Sample syllabus (Specific details can vary, but all of the sections below must be included.)

Math 596 Concepts for Teaching Mathematics in the Elementary and Early Childhood Classroom

Instructor:
Office:

Days and times of scheduled office/student hours:

Phone:
E-mail:
Expectations for response times:

Course Materials:

- Textbook: *Mathematics for Elementary School Teachers*, 7th edition by Bassarear & Moss. We will cover Chapters 1-4 and possibly Chapter 6 in this course.
- Canvas: Explorations Manual, Assignments, materials, and grades will be posted here.

Course Description:

This course concerns a thorough development of fundamental concepts, such as patterns, numeration, algorithms, mathematical systems, real numbers, and quantitative reasoning. We will study the fundamental principles that underlie elementary school mathematics from an advanced viewpoint, building on knowledge that you bring with you from your K-12 education.

You will be required to reason mathematically, solve problems, and communicate mathematics effectively at different levels of formality, using a variety of representations of mathematical concepts and procedures. Physical materials and models will be used to explore fundamental properties of number systems, to model algorithms, and to explore selected algebraic structures.

Course prerequisites:

This course will study the fundamental principles that underlie elementary school mathematics from an advanced viewpoint, building on knowledge that students bring with them from their K-12 education. Students must be in the ELEM MAT or post-bac certification in ELEM program to enroll or have the permission of the instructor.

Course Purpose and Learning Goals

Why do we "invert and multiply" when dividing fractions? How do other numeration systems compare to our base ten system? How do we know that 0.9999… = 1? How can we visually represent multiplication of any type of numbers? Is 0 odd or even? Why can't we divide by 0? These are the types of questions we will answer in this class.

Content goals: In Math 596, students will engage in a thorough development of fundamental concepts, such as patterns, numeration, algorithms, mathematical systems, real numbers, and quantitative reasoning. Through this process, you will develop understanding of the processes and algorithms found in elementary mathematics and discover purposes beneath the symbols and techniques. You may enter the course with the misconception that mathematics is all about computation and following procedures.

Through careful consideration of many types of problems and alternative algorithms, you will come to understand that mathematics is much more than computation, and that there is often more than one approach to solving any problem.

Performance goals: By the completion of the course, the successful student will be able to demonstrate all of the following:

- Understanding of the processes and algorithms, and the purposes beneath them, found in the elementary mathematics topics mentioned above.

- An improved ability to communicate mathematical ideas appropriately using the language of mathematics.

- An improved ability to reason mathematically.

- A willingness and ability to solve various types of mathematical problems using appropriate strategies.

- Knowledge of the relationship of mathematics to other subjects, its applications in society, and relationships within mathematics itself.

- An appreciation of the history, structure, and application of mathematics.

- Apply formal logic or numerical analysis to evaluate a quantitative claim, guide a decision, solve a problem, or answer a question.

Format:

The course you are about to begin may be different from any math course you've had before. In this course you will learn the mathematics you need to become a more effective teacher. This is not a methods course. You will take ELEM 522 to learn methods of how to teach mathematics. However, it is often said that teachers teach in the manner in which they learned a subject.

What kind of mathematics do teachers need to know? It is mathematics that helps teachers better understand how their students are thinking about mathematics and how they can help their students improve their thinking. It is mathematics that helps teachers see how the different topics in elementary and middle school fit together. It is mathematics that helps teachers see behind all the things they have learned before so they can understand why they work and so they can help their students understand.

This is a different kind of mathematical knowledge. Learning this mathematics requires that you start fresh, that you ‘unpack’ your current and previous mathematical understandings. It requires that you become curious, genuinely curious, about how and why all those rules in mathematics work like they do, and about the methods children are likely to use to solve mathematical problems and why some of these methods are useful for them and some are not.

Because you will be thinking about elementary topics in mathematics in a new way, you will notice very soon that you are not doing the usual kinds of things. You will not be shown how to do some sample problems and then asked to practice more on your own. Instead:

- You will solve new kinds of problems that are designed to provide insight into several mathematical topics and promote your mathematical reasoning skills. Thus, you will understand familiar problems more deeply.

- You will examine patterns and structure; formulate generalizations and conjectures; investigate and test your conjectures using concrete or virtual materials, calculators, and other tools; and construct and evaluate mathematical arguments. You will learn to ask yourself: Is there a pattern? What might happen next? Can I make a generalization or conjecture? Do I think my conjecture is true for all cases, true for some cases, true for no cases (that is, false for all cases), and why? Under what circumstances is it not true? Can I give an example? Why does it work? How might I convince my group members that my conjecture is correct?

