigations.terc.edu/the-hard-work-of-counting-by-groups/>

Read and Reflect

- **Review:** notes and any reading(s) from the Multiplication and Division Sessions.
- **Review** the Multiplication and Division section in the Mathematics essay for your grade level from Part 3 of *the Implementing Investigations* guide.(Note: this only appears in Grades 2-5)
- **Read:** Progressions for CCSSM *Grades K–5, Operations and Algebraic Thinking*: pp. 22-32.
- **Consider** how the Multiplication and Division session supports and illustrates particular aspects of the progression of learning.
- **Written Reflection:** What are the “Big Ideas” in Multiplication in K-2 and in 3-5? How does the work in K-2 around counting by groups and with rectangular arrays (refer back to Geometry and Measurement session) lay the foundation for the work with multiplication in grades 3-5? How does students’ work with multiplication support their understanding of and work with division?

Think about your work with K-5 students. What aspects of multiplication and division are students at your grade level working on? What aspects (if any) do you find to be most accessible to students? Which are most challenging?

Final Paper

- Write an 11-page (minimum) paper; typewritten, double-spaced, free of grammatical and spelling errors, due no later than **August 10, 2018** on the following topic:

Supporting Computational Fluency

- What does it mean to be computationally fluent? Describe the different aspects (building blocks) of computational fluency and how students at your grade level are working on each of them. Draw on reading from the sessions.
- Be sure to reference the Boaler and Russell articles in your description.
- Discuss the challenges you see students at your grade level or grade band, encounter as they develop computational fluency. How do you support the range of learners in developing computational fluency? What do you find most challenging and most rewarding about supporting students in the development of Computational Fluency?
- Share the new learning about computational fluency have you gained in this course and how you plan to apply this learning to your teaching practice. Offer specific examples.
- What role do the Mathematical Practices play in the development of Computational Fluency? Select 2-3 Math Practices that interests you and describe how they support the development of Computational Fluency.

Academic Honesty Policy

- Students who register for this course agree to “maintain high standards of academic honesty and scholarly practice. They shall be responsible for familiarizing themselves with the published policies and procedures regarding academic honesty. Academic honesty requires but is not limited to the following practices: appropriately citing all published and unpublished sources, whether quoted, paraphrased, or otherwise expressed, in all of the student’s oral and written, technical and artistic work.”
- Please also refer to the Framingham State University Graduate Catalog at <http://www.framingham.edu/graduate-and-continuing-education/documents/grad-catalog-0910.pdf>.

Academic Accommodations Policy

- “Framingham State University offers equal opportunities to all qualified students, including those with disabilities and impairments. The University is committed to making reasonable accommodations as are necessary to ensure that its programs and activities do not discriminate, or have the effect of discriminating, on the basis of disability. Academic Support serves students with learning and psychiatric disabilities as well as students with visual, mobility and hearing impairments. For further information, please visit the website at <https://www.framingham.edu/academics/center-for-academic-success-and-achievement/disability-access-services/index>