

## **Program Cover Document --- MTT 380: Methods of Teaching Mathematics I**

### **I. Basic Course Information**

MTT 380: Methods of Teaching Mathematics I is primarily a junior level course. It is scheduled for two 80-minute meetings each week, with an optional fourth hour to be used at the instructor's discretion. Its prerequisites are MAT 200, MAT 205, and MAT 229. It is the first course in a two-course sequence of professional courses designed for mathematics education majors. This course will be a writing intensive course to satisfy the sophomore/junior level writing intensive liberal learning requirement.

### **II. Learning Goals**

The content and performance goals for MTT 380 and the second professional course, MTT 390, directly address the goals of the MATT program. In MTT 380, they will begin to comprehend the scope and sequence of K-12 mathematics with a focus on the middle school level.

Students in MTT 380 will begin to relate their subject matter knowledge to content pedagogy appropriate for mathematics. They will be introduced to national and state standards for mathematics and standards-based teaching and curricula. This will form the basis for discussing appropriate instructional strategies, theories of learning, materials, and technology. In addition, students will begin to learn how to continue their professional development beyond graduation.

An additional learning goal for MTT 380 is to help students develop as writers in the context of their field of study.

### **III. Student Assessment**

The assessment in MTT 380 is a crucial part of the assessment plan for the Math Secondary Education program. This will be the first time the student is assessed on the pedagogical goals for the program. It will be vital to get evidence of student progress and to give feedback at this point before the student takes part in the junior and senior field experiences where he/she will be teaching mathematics to middle or high school grade students. All of the written assignments and projects in MTT 380 are designed as learning activities as well as methods of assessment. For example, creating lesson plans is preparation for Clinical I and II. Since this is a writing intensive course, students will receive detailed feedback on all written assignments and revise as necessary to improve writing competency.

Student performance on these assessment instruments and the performance of students in their future professional courses, such as MTT 390 (part of Clinical I) and MTT 490 (Clinical II), will be used to assess the success of MTT 380 in achieving its learning goals and its contribution to the fulfillment of the Math Secondary Education program goals.

### **IV. Learning Activities**

Students must experience standards-based teaching and learning in order to understand how to implement it. Learning activities should be situated in middle school content and a variety of strategies and methods of instruction should be used to model effective teaching of mathematics. Learning activities will consist of a combination of lectures, demonstrations, explorations, group work, participation in class discussions, readings, writing and revising papers and other assignments, including lesson plans.

This study of standards-based teaching will continue in MTT 390 as they focus on high school curricula. In the second course of the sequence, students will have to develop a unit plan and teach a two-week mini-unit in their field placement. The foundation they build in MTT 380 will help prepare them for this experience.

## Sample syllabus:

**MTT 380**-Methods of Teaching Mathematics I (writing intensive) 1 course unit  
Fall, 2022

Instructor: Cathy Liebars

Office: Math and Stat Department office, P231

Days and times of scheduled office/student hours:

M 2:30 – 3:20, Th 11:00 – 12:00 and 2:30 – 3:20; Other hours by appointment

Phone: 771-3043

E-mail: liebars@tcnj.edu

Expectations for response times: *24 hours on weekdays, 48 hours on weekends*

**PREREQUISITES:** MAT 200 (Discrete Math), MAT 205 (Linear Algebra), and MAT 229 (Multivariable Calculus)

### Course Description and Purpose:

In addition to subject matter knowledge, an effective teacher needs to have pedagogical content knowledge. MTT 380 is the first in a two-course sequence of professional courses designed to prepare mathematics education majors to teach mathematics effectively. You will be introduced to national and state standards for K-12 mathematics, and learn how to teach according to these standards. Topics include the use of manipulatives and technology in teaching mathematics, learning theories, leading mathematical discussions, and the investigation of standards-based curricula. These topics will be situated in the content of middle school mathematics. You will make connections between your college mathematics courses and middle school mathematics. This is a writing intensive course and as such, you will be expected to submit written assignments for feedback and make revisions.

### Learning Goals

Content goals: You will become familiar with the national and state standards relating to mathematics instruction, know how to teach according to these standards, and become familiar with standards-based curricula. You will understand learning theories and how they apply to the teaching and learning of mathematics. You will know what it means to teach through problem solving. You will understand the mathematical content of the middle school mathematics curricula and become familiar with the manipulatives and technology that are available for teaching it. You will lead mathematical discussions focused on argumentation. Many of you will enter the course with the misconception that doing mathematics is merely doing computation. You will learn that the mathematical habits of mind of a mathematical thinker and problem-solver, such as reasoning and explaining, modeling, seeing structure, and generalizing, should be a focus of the entire K-12 curriculum, according to national and state standards. You will come to a new understanding of what it means to “do mathematics” at any level.

