

# Math: Teaching for Understanding

GRADES K–6

GRADUATE CREDIT: 3 SEMESTER HOURS

Educators can learn how to deliver high-quality, engaging mathematics instruction while developing their own understanding of foundational mathematics concepts. They examine methodology to assist students in absorbing new ideas, calculating efficiently and accurately, as well as formulating alternative solutions. Educators also study five critical mathematical processes, including communication and problem-solving. They then apply these processes to the five primary content areas of elementary mathematics: number and operations, geometry, algebra, measurement, and data analysis and probability.

*This course is designed for K–6 classroom teachers, lead teachers, curriculum coordinators, and subject teachers.*

## COURSE TOPICS

- The changing landscape of mathematics
- Problem-solving
- Communication
- Representation
- Connections
- Number and operations: number sense, computation, and fractions
- Geometry
- Algebra
- Measurement, data, and probability
- Integrated mathematics curriculum
- Issues in mathematics reform (print & DVD only)
- Profound understanding of fundamental mathematics (online only)

## COURSE OUTCOMES

By the end of the course, educators will:

- Describe the process of problem-solving, state a rationale for its use in all areas of math instruction, identify the teaching practices that facilitate problem-solving, and compare different assessment models.
- State a rationale for using the process of communication as an integral part of mathematics instruction and analyze a lesson to identify teaching strategies that foster communication in order to facilitate students' understanding and expression of mathematical ideas.
- State a rationale for integrating the process of representation into mathematics instruction and modify a math lesson to incorporate the process of representation as a way to develop conceptual understanding.
- State a rationale for incorporating the process of making connections into their lessons and identify examples of various types of connections that could be made within mathematics lessons on a selected topic.
- Define number sense, justify its importance in the elementary mathematics curriculum, and identify activities that will increase students' development of number sense.
- State a rationale for teaching computation, describe effective strategies for computation instruction, and create a lesson that effectively teaches computational skills to students.
- Identify examples for each of the three stages of elementary geometric thinking and create a developmentally appropriate lesson that teaches students meaningful geometry content.
- State a rationale for the inclusion of algebra in elementary mathematics and describe key elements of an elementary algebra curriculum.
- Describe the importance of developing the concepts of units and practicing techniques when teaching measurement.
- State a rationale for integrating processes and content in mathematics instruction and design a lesson that integrates processes and content and provides a balance between conceptual understanding and procedural knowledge and skills.

## MATH: TEACHING FOR UNDERSTANDING

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### METHODS OF ASSESSMENT

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This course provides numerous opportunities to apply research-based concepts and theory to practical teaching situations. Assessment is conducted in the following ways:

- **Activities** are short assessments that help educators explore concepts and make connections between the content and their teaching practice. Some activities are ungraded but serve to prepare educators for other graded assignments. Any ungraded activities are clearly marked as such.
- **Study Team Discussions (print & DVD) or Dialogue Summaries (online)** allow educators to share ideas about the course content with other teachers, then ask them to analyze and summarize the discussion and then describe how their understanding of the topic has been enhanced or expanded.
- **Applications** assist educators in applying the theories, concepts, and strategies to their teaching practice.
- **Quizzes** provide educators with instant feedback (online only) on their understanding of the course material. There are three quizzes, each reviewing several sections of content.
- The **Final Reflection** requires educators to synthesize the content and reflect on their key learnings throughout the course.

### COURSE MATERIALS AND FORMAT

Course texts, websites, and journal articles help facilitate learning and transfer theory into practice. Video programs feature interviews with nationally recognized education experts. Classroom scenes provide a view into the classrooms of master teachers who demonstrate the strategies taught in the course. This course is offered in two distance-learning formats: print & DVD and online. Educators select one format when they enroll.

#### PRINT & DVD FORMAT

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Educators in the print & DVD version of the course receive printed materials to facilitate their learning. This version of the course requires educators to form a study team. The educator must have at least one study partner or peer coach, preferably another educator, to complete activities, engage in discussion, and seek feedback. It is not necessary that the study partner be enrolled in the course. Educators enrolled in the print & DVD version should have Internet access in order to connect with the many websites that are offered as learning resources. Assignments are submitted via email. The print & DVD course includes:

- The print study guide:
  - *Math: Teaching for Understanding K–6*
- The DVD:
  - Laureate Education, Inc. (Executive Producer). (2006). *Math: Teaching for understanding, grades K–6*. Baltimore: Executive Producer.
- The course textbook(s):
  - National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics: An overview* (3rd ed.). Reston, VA: NCTM, Inc. (To read the entire Principles and Standards for School Mathematics document, visit the NCTM website at <http://standards.nctm.org/>.)
- The other required readings

#### ONLINE FORMAT

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Educators in the online version of the course access the course content via an online classroom. Educators are required to participate in virtual discussions with fellow educators via a discussion board. The course textbook is shipped to educators, but the video programs and other resources are available within the online classroom. Assignments are submitted through the online classroom. The online course includes:

- Access to the online classroom for:
  - Math: Teaching for Understanding K–6
- Access to the video programs in the online classroom as well as a backup DVD:
  - Laureate Education, Inc. (Executive Producer). (2006). *Math: Teaching for understanding, grades K–6*. Baltimore: Executive Producer.
- The course textbook(s):
  - National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics: An overview* (3rd ed.). Reston, VA: Author.
- Access to the other required readings

### SYSTEM REQUIREMENTS FOR ONLINE COURSE FORMAT:

- Operating system for PC: Windows® XP, Windows Vista®, or Windows® 7
- Operating system for Mac®: OS X or higher
- Processor: 1 GHz, 32/64 bit or higher
- Memory: Minimum 512 MB of RAM; 1 GB recommended
- Browser: Microsoft Internet Explorer® 6.0 or higher; Firefox® 3.6 (also for Mac®: Apple® Safari® 4 or higher)
- Internet connection: Broadband (DSL, cable modem, or similar) required
- Software: Microsoft Word®, Adobe® Flash® Player 7 or higher (free), Adobe® Acrobat® Reader® version 8 or higher (free)
- Monitor resolution: 1280 x 800 pixels or higher

**Note:** If you are using a Macintosh®, please be sure to download Mozilla® Firefox® 3.6. It's free, and the download should take only a few minutes at [www.mozilla.org](http://www.mozilla.org).

