EECE 350: Teaching Mathematics in the Elementary School
Sample Syllabus with ungrading, NACE career competencies, and care statement

Professor Contact Information
Professor: Dr. Grace Pai, PhD
Email:
Office :
Office Hours:

Course Information
Course Section:
In person classes:
Location:

Professor Pai's care statement
I care about you, how you do in this class, and how you do in life.

First off, I'm here to talk about how this course fits into your overall career and life trajectory. QC has a great career office to help students – take advantage of them! Some of you may also face challenges throughout the semester including struggles with academics, finances, or your personal well-being. As your professor, I believe your mental health is key to your academic success. QC and CUNY offers counseling services on-campus that are available to you at no cost. All counseling services provided are completely confidential and in no way connected to your academic record. I strongly encourage you to take advantage of this valuable resource if you are interested or find yourself struggling and in need of additional support. QC also offers other supports such as emergency grants, health services, and food distribution. Ask me if you find yourself needing these supports. *Finally, make sure you reach out to me about any difficulty you may be having that may impact your performance in this course <u>before</u> you potentially fall behind in the course so we can discuss how I can support you and the possibility of alternative arrangements.*

I. Course Description, Standards and Goals

COURSE DESCRIPTION: This course is designed to introduce pre-service childhood educators to the mathematical content and methods most effective for teaching elementary school mathematics. Students will learn to teach elementary mathematics inclusively and equitably, while deepening his or her understanding of the exciting mathematical content. The link between mathematics, pedagogy and meaningful mathematical tasks makes this a truly interdisciplinary course.

This course is aligned with the Core Values of the Education Unit of promoting *Equity*, *Excellence*, and *Ethics* in urban schools and communities. More specifically, the Education Unit is committed to preparing teachers and other school professionals who: a) build inclusive communities that nurture and challenge all learners; b) demonstrate professionalism, scholarship, efficacy, evidence-based practice and reflection; and c) value diversity, democracy, and social justice.

STANDARDS: The Council for the Accreditation of Educator Preparation (CAEP) has set standards for K-6 elementary teacher education. The goals of this course align with many of those standards as outlined below:

DEVELOPMENT, LEARNING, AND MOTIVATION

1.0 **Development, Learning, and Motivation**: students will learn to know, understand, and use the major concepts, principles, theories, and research related to development of children to construct learning opportunities that support individual students' development, acquisition of knowledge, and motivation.

CURRICULUM

2.b **Mathematics**: students will learn to know, understand and use the major concepts and procedures that define Number and Operations, Algebra, Geometry, Measurement, Data Analysis and Probability. In doing so they consistently engage problem sovling, reasoning and proof, communication, connections, and representation.

INSTRUCTION

3.1 **Integrating and applying knowledge for instruction**: students will learn to plan and implement instruction based on knowledge of children, learning theory, connections across the curriculum, curricular goals, and community.

3.2 **Adaptation to diverse students**: students will learn to understand how elementary aged children differ in their rates of development. Approaches to learning, and the creation of instructional opportunities that can be adapted to diverse learners are to be explored.

3.3 **Development of critical thinking and problem solving**:

students will learn to understand and use a variety of teaching strategies that encourage elementary aged children to develop critical thinking and problem solving strategies.

3.4 **Active engagement in learning**: students will learn to apply their knowledge and understanding of individual and group motivation and behavior among elementary aged children to foster active engagement in learning, self motivation, and positive social interaction and to create supportive learning environments.

3.5 **Communication to foster collaboration**: students will learn to use their knowledge and understanding of effective verbal, non-verbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the elementary classroom.

ASSESSMENT

4.0 **Assessment for instruction**: students will learn to know, understand, and use formal and informal assessment strategies to plan, evaluate, and strengthen instruction that will promote continuous intellectual, social, and emotional development of individual elementary children.

PROFESSIONALISM

5.1 **Professional growth, reflection, and evaluation**: students will learn to be aware of and reflect on their practice in light of research on teaching, professional ethics, and resources available for professional learning. Moreover, learning to evaluate the effects of

professional decisions and actions on pupils, families, and other professionals in the learning community, will be addressed including finding ways to grow professionally.

II. Course Objectives

- Demonstrate and apply understandings of major mathematics concepts, algorithms, procedures, applications and mathematical practices in varied contexts, and connections within and among mathematical domains (CAEP Standard 2.b)
- Develop understanding of how to apply the Next Generation elementary math standards – including the vertical progression of mathematical concepts across grades – to create appropriately scaffolded lessons and learning goals
- Learn to use a variety of assessment strategies to evaluate student progress in mathematics, including how to address potential misconceptions
- Develop an understanding of how to apply mathematical practices grounded in a constructivist view of learning to support student motivation and engagement
- Create student-centered, problem-based lessons, tasks and routines that is differentiated for diverse learners

III. Career competencies

The [National Association of Colleges and Employers](#) developed a framework of 8 career competencies (see list on right) to form a shared understanding of what is needed to launch and develop a successful career, a common vocabulary by which to discuss needs and expectations, and a basic set of skills upon which a successful career is launched. Each major assignment in this course is designed to develop one or more of these competencies.