The course goals are tied to the five principles of the School of Education’s Conceptual Framework, Creating Agents of Change (CF 1-5):

**CF 1. Demonstrating Subject Matter Expertise**

**CF 2. Demonstrating Excellence in Planning and Practice**

**CF 3. Demonstrating a Commitment to All Learners**

**CF 4. Demonstrating a Strong, Positive Effect on Student Growth**

**CF 5. Demonstrating Professionalism, Advocacy, and Leadership.**

Performance goals: The successful student completing this course should be able to do all of the following:

- Demonstrate understanding of national and state standards.(CF 2)
- Select and use appropriate concrete manipulative materials, activities, performance tasks, textbooks, technology, and other representations to develop conceptual understanding, procedural fluency, mathematical reasoning, problem-solving skills, and precise mathematical communication. (CF 2)
- Demonstrate use of appropriate calculators and computer software in teaching mathematics. (CF 2)
- Utilize effective strategies, based in theory of learning, for teaching various mathematical topics in the middle school curriculum. (CF 2)
- Demonstrate knowledge of various methods of assessment and evaluative criteria. (CF 2)
- Reflect on his/her own growth as a doer and teacher of mathematics. (CF 1, CF 5)
- Demonstrate knowledge of print and electronic resources available to them. (CF 5)
- Demonstrate progress as a writer.
- Demonstrate ability to lead a mathematical discussion with a group of student avatars. (CF 2)

#### **Course Materials:**

- 1) *Teaching Student-Centered Mathematics, Developmentally Appropriate Instruction for Grades 6-8, 3<sup>rd</sup> ed.*, Van de Walle, Bay-Williams, Lovin, and Karp, Pearson Education, Inc., 2018. – **Must be purchased through Perusall. Access code available in bookstore. You must access Perusall through Canvas.**
- 2) *National Council of Teachers of Mathematics (NCTM) Standards:* Some of the readings for the course are from the *Principles and Standards for School Mathematics (PSSM)*. These will be posted in Perusall along with a few other random resources.
- 3) *New Jersey Student Learning Standards*– will serve as a reference  
<http://www.state.nj.us/education/cccs/2016/math/standards.pdf>

#### **Course Requirements and Grading:**

You must experience standards-based teaching and learning in order to understand how to implement it. Learning activities will be situated in middle school content and a variety of strategies and methods of instruction will be used to model effective teaching of mathematics. Learning activities will consist of a combination of lectures, demonstrations, explorations, group work, participation in class discussions in class and on Perusall, readings, written homework assignments, writing in class, discussion simulation, and writing lesson plans. Outside of class, you are expected to do a significant amount of individual or group homework to achieve the learning goals.

Your final grade will be based on the following:

- 20% midterm exam
- 25% final exam
- 10% class participation
- 5% autobiography
- 10% Teacher Moment(TM)/case study analysis
- 10% Lesson plan 1
- 10% Lesson plan 2

10% Avatar-based simulation (ABS) reflection(s)

Class policies:

1. All assignments must be submitted electronically on Canvas by the due date. For each day an assignment is late, it will drop 10% of the grade. If you need an extension, please contact me prior to the due date to discuss.
2. Additional assignments for extra credit will not be given.
3. Students are responsible for any work that is missed.
4. Make-up exams will be given for excused absences in which case I must be notified within 24 hours of the missed exam. Documentation may be required. Make-up exams will generally be harder.

**Exams:**

The exams will be short essay type exams and will be discussed further in class before the time of the exams. See tentative course outline for dates.

**Participation:**

The class participation grade will be determined by contributions to class and preparation for class, including Perusall assignments and participation in simulations.

A general rubric for class participation follows:

	<b>Unsatisfactory 0-4</b>	<b>Basic 5-6</b>	<b>Proficient 7-8</b>	<b>Distinguished 9-10</b>
<p><b>**Class Contributions and Preparation</b></p> <p><i>*Participation may be reduced by absence or tardiness</i></p> <p>**Contributing positively to a class also means listening to, acknowledging, and respecting opinions of others.</p>	<p>Student almost <b>never</b> contributes to class by offering ideas and asking questions, and/or is almost never prepared for class.</p>	<p>Student sometimes contributes to class by offering ideas and asking questions, rarely volunteers to present work, and/or is inconsistently prepared for class.</p>	<p>Acts professionally, often proactively contributes to class by offering ideas and asking questions, volunteers to present work, and is usually prepared for class.</p>	<p>Acts professionally at all times, consistently and proactively contributes to class by offering ideas and asking questions, including during group work, consistently volunteers to present work, actively listens when others speak, and is always prepared for class.</p>

