



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



COURSE: EDU 3122

Name: Kim Peddle M.Ed.

Course Title: Math Methods for Elementary Education

MTC Goal Area: _____

Credits: 3 **Pre-requisites:** MATH 1025 Introduction to Contemporary Mathematics

Co-requisites: _____

Course Description: This course is designed to prepare teacher candidates to evaluate, plan, and deliver math lessons appropriate for K-6 students. Candidates will also assess students understanding and skills through a student-centered, inquiry-based approach using the Minnesota Academic standards for K-6 Math. Topics to be covered are standardized skills/concepts in Number & Operation, Algebra, Geometry/Measurement, Data Analysis & Probability. (13 clock hours of field experience are required for this course.)

Recommend Text and/or other Resources (journals, articles, and/or any other additional materials):

- Van de Walle, J (2019) *Elementary and Middle School Mathematics: Teaching Developmentally*, Pearson
- Parrish, S (2014) *Number Talks Whole Number Computation*, Math Solutions

Course Content:

- The Minnesota Academic Standards for K-6 Math. State Process Standards
- The National Council for Teachers of Mathematics (NCTM) Effective Math Teaching
- Teacher preparation for all learners in a technological society
- Mathematics as problem solving, communicating, and reasoning
- Mathematics for all that includes a broad range of content, a variety of contexts, and deliberate connections
- Learning mathematics as an active and constructive process
- Instruction based upon real world problems
- Assessment and evaluation as a means of improving instruction and learning
- The Anishinaabe perspective into mathematics

Outcomes and Assessments:

Learning Outcomes Apply concepts of mathematical patterns, relations, and functions, including the importance of number and the importance of the educational link between primary school activities with patterns and the later conceptual development of important ideas related to functions.

1. Apply concepts and techniques of discrete mathematics and how to use them to solve problems from areas including graph theory, combinatorics, and recursion.
2. Use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the student.
3. Interpret and draw inferences from data investigations.
4. Provide interactions and connections of historical and cultural mathematical perspectives.
5. Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.
6. Use a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.
7. Use a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.
8. Acquire number sense of concepts of numerical literacy.
9. Identify real world applications concepts of space and shape.
10. Make connections among mathematical processes to real world application.

Plagiarism

Plagiarism, or presenting the writing of another as your own (a.k.a. “copying”), results in an F for this course and is subject to any other disciplinary actions mandated by this institution and the Minnesota State system.

Disabilities Notice

Fond du Lac Tribal & Community College is committed to providing equitable access to learning opportunities for all students. Under the Americans with Disabilities Act and Section 504 of the Rehab Act, Fond du Lac Tribal & Community College provides students with disabilities (e.g., mental health, attentional, learning, chronic health, sensory or physical) reasonable accommodation to participate in educational programs, activities or services. Students with disabilities requiring accommodation to participate in class activities or meet course requirements must first complete an intake form and necessary requirements with Nancy Olsen, Disability Services coordinator, to establish an accommodation plan. She can be reached at nancy.olsen@fdltcc.edu or 218-879-0819.

Sexual Violence

Fond du Lac Tribal & Community College (FDLTCC) is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence, gender or sex-based bullying and stalking. If you or someone you know has experienced gender or sex-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), know that you are not alone. FDLTCC has staff members trained to support survivors in navigating campus life, accessing resources, providing accommodations, assistance completing with protective orders and advocacy. For more information regarding the Campus Security Report, the following link will give you a report on the Clery Compliance and Security Report at FDLTCC: <https://fdltcc.edu/admissions/about-us/policies-reports/campus-security-policies-reports/>.

Please be aware that all FDLTCC employees are required to report any incidents of sexual violence and, therefore it cannot guarantee the confidentiality of a report, but it will consider a request for confidentiality and respect it to the fullest extent possible. If you wish to report sexual misconduct or have questions about school policies and procedures regarding sexual misconduct, please contact Anita Hanson, Dean of Student Services, at 218-879-0805 or anita.hanson@fdltcc.edu.