- Career & Self-Development
- Leadership
- Communication
- Professionalism
- Critical Thinking
- Teamwork
- Equity & Inclusion
- Technology

IV. Anthology

The Education Unit (EPP) uses Anthology Portfolio (previously known as Chalk and Wire) as an electronic portfolio and assessment system. When candidates are admitted to one of the undergraduate or graduate programs in the EPP, they will be required to purchase an Anthology Portfolio subscription in order to submit their assignments as directed until graduation. Designated course work will be assessed by faculty for professional knowledge and skills through key program course assignments. The electronic portfolio system is not used for grading purposes.

Your Anthology Portfolio helps you collect, organize, and reflect on your academic work. It can contain files, images, and multimedia that document your academic progress, enriching your learning, sharpening your technological skills, and preparing you for certification. You can also

share your professional ePortfolio with colleagues, and potential employers. The Anthology Portfolio is a great tool to use when applying for internships, employment, or graduate schools.

Candidates that need to create an Anthology Portfolio account or renew an existing account must visit the following website to view the subscription options available for purchase:

   https://qccuny.chalkandwire.com/SecureUrlPage.aspx?urlId=36191&u=guest&cus=343

If you already have an active Anthology Portfolio account, you will not need to purchase a renewal until the current subscription expires. You can check your account's expiration by logging into your account and clicking on your name in the upper right-hand corner.

V. Required purchases

- Anthology subscription (ranging from $75 to $164 for a 1 to 5 year subscription)
- Math manipulative kit from EAI ($60.11 including shipping)
- There is no required textbook for this course. Readings will be posted in Blackboard.
- *OPTIONAL textbook: I highly recommend Elementary And Middle School Mathematics Teaching Developmentally by Van de Walle, Karp and Bay-Williams, which is a great textbook that is easy to read and full of resources and activities that will be helpful for your teaching career.*

VI. Course Expectations

Authentic growth based on critical reflection
My goal is for each and every one of you to grow as a future math teacher. This can only happen through you engaging in critical self-reflection and authentic engagement in the course content. Please do not rely on simply using chatbots like ChatGPT or apps to help you complete the course assignments. If you use them at all, it should be through a critical lens to deepen your work, where you still apply your own creativity (and humanity) to your products.

Attendance
Please email me if you cannot make it to class or are going to be late.

Use of Cell Phone and other Electronic Devices in class
In order to maximize what you get out of this course, do not take away from your learning or efforts with digital distractions. Let's all be fully present when we are together.

Positive Participation
Check anything that's weighing you down at the door when you arrive to class. Bring an open mind and positive attitude to our class community. Participate actively. Offer your ideas and ask questions. There's never one right answer or approach to any question or problem. Actively listen to, respond to, and respect your peers.

VII. Grading

"**Ungrading**" is an alternative pedagogical approach towards assessing learning that de-centers the importance of traditional grades, scores and ranking to instead focus on deepening individual student learning ([Blum](link), 2020). It critically questions the conventional grading system by challenging commonly used practices like learning outcomes, rubrics, grading on a curve, and participation grades (Stommel, 2020).

What does that actually mean?
Instead of emphasizing summative outcomes in this class, I would like for us to emphasize the reflection, intrinsic motivation, and feedback that undergirds the *process* of learning. You will be engaging in many ungrading practices throughout the semester such as designing your own rubric as a class, having choice in what you're assessed on, and conducting peer as well as self-assessments. In a nutshell, you should focus on reflecting on what you are actually learning, and I will focus on providing you feedback rather than scores or grades.

Does that mean I don't get a final course grade? *(The answer is no. You do still get a final course grade!)*
It is important to point out that we are still part of a university that requires grades that calculate into your GPA. However, you will have an individual end-of-semester grade conference with me where you reflect beforehand on what you learned throughout the course and have 10 minutes to talk to me about your key takeaways along with what final grade you think you should get in the course. In this way, I want you to be a part of the process of deciding what your final grade should be. Again, final grading for this course is still based upon the standard point and letter grade system. A complete guide to the Queens College's grading conventions is available at [Academic and Grading Policies](link).