- **\*Note that your participation grade will not be affected if you are ill and cannot attend class. Please do not come to class if you are sick! A zoom option will be available for anyone who is sick and/or must isolate. Please note that zoom is ONLY to be used in cases of illness or isolation. Otherwise, you are expected to attend class as usual.**

**Perusall**

**Log into Perusall only through Canvas!** Readings will be discussed on Perusall. You must sign in to Perusall through Canvas to complete the reading assignments. You will receive a participation score for each Perusall assignment on a scale from 0 to 2. The grade is based on a number of factors, including frequency of responses and the relevance of the responses.

Perusall helps you **learn faster** by collaboratively annotating the readings and communicating with your classmates. Collaboration gets you help whenever you need it, makes learning more fun, enables you to help others (which research shows is also a great way for you to learn), and helps the instructor make class better by emphasizing information that you need.

If you have a question or information to share about a passage in the readings, highlight the text and type in a comment as an annotation. You can also respond to a classmate's annotation in threads (Facebook style) in real time or upvote questions/comments you find helpful. Good annotations contribute to the class by stimulating discussion, explaining your thought processes, helping others, and drawing attention to good points. If a particular classmate's point is relevant, you can explicitly "mention" them and they will be immediately notified, even if not presently signed on.

Research shows that the following behaviors on Perusall predict higher end-of-semester grades and long term mastery of the subject. These behaviors contribute to your grade in Perusall.

- Contributing thoughtful questions and comments to the class discussion, spread throughout the entire reading ([see some examples](#))
- Starting the reading early
- Breaking the reading into chunks (instead of trying to do it all at once)
- Reading all the way to the end of the assigned reading
- Posing thoughtful questions and comments that elicit responses from classmates
- Answering questions from others
- Upvoting thoughtful questions and helpful answers

**Writing assignments:**

This is a writing intensive course and as such, you can expect to do a good deal of writing in and out of class. The following are some resources you should consult:

- "Understanding Assignments" from the University of North Carolina at Chapel Hill Writing Center – found on Canvas under Files
- <http://www.tcnj.edu/~writing/index.html> is the link for the college's writing program homepage

\*Note: You may select one assignment over the course of the semester to revise based on feedback and re-submit before the week of finals.

## (Very) Tentative Course Schedule

**4<sup>th</sup> hour:** Note that the course is scheduled for Monday and Thursday, 3:30 – 5:20, which includes a 4<sup>th</sup> hour split up into extra half-hours on each class meeting. The 4<sup>th</sup> hour will sometimes be used for group activities but may also be used to continue class discussion or other activities.

Dates	Content	Reading (Note: this is a rough outline from past years – all reading assignments will be posted and completed in Perusall)
9/1	Intro. to NCTM <i>Standards</i> and New Jersey Learning Standards/Common Core Standards Intro to the Online Practice Suite (OPS)	Chapter 1 from <i>PSSM</i> , “A Vision for School Mathematics,” pp. 3-8 Introduction to Common Core Standards, <a href="http://www.corestandards.org/Math">http://www.corestandards.org/Math</a>
9/6 – 9/8	Learning theory Teaching with problems 3-part lesson format	Van de Walle, Chapter 1 CCSS: <i>Mathematical Practices</i> , Problem Solving (1) Van de Walle, Chapter 2
9/12 – 9/15	Fraction concepts and misconceptions Operations on fractions Multiple Representations Decimal computation Percents <b>Math Autobiography due</b>	Van de Walle, Chapter 8 CCSS: <i>Mathematical Practices</i> , Modeling & Using Tools (4 & 5) Representation Standard for grades 6-8 Van de Walle, Chapter 9
9/19 – 9/22	Proportional reasoning Reasoning and Proof Selecting worthwhile tasks	Van de Walle, Chapter 11 CCSS: <i>Mathematical Practices</i> , Reasoning (2) Reasoning and Proof Standard for grades 6-8 Case studies
9/26 – 9/29	Classroom Discourse and prep for TM <b>Complete TM</b> Integers Connections	“Communications Standard for Grades 6-8”, PSSM CCSS: <i>Mathematical Practices</i> , Argumentation (3) Van de Walle, Chapter 10 CCSS: <i>Mathematical Practices</i> , Seeing Structure & Generalizing (7&8)
10/3 – 10/6	Debrief TM Writing objectives and lesson planning Attending to precision Geometry Van hiele model of Geometric thought <b>TM/Case Study Analysis due</b>	“Developing Lesson Plans: An Open-ended Approach,” Sawada Van de Walle, Chapter 13, pp. 298 - 322 CCSS: <i>Mathematical Practices</i> , Precision (6)
10/10 – 10/13	Fall break National metric week Developing Measurement concepts and formulas	Van de Walle, Chapter 14
10/17 – 10/20	Cooperative learning Pythagorean Theorem <b>Midterm exam</b>	. “Using Cooperative Learning in Math,” Johnson, <i>Cooperative Learning in Mathematics: A Handbook for Teachers</i> , pp. 103-125.