- And you will frequently be asked to explain your reasoning – how you were thinking while you were solving a problem, why you think students will solve problems in a particular way, and why you think some methods for solving problems work better than others. Developing good explanations that are convincing to others is the best way to know that you understand.

- My role extends beyond direct instruction to support and facilitate your engagement with and exploration of the material.

Course Requirements and Grading:

3 quests	45%
Class participation	10%
homework/opportunities	20%
final exam	25%

Grading scale

A	95 – 100%
A-	90 to < 95%
B+	87 to < 90%
B	83 to < 87%
B-	80 to < 83%
C+	77 to < 80%
C	73 to < 77%
C-	70 to < 73%
D+	67 to < 70%
D	60 to < 67%
F	< 60%

Class policies:

1. Additional assignments for extra credit will not be given.
2. The instructor must be contacted prior to any due date to negotiate alternative arrangements if necessary. 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.
3. Students are responsible for any work that is missed. Canvas should be checked for any updates.
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.

Homework problems:

Homework will be assigned frequently. It will not be collected and graded. Instead, we will use Canvas to record videos of homework solutions. You will each choose 4 or 5 homework problems over the course of the semester to solve and present via video recording. (You will not be permitted to sign up for more than one problem until everyone has an opportunity to do a problem in that round.) A rubric for the homework solution presentations will be distributed. Keep in mind that your classmates will be watching your videos to try to understand how to solve the homework problems that they weren't able to solve so you should explain the solution clearly. Canvas provides the ability to respond to videos so you will be able to ask each other questions about the solutions. If there is a solution with many questions, it may be discussed in class. In addition to working together in class, you are encouraged to work together outside of class on problems. However, the final expression, the answer to a question, the solution and explanation to a problem, are matters for individual action to show that each person comprehends the matter at hand in their own way. Work that is merely copied will not be tolerated.

Exams:

See course outline for dates. The final exam will be given during final exam week at the scheduled time and will be cumulative.

Learning activities:

Learning activities will consist of a combination of lectures, explorations, group work, participation in class discussions, readings, reflections, and recorded presentations.

Class participation:

Participation in the course takes many forms, including working in small groups, participating in whole class discussions, asking questions, listening, presenting your work, preparing for class by completing homework and assigned readings, etc. To be successful in the course, it is important for you to be an active participant. Written reflections/exit tickets done on Canvas will also factor into the class participation grade. Below is a rubric for class participation:

	Unsatisfactory **0-4**	**Basic** **5-6**	**Proficient** **7-8**	**Distinguished** **9-10**

Class Contributions and Preparation ***Participation is reduced by absence or tardiness*** **Contributing positively to a class also means listening to, acknowledging, and respecting opinions of others.	Student almost **never** contributes to class by offering ideas and asking questions, and/or is almost never prepared for class.	Student sometimes contributes to class by offering ideas and asking questions, rarely volunteers to present work, and/or is inconsistently prepared for class.	Acts professionally, often proactively contributes to class by offering ideas and asking questions, volunteers to present work, and is usually prepared for class.	Acts professionally at all times, consistently and proactively contributes to class by offering ideas and asking questions sometimes **more than once** per class, consistently volunteers to present work, and is always prepared for class.

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.

- **Important note:** *Incorrect solutions* can add value to a problem. Your participation grade is therefore not based on the correctness of your work.

Tentative Course Schedule (subject to revision as needed)

Dates	**Content**	**Reading**
8/28	Foundations for Learning Mathematics	Section 1.1

9/4	Foundations for Learning Mathematics Sets, Number Systems	Sections 1.1 & 1.2
9/11	Whole numbers and place value Addition of whole numbers	Sections 1.2 & 3.1
9/18	Subtraction of whole numbers	Section 3.2
9/25	Multiplication of whole numbers **Quest 1**	Section 4.1
10/2	Multiplication and Division of whole numbers	Sections 4.1 & 4.2
10/9	Division of whole numbers	Section 4.2
10/16	Fractions	Section 2.2
10/23	Fractions	Section 2.2
10/30	Addition and subtraction of fractions **Quest 2**	Sections 3.3 & 3.4
11/6	Addition and subtraction of fractions	Sections 3.3, 3.4, & 4.3

	Multiplication and division of fractions	
11/13	Multiplication and division of fractions	Section 4.3
11/20	Decimals and real numbers	Section 2.3
11/27	Thanksgiving break	
12/4	Algebraic Thinking (if time permits) **Quest 3**	Parts of Chapter 6
12/9-10	Reading Days Review for final exam	
12/11	Final exam	

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/."