Cultural Standards*: listed at the end of the syllabus

*Each course within the BS in Elementary Education program must meet a minimum of 2 measurable learning outcomes for 3 different **Cultural Standards**. If your course does not meet the Cultural Standards, please justify your rationale.*

Standard (must meet 3)	Learning Outcomes (2 for each standard) The student will:	Assessment
<p>1. GIKENDAASOWIN <i>Knowing knowledge</i> To prepare our students to be problem solvers who strive for continuous learning and growth.</p> <p><u>Outcome:</u> Content/Pedagogical Knowledge and Technology Integration To develop teachers who value and utilize knowledge, learning, and critical thinking that is central to an Ojibwe-Anishinaabe way of knowing.</p>	<p>Apply concepts of mathematical patterns, relations, and functions, including the importance of number and the importance of the educational link between primary school activities with patterns and the later conceptual development of important ideas related to functions.</p> <p>Apply concepts and techniques of discrete mathematics and how to use them to solve problems from areas including</p>	<p>Teacher candidates will discuss (in-person and online) horizontally and vertically “unpacked” learning standards for grade K-6. They will learn to introduce worthwhile tasks (NCTM) to impact diverse learner needs intentionally and directly, including those of Anishinaabe students. Teacher candidates will do this in various ways: 1) By examining and rating company-based math programs for responsiveness 2) by supplementing and modifying existing tasks 3) by observing and critiquing live instruction 4) by developing their own tasks.</p> <p>Teacher candidates will complete in-class activities and assignments focused on building conceptual fluency in mathematics for diverse learners,</p>



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



	<p>graph theory, combinatorics, and recursion.</p>	<p>including Anishinaabe students. This includes written assignments, story problems, textbook tasks, hands-on projects, and modeling solutions (Boaler, 2016). They will complete formative assessments of their comprehension of mathematics learning by students from various cultural experiences including Anishinaabe (Ma, 2010).</p> <p>Learning to identify Effective Math Teaching Practices will impact teacher candidates' personal pedagogy. Citing evidence will cause candidates to look for specific "teacher moves" or techniques they can employ to be more effective practitioners of math instruction with learners from all backgrounds, including Anishinaabe learners.</p>
<p>5. DEBWEWIN <i>Honesty and integrity</i> Encourage students to develop a deeper appreciate their own worldview and the worldview of others.</p> <p><u>Outcome:</u> Assessment and Use of Data To expand teachers' potential to think and act with honesty and integrity as they use multiple types of assessment strategies to evaluate student progress and guide student learning and development.</p>	<p>Use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the student.</p> <p>Interpret and draw inferences from data investigations.</p>	<p>Learning to identify the unique social and emotional needs of students from Anishinaabe and other cultural backgrounds requires teacher candidates to examine in quantifiable ways the diverse approaches students use in mathematics. Their approach forms a specific relationship and identity with mathematics (i.e. the "apprehensive" learner, the "apathetic" learner, the "teacher's pet." Candidates must also learn to differentiate instruction for students with particular knowledge packages (Ma, 2010). They will develop this knowledge by: 1) Describing and using an online survey to rate videos of math learners 2) Observing learners in classrooms and describing their thinking in reflection papers.</p> <p>Teacher candidates will review sample data from popular assessments used in schools to measure proficiency, including Minnesota Comprehensive Assessments</p>

		(MCA) Measurements of Academic Progress (MAP), Achievement Improvement Monitoring System (AIMS). They will compare data to examples of student work from diverse classrooms including those with significant populations of Anishinaabe students, to determine correlation to proficiency. They will develop and journal solutions for sample tasks including bar graphs, pie graphs, pictographs, line plot graphs for K-6 learners.
<p>6. ZAAGI' IDIWIN <i>Loving and Caring</i></p> <p>To encourage the development of healthy, caring relationships built on respect for all.</p> <p><u>Outcome:</u> Diversity and Dispositions</p> <p>Promote teachers' acceptance and respect of the diversity within their school, community and environment.</p>	<p>Provide interactions and connections of historical and cultural mathematical perspectives.</p> <p>Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.</p>	<p>Defining Anishinaabe pedagogy helps to illuminate the beliefs and strategies social groups use to perpetuate their unique civilizations. For Anishinaabe people this is done via oral history, community, and personal sovereignty. Candidates will compare and contrast this pedagogical ideology with constructivism for commonality and difference, using a rubric.</p> <p>For Anishinaabe people, a common form of assessment was not only the demonstration of a skill but also the teaching of it. Teacher candidates will learn how to provide this culturally responsive experience to instruct mathematics through various technological programs. This includes Kahoot (assessment), FlipGrid, (video response), Padlet (online notes/discussion), GoFormative (assessment), and Google forms.</p>

Minnesota Professional Education License and Standards Board Standards (MN PELSB)** listed at the end of the syllabus.