10/24 – 10/27	Technology and NCTM position statement Geometric transformations Coordinate Geometry Differentiating instruction	Technology principle,” <i>PSSM</i> , pp. 24 – 27 Van de Walle, Chapter 4 Van de Walle, Chapter 13, pp. 323-339
10/31 – 11/3	Data Analysis Assessment <b>Lesson plan 1 due</b>	Van de Walle, Chapter 15 Van de Walle, Chapter 3 “Assessment Principle,” <i>PSSM</i> , pp. 22-24.
11/7 – 11/10	Preparation for ABS Rubrics Grading Probability <b>ABS Simulations</b>	Article on argumentation Van de Walle, Chapter 16
11/14– 11/17	Diverse learners Cultural and Linguistic Diversity <b>ABS Simulations</b> Debrief ABS	Van de Walle, Chapters 5 & 6 “Equity Principle,” <i>PSSM</i> , pp. 12 – 14.
11/21 - 11/24	Pattern Generalization <b>Simulation reflection due</b> Thanksgiving Break	Van de Walle, Chapter 12
11/28 – 12/1	Variables and Equations Exploring Functions <b>Lesson Plan 2 due</b>	
12/5 – 12/8	Use of algebra tiles Qualitative graphs	“Creating Connections: Promoting Algebraic Thinking,” Chappell and Strutchens.
12/12 - 13	Reading Days Review for final exam	
12/14 - 20	Final exam scheduled by Records & Registration	

### SELECTED TCNJ POLICIES

Please note that the “[TCNJ Student Support Resources and Classroom Policies](#)” webpage contains all of the relevant policies mentioned below and others that govern the classroom.

#### Final Assessment

All courses are to have a final assessment and no final assessments will be scheduled before the final exam period. Students are expected to take their final assessments in the time blocks assigned by Records and Registration. Students must notify the instructor two weeks before the final assessment if they have a conflict as defined by the Final Assessment and Reading Day policy.

#### Attendance

*Students are expected to check the college calendar, and plan their course schedules and vacations so as to enroll only in those classes that they can expect to attend on a regular basis. Students are expected to participate in each of their courses through regular attendance at lecture and laboratory sessions, complete assignments as scheduled, and to avoid outside conflicts, including for the final exam. It is further expected that every student will be present, on time, and prepared to participate when scheduled class sessions begin. In all circumstances, it*

*remains the student's responsibility to initiate discussion about absence and arrangements for making up any missed work with each instructor.*

### **Academic Integrity Policy**

The College of New Jersey is a community of scholars and learners who respect and believe in academic integrity. This integrity is violated when someone engages in academic dishonesty. Complaints of student academic misconduct will be addressed and adjudicated according to the *Academic Integrity Procedural Standards*.

### **COMMITMENT TO DIVERSITY, EQUITY, INCLUSION, ACCESS AND BELONGING**

The TCNJ community is composed of people with diverse backgrounds, perspectives, and experiences, and the college is committed to diversity, equity, inclusion, access and belonging. The college's Campus Diversity Statement can be viewed here: <https://diversity.tcnj.edu/campus-diversity-statement/>.”

### **CLASSROOM ENVIRONMENT AND COMMITMENT TO STUDENT SUCCESS, SAFETY AND WELL-BEING**

The TCNJ community is dedicated to the success, safety and well-being of each student. TCNJ strictly follows key policies that govern all TCNJ community members' rights and responsibilities in and out of the classroom. In addition, TCNJ has established several student support offices that can provide the support and resources to help students achieve their personal and professional goals and to promote health and well-being. You can find more information about these policies and resources at the “TCNJ Student Support Resources and Classroom Policies” webpage here: <https://academicaffairs.tcnj.edu/tcnj-syllabus-resources/>.

Students who anticipate and/or experience barriers in this course are encouraged to contact the instructor as early in the semester as possible. The Accessibility Resource Center (ARC) is available to facilitate the removal of barriers and to ensure reasonable accommodations. For more information about ARC, please visit: <https://arc.tcnj.edu/>.”