Miami Dade College

GENERAL INFORMATION	
Course Prefix/Number: MAE4360	Course Title: **Methods of Teaching Mathematics**
Number of Credits: 3 credits	
Degree Type	☐ B.A. ☐ B.S. ☐ B.A.S ☒ A.A. ☐ A.S. ☐ A.A.S. ☐ C.C.C. ☐ A.T.C. ☐ V.C.C
Date Submitted/Revised: 2/29/12	Effective Year/Term: 2012-1
☐ New Course Competency ☒ Revised Course Competency	
Course Description (limit to 50 words or less): The student will learn to develop theoretical knowledge and skills that are essential for successful K-12 mathematics instruction. The student will design, implement, and assess mathematics instruction and curriculum utilizing the problem-solving approach in mathematics and research-based practices that accommodate the learning needs of a diverse population. Fifteen hours of clinical experience are required. Special fee. (3 hr. lecture)	
Prerequisite(s): EDG3321, EDF4430	Corequisite(s):

Competencies:

Competency 1:
The student will analyze and apply local, state, and national standards by:

1. Analyzing the primary features and goals of state (Common Core Standards), and national (e.g., National Council of Teachers of Mathematics) standards and identifying commonalities and differences.
2. Interpreting state-wide and national standardized assessments that measure mathematics knowledge.
3. Aligning instruction with state-adopted standards at the appropriate level of rigor.
4. Defining mathematical literacy and evaluating its importance in society.
5. Identifying and accessing resources and activities for mathematics education that are aligned to the standards.
6. Selecting relevant general mathematics education and alternate standards and curriculum appropriate for students' age, instructional needs, and functional performance across settings.
7. Explaining the value of using a variety of mathematics teaching approaches to meet national and state standards, particularly to groups that traditionally have been underserved and underrepresented in mathematics.
8. Formulating personal goals aligned with the national and state standards for teaching mathematics.
9. Engaging in targeted mathematics professional growth opportunities and reflective practices sponsored by national, state, and/or local professional organizations, both independently and in collaboration with colleagues.

Revision Date:
Approved By Curriculum Report: 90 Reviewed By Director of Academic Programs Date: _____

Miami Dade College

Competency 2:
The student will demonstrate knowledge of how students construct mathematical understanding by:

1. Discussing how mathematics relates to and is applied in the real world and other disciplines.
2. Identifying fundamental concepts that connect middle grades mathematics to high school and postsecondary mathematics (e.g., trigonometry, number theory, calculus).
3. Developing and interpreting appropriate models for mathematical concepts including real-world models and equivalent representations (e.g., graphical, symbolic, verbal, numeric).
4. Identifying, comparing, and contrasting mathematics learning theories (e.g., constructivism, direct instruction, etc.).
5. Analyzing mathematical errors (e.g., computational, algebraic, statistical, geometric).
6. Recognizing the importance of student prior knowledge to learning new mathematics information and building new mathematical knowledge through problem solving approaches.
7. Identifying instructional strategies that facilitate students' metacognitive skills in mathematics.
8. Scaffolding and sequencing mathematical lessons and competencies to ensure coherence and required prior knowledge to help all students accomplish a learning task.
9. Determining the appropriate sequence of lessons for a specific mathematical concept.
10. Designing mathematics instruction for students to achieve mastery.
11. Developing learning experiences that require students to demonstrate a variety of mathematical skills and competencies.
12. Recognizing and utilizing connections between and among mathematical ideas in contexts outside mathematics to build mathematical understanding
13. Discussing how authentic tasks help students participate and stay interested in mathematics particularly groups that have been traditionally underserved and underrepresented in mathematics.
14. Analyzing the ways students think about mathematics, to assess students' mathematical knowledge.