VIII. Course assignments

	How you will be assessed	NACE career competencies
Math autobiography (5%)	Check for completion + feedback	Self-development
Math tasks (25%)	Check for completion + feedback	Professionalism; critical thinking
Reflection journal (10%)	Check for completion + feedback	Self-development; critical thinking
Mathematics in literature assignment, in pairs (20%)	Self + peer using class-designed rubric	Teamwork; communication; leadership
Final exam (15%)	Self + Prof. Pai using CST rubric	Critical thinking;
Lesson plan (25%)	Prof. Pai using Anthology rubric w/adjustments based on your reflection	Equity & inclusion; communication; technology

Math autobiography (5%): You will begin this course writing a portrait of what a typical math lesson in your class is like, before sharing your own history of math learning and how this

influences your teaching. You will also send this as a letter to your future self that you will receive on the last day of class so that you can use this in your final end-of-semester reflection.

Math tasks (25%): Throughout the course, you will complete math tasks aligned to the Next Generation math standards, New York State Elementary Math exams, and the CST math exam you must take to obtain initial certification. These math tasks are a chance for you to practice how to teach new math strategies you learn in class while familiarizing yourself with these state exams.

Reflection journal (10%): You will be completing 2 journal entries throughout the semester, in which you will: (1) assess a lesson plan from ChatGPT or Engage NY on whether it effectively promotes productive struggle, math discourse, and cultural responsiveness; (2) complete an end-of-semester reflection on what you learned throughout this entire course.

Mathematics in literature assignment (10%): For this assignment, you will work in pairs to find 5 books that you can use in teaching a math lesson or concept. See more details in Week 7 of the course schedule.

Lesson Plan (25%): The purpose of this field assignment is to demonstrate your ability to develop a lesson plan with a quality math task around a math standard of your choice, teach it to a class or small group of children (e.g. 3-5), and observe student thinking. You will first *submit a draft lesson plan by March 2 for feedback*. You will then teach it in the field, collect at least 3 samples of student work, and use that to reflect on your students' reaction to your lesson plan and potential misconceptions. At the end of the semester, you will be required to turn in your lesson plan, student work samples, and a reflection of how you would revise the lesson to improve your instruction.

Final exam (15%): In this exam, you will be given samples of student work from the concepts we have already covered in class. For each student sample, you will analyze what is the student's misconception, articulate what your next teaching step would be, and plan individualized interventions for the student. The exam and assessment is also purposely formatted like the open, constructed response portion of the CST exam to help you prepare for that test. Concepts may include: Whole-number place-value, addition, subtraction, multiplication, division, algebraic thinking, measurement and data, and fraction and decimal concepts. This will be a take-home exam that you will then peer review in class, before turning it in to be graded by Prof. Pai and yourself.

IX. Tentative Course Schedule

Weekly assignments and details will be posted in Blackboard. Each week we will explore a math content topic that is aligned to the CAEP and Next Generation math domains, as well as a pedagogy topic designed to help you teach math.

CLASS	MATH TOPIC (from CAEP)	PEDAGOGY TOPIC
WEEK 1 1/26	• Introduction to course and each other (3-minute manifesto activity) • Introduction to Next Generation elementary math domains	Overview of math mindset
WEEK 2 2/2 Due: Math autobiography	**Number and operations in base ten:** • Understand the intricacy of counting, including the distinction between counting as a list of numbers in order and counting to determine a number of objects. • Understand how the base-ten place value system relies on repeated bundling in groups of ten and how to use varied representations including objects, drawings, place value cards, and numerical expressions to help reveal base-ten structure.	Selecting "good" math tasks (Smith & Stein, 1998) that foster productive struggle
WEEK 3 2/9	**Number and operations in base ten:** • Explain how efficient base-ten computation methods for addition, subtraction, multiplication, and division rely on decomposing numbers represented in base ten according to the base-ten units represented by their digits and applying (often informally) properties of operations, including the commutative and associative properties of addition and multiplication and the distributive property, to decompose a calculation into parts. • Know how to use drawings or manipulative materials to reveal, discuss, and explain the rationale behind computation methods.	Alternative ways to design a lesson (e.g. 3 act tasks and lessons, 5E model, discovery-based You do/We do/I do)
WEEK 4 2/16	**Number and operations (continued):** • Understand teaching/learning paths for single-digit addition and associated subtraction and single digit multiplication and associated division, including the use of properties of operations.	Number talk and facilitating math discourse (Parrish, 2011)
WEEK 5 2/23	**Number and operations – fractions:** • Understand fractions as numbers, which can be represented by area and set models and by lengths and on a number line. Define a/b fractions as a parts,	Learning Trajectories for Vertical Coherence (Confrey, 2022; Achieve the Core)