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## EDUCATION EXPERTS

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### Alfinio Flores, Ph.D.

Dr. Alfinio Flores is a professor emeritus of mathematics education at Arizona State University. As a member of the writing team for *Principles and Standards for School Mathematics* (2000), Dr. Flores has researched and analyzed effective instructional strategies for the pre-K–2 grades. Dr. Flores is the author of numerous articles in journals such as *School Science and Mathematics* and *Teaching Children Mathematics*.

### Liping Ma, Ph.D.

Dr. Liping Ma is a senior scholar at the Carnegie Foundation for the Advancement of Teaching. She is the author of *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*, which examines a comparative study on the mathematical understanding of U.S. and Chinese elementary school teachers.

### Robert McIntosh, M.Ed.

Robert McIntosh is a K–12 mathematics program specialist for the North Thurston School District in Washington. He has also worked as a mathematics associate at Education Northwest, formerly the Northwest Regional Educational Laboratory (NWREL) where he developed a model for teaching and assessing through problem-solving at NWREL's Mathematics and Science Education Center.

### Janet Scheer, Ph.D.

As the executive director of Create A Vision, Dr. Janet Scheer serves as a mathematics consultant and conference presenter for organizations throughout North America and Europe. She has taught extensively at both elementary and secondary levels and is a former professor of mathematics education at Southern Illinois University at Carbondale. Dr. Scheer has authored numerous books and articles that feature her comprehensive expertise in practical, research-based strategies for teaching math for understanding.

### Diana Steele, Ph.D.

Dr. Diana Steele is an assistant professor in the department of Mathematical Sciences at Northern Illinois University. She has written numerous articles for educational journals, including *Teaching Children Mathematics* and *Journal of Mathematics Teacher Education*. Dr. Steele has presented at national meetings for several organizations, including the American Educational Research Association, Research Council on Mathematics Learning, and National Council of Teachers of Mathematics (NCTM).

### Paul Trafton, Ph.D.

Dr. Paul Trafton is a professor of mathematics and fellow in the Regents' Center for Early Developmental Education at the University of Northern Iowa. Dr. Trafton, formerly on the board of directors for the National Council of Teachers of Mathematics (NCTM), is the author of numerous articles and books, and he chaired the K–4 writing team for the *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989).



**ABOUT CANTER**

Canter, a subsidiary of Laureate Education, Inc., is committed to serving the educational community with high-quality, graduate-level courses that blend research-based theory with practical strategies. Canter began with one groundbreaking guide on managing behavior in the classroom and, more than 35 years later, has helped more than 300,000 educators address the most critical issues in education while advancing their careers.

**FOR MORE INFORMATION**

For more information about Canter graduate-level courses, visit [www.Canter.net](http://www.Canter.net) or call 1-800-669-9011.

**ABOUT OUR PARTNERSHIP**

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Canter offers its courses in partnership with Walden University, allowing you to benefit from Canter’s quality curriculum in a self-paced format, while earning graduate credit from a leading accredited university.\* The course curriculum is developed and designed by Canter in collaboration with national education experts, while graduate credit is granted through Walden University, which assesses student work. Credit may be applicable for certification renewal and/or salary advancement.<sup>†</sup> Course credit may be transferable with prior approval from the university providing your advanced degree or planned program.

**Walden University**

The Richard W. Riley College of Education and Leadership at Walden University is a **National Council for Accreditation of Teacher Education (NCATE)**–accredited college dedicated to enhancing educator effectiveness. As a recognized standard of excellence in professional education for the preparation of teachers, administrators, and other pre-K–12 school professionals, NCATE accreditation ensures the college has met rigorous national standards set by the profession and members of the public.

The college, named for the former Secretary of the U.S. Department of Education, was identified by *U.S. News & World Report* as having the largest online graduate program in education by enrollment (May 2010). Walden students were awarded the fourth most TEACH Grants to students nationwide in 2010–2011, according to the U.S. Department of Education. The choice of more than 53,000 students and alumni, including more than 80 state teachers of the year, the college is also a proud partner of the National Education Association (NEA) Academy and a year-round sponsor of the National Association for the Education of Young Children (NAEYC).

Walden University is accredited by The Higher Learning Commission and a member of the North Central Association, [www.ncahlc.org](http://www.ncahlc.org). Canter and Walden University are both subsidiaries of Laureate Education, Inc.

\*Prospective Washington state students are advised to contact the Office of the Superintendent of Public Instruction at 1-360-725-6275 or [prof.educ@k12.wa.us](mailto:prof.educ@k12.wa.us) to determine whether Walden’s programs in the field of education are approved for teacher certification or endorsements in Washington state. Additionally, teachers are advised to contact their individual school district as to whether this program may qualify for salary advancement.

<sup>†</sup>It is each student’s responsibility to check with his or her state/district and evaluate and understand any requirements related to the use of individual courses for any purpose.