Competency 3:
The student will communicate and develop students' mathematical connections by:

1. Identifying statements that correctly communicate mathematical definitions/concepts.
2. Identifying appropriate mathematical representations (e.g., verbal statements, manipulatives, pictures, graphs, algebraic expressions).
3. Interpreting descriptions, diagrams, and representations of arithmetic operations.
4. Interpreting concepts with multiple representations (e.g., manipulatives, tables, graphs, symbolic expressions, technology).
5. Identifying equivalent representations of the same concept or procedure (e.g., graphical, algebraic, verbal, and numeric).
6. Creating and utilizing representations to organize, record, and communicate mathematical ideas while utilizing these representations to model and interpret physical, social, and mathematical phenomena.
7. Interpreting relationships between mathematical concepts (e.g., multiplication as repeated addition, powers as repeated multiplication) while integrating them within the curriculum (e.g., fractions, ratios, scale factor and proportional reasoning).
8. Identifying methods, strategies, and questioning techniques for teaching problem-solving skills and applications (e.g., constructing tables from given data, guess-and-check, working backwards, reasonableness, estimation
9. Communicating and organizing mathematical thinking coherently and clearly to peers, faculty, and K-12 students.
10. Utilizing the language of mathematics to express ideas precisely.

11. Identifying appropriate techniques for utilizing problem solving skills and leading discourse.
12. Recognizing cognitive complexity in various questioning strategies.
13. Examining strategies that reveal, support, and challenge student's mathematical thinking.
14. Orchestrating discourse among all students about mathematical ideas and processes.
15. Demonstrating the ability to lead classes in mathematical problem solving and in developing in-depth conceptual understanding, and to help students develop and test generalizations.

Competency 4:
The student will use a variety of mathematic teaching approaches by:

1. Identifying and utilizing appropriate and diverse teaching models such as effective explanation, cooperative learning, project-based discovery learning, differentiated instruction, and the problem solving approach that foster critical and creative thinking and respond to cultural, linguistic, and gender differences.
2. Identifying appropriate techniques for presenting concepts in mathematics such as: modeling with manipulatives, using computer software, calculators, multimedia, and the Internet.
3. Identifying and utilizing national, state, and local instructional resources, such as NCTM's *Illuminations, Addenda Series, Navigations Series,* etc..
4. Identifying and applying appropriate methods and strategies to teach key mathematics concepts (Operations and Algebraic Thinking, Number and Operations in Base 10, etc.).
5. Integrating mathematics across the curricula.
6. Identifying and interpreting strategies that can be used to help all students learn mathematics, especially to individuals with disabilities and ELL.
7. Utilizing strategies for increasing accuracy and proficiency in math calculations and applications.
8. Applying research-based instructional practices for developing mathematical literacy.
9. Differentiating among various learning environments, including alternative methods of assessment (e.g., performance, portfolios, projects) to accommodate the needs and diversity of students.
10. Utilizing appropriate manipulatives for teaching diverse groups of students (e.g., varied learning styles and exceptionalities).
11. Applying and adapting a variety of appropriate strategies to solve mathematics problems.

Competency 5:
The student will plan a curriculum that emphasizes the development of students' mathematics concepts by:

1. Identifying and sequencing mathematics learning activities that are in concert with brain research.
2. Identifying and selecting appropriate resources and materials based on instructional (long- and short-term) objectives and all student learning needs and performance levels.
3. Interpreting and developing various criteria for the design of the specific scope and sequence of a mathematics curriculum framework with reference to both state and national mathematics standards
4. Selecting and utilizing a variety of available mathematics curricula and teaching materials for all.
5. Employing higher-order questioning techniques.
6. Evaluating appropriate alternative assessments (e.g., projects, portfolios) that utilize various cognitive complexity levels.
7. Designing and aligning formative and summative assessments that match learning objectives and lead

to mastery.

8. Identifying mathematical tasks that aim at higher-order thinking (e.g., discovering and formalizing patterns).

Competency 6:
The student will develop communities of mathematic learners that reflect the attitudes and social values conducive to mathematic learning by:

1. Encouraging respect for the diverse ideas, skills, and experiences of all students in their classrooms
2. Identifying teacher behaviors that indicate sensitivity to race, gender, ethnicity, socioeconomic status, ability, and religion.
3. Modeling a climate of openness, inquiry, fairness and support.
4. Identifying and value the mathematics of different cultures (how concepts are presented, what is valued, where it is used, etc.)
5. Identifying the effect of inequitable practices in the classroom and addressing these practices when they occur.
6. Nurturing collaboration among all students and respecting students' cultural and family background.