	each of size 1/*b*. Attend closely to the whole (referent unit) while solving problems and explaining solutions. • Recognize that addition, subtraction, multiplication, and division problem types and associated meanings for the operations extend from whole numbers to fractions. • Explain the rationale for defining and representing equivalent fractions and procedures for adding, subtracting, multiplying, and dividing fractions.	
WEEK 6 3/2 DUE: Lesson plan draft	Number and operations – fractions: • Understand the connection between fractions and division, *a/b* = *a÷b*, and how fractions, ratios, and rates are connected via unit rates. • Reason about how quantities vary together in a proportional relationship, using tables, double number lines, and tape diagrams as supports. • Distinguish proportional relationships from other relationships, such as additive relationships and inversely proportional relationships. • Use unit rates to solve problems and to formulate equations for proportional relationships.	Mathematics through children's literature (Crawford-Mckinney & Ozgun-Koca, 2022) & Introduction to QC library's children's section
WEEK 7 3/9	Mathematics in Literature: In pairs, find 5 books in the QC library and summarize how you can use them to teach math by using THIS FORM to add it to the EECE math in literature online directory.	
WEEK 8 3/16 DUE: Mathematics in literature assignment	Decimals: • Extend the base-ten system to decimals and use decimals to represent and address systems on number lines. Explain the rationale for decimal computation methods. • Developing multiplication and division algorithm for decimals	Writing mathematical prompts and assessing student learning (Casa et al., 2022)
WEEK 9 3/23	Operations and algebraic thinking: • Understand the different types of problems solved by addition, subtraction, multiplication, and division, and meanings of the operations illustrated by these problem types. • Know and understand foundations of algebra within elementary mathematics, including understanding the equal sign as meaning "the same amount as" rather than a "calculate the answer" symbol. • Understand numerical and algebraic expressions by describing them in	Numberless story problems and word problem strategies

	words, parsing them into their component parts, and interpreting the components in terms of a context. • Understand and apply lines of reasoning used to solve equations and systems of equations.	
WEEK 10 3/30	Measurement: • Understand the general principles of measurement, the process of iterations, and the central role of units: that measurement requires a choice of measurable attribute, that measurement is comparison with a unit and how the size of a unit affects measurements, and the iteration, additivity, and invariance used in determining measurements. • Know how the number line connects measurement with number through length. • Understand what area and volume are and give rationales for area and volume formulas that can be obtained by finitely many compositions and decompositions of unit squares or unit cubes, including formulas for the areas of rectangles, triangles, and parallelograms, and volumes of rectangular prisms.	Culturally relevant and sustaining math pedagogy
NO CLASS 4/6 and 4/13 (Spring recess)		
WEEK 11 4/20 DUE: Journal #1	Geometry: • Understand geometric concepts of angle, parallel, and perpendicular, and using them in describing and defining shapes; describing and reasoning about spatial locations (including the coordinate plane). • Classify shapes into categories and reasoning to explain relationships among the categories. • Reason about proportional relationships in scaling shapes up and down.	Differentiating instruction for individual, small group and whole class instruction
WEEK 12 4/27	Data and probability: • Recognize and use appropriate graphs and numerical summaries to describe the distribution of categorical and numerical data. • Understand that responses to statistical questions should take variability into account. • Understand distributions for quantitative data are compared with respect to similarities and differences in center, variability (spread), and shape.	Teaching math to multilingual learners and families

	• Determine and understand theoretical and experimental probabilities of simple and compound events, and why their values may differ for a given event in a particular experimental situation. • Understand the scope of inference to a population is based on the method used to select the sample.
WEEK 13 5/4 DUE in class: Take-home final exam draft	Peer review of final exam + Lesson plan presentations
WEEK 14 5/11 DUE: 1) Final exam w/ self assessment Course evaluations http://courses.qc.cuny.edu/ 2) Submit lesson plan in Anthology	Lesson plan presentations (continued)
WEEK 15: 5/17-22 DUE: Journal #2	Final exam period (Individual end-of-semester grade conferences)

X. FIELDWORK REQUIREMENTS

You are required to teach a mathematics lesson to students (whole class or small group) in the elementary school classroom in which you are placed for your practicum.

XII. USE OF CANDIDATE WORK

All teacher education programs in New York State undergo periodic reviews by accreditation agencies and the state education department. For these purposes, samples of candidates' work are made available to those professionals conducting the review. Candidate anonymity is assured under these circumstances. If you do not wish to have your work made available for these purposes, please let me know before the start of the second class. Your cooperation is greatly appreciated.

XIV. COURSE EVALUATIONS

During the final four weeks of the semester, you will be asked to complete an evaluation for this course by filling out an online questionnaire. Please remember to participate in these course evaluations. Your comments are highly valued, and these evaluations are an important service to fellow students and to the institution since your responses will be pooled with

those of other students. Please also note that all responses are completely anonymous; identifying information is erased once the evaluation has been submitted.