MN PELSB	8710.2000 Standards of Effective Practice	Assignment & Assessment	How does this show students will meet the standard:	FDLTCC Learning Outcomes	Cultural Standard
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		Number Pieces and NLVM	<p>tasks using free online software. They will create their own accounts and prompts for future tasks at various grade levels.</p> <p>Being able to use digital manipulatives will provide the necessary experience for TC's to teach with these tools in any classroom, with any curricular program.</p> <p>HA8b TC's will solve numerous in-class tasks involving multi-digit and decimal numbers using free digital resources to model solutions and make connections to abstract algorithms/equations.</p>	
5A	understand Minnesota's graduation standards and how to implement them;	<p>Algebraic Reasoning Across Grade Levels</p> <p>Proficiency of Multiplication and Division of Decimals</p> <p>Review the Minnesota Academic Standards for Math</p>	<p>HA1b TC's will participate in a matching activity to unpack K-6 standards in an algebra, to become familiar with the scaffolding of algebraic reasoning.</p> <p>HA3c TC's will participate in a classroom activity to unpack K-6 standards in multiplication and division procedures, to become familiar with 3 proficiencies (fact, procedural, conceptual).</p> <p>A vertical analysis of the graduation standards in these two content areas allows TC's to see the developmental progression of traditionally difficult concepts and how they are meant to be scaffolded from grade level to grade level.</p> <p>TC's will be required to use the Unit Lesson Plan Template when designing lesson plans. TC's will be asked to include which Academic Standards they are addressing in each lesson plan and how they plan to assess the students. The Lesson Plan Template includes pre-and post-assessments, as well as formative and summative assessments. TC's will use the data from the assessments to make changes to their lessons. The Lesson Plan Template will be reviewed to check for</p>	



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



			understanding prior to designing and implementing a lesson.		
9A	be able to assess student performance toward achievement of the Minnesota graduation standards under chapter 3501;	Problems to Engage Zones of Proximal Development	Learning the various reasoning levels from concrete representations to abstract generalizations at different grade levels helps TC's to assess proficiency of students founded in conceptual understanding, complemented by procedural and fact fluencies.		
		Proficiency of Multiplication and Division	<p>HA3b TC's will research and discuss Zones of Proximal Development in class. They will present ideas to each other in the form of math tasks that intentionally move students from one level to the next.</p> <p>By observing students in classrooms and examining their solutions, TC's are able to see a variety of proximities to graduation standards at various grade levels.</p> <p>HA7a TC's will observe and record classroom interactions to gauge proficiency of students based on MCA test specs and guidelines for "answers."</p>		
		Review the Minnesota Academic Standards for Math	TC's will be required to use the Unit Lesson Plan Template when designing lesson plans. TC's will be asked to include which Academic Standards they are addressing in each lesson plan and how they plan to assess the students. The Lesson Plan Template includes pre-and post-assessments, as well as		

			formative and summative assessments. TC's will use the data from the assessments to make changes to their lessons. The Lesson Plan Template will be reviewed to check for understanding prior to designing and implementing a lesson.		
9B	understand the characteristics, uses, advantages, and limitations of different types of assessments including criterion-referenced and norm-referenced instruments, traditional standardized and performance-based tests, observation systems, and assessments of student work;	<p>Rehumanizing Proficiency</p> <p>Patterns and Correlations in Assessment Data</p>	<p>Looking for specific distinguishing factors in student responses on various kinds of assessments provides a wider perspective of measuring student proficiency in mathematics.</p> <p>HA3c TC's will participate in a sorting activity to examine levels of proficiency from an older assessment: Iowa Test of Basic Skills. TC's will discuss the differences between "traditional" math proficiency based on computation vs. conceptual proficiency based on understanding.</p> <p>HA1c TC's will review sample data from popular assessments used in schools to measure proficiency, including Minnesota Comprehensive Assessments (MCA) Measurements of Academic Progress (MAP),</p>		
9K	monitor teaching strategies and behaviors in relation to student success to modify plans and instructional approaches to achieve student goals;	<p>Fraction Games and Models for Intermediate Grades</p> <p>Expanding Mathematical Reasoning and Flexible Thinking</p> <p>Video Samples</p> <p>Field Experience Observation</p>	<p>There will be multiple opportunities in the field experience for TC's to observe pedagogical strategies, discuss and write about them, and implement them.</p> <p>HA2b TC's will participate in classroom games to explore fractional thinking and partitioning numbers. They will write lesson ideas and modifications for these games to be played in grades 3-5.</p> <p>HA3a TC's will watch video samples and write about teaching strategies observed in the videos. They will also be asked to observe student behaviors in relation to the</p>		



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



			<p>teaching strategies that were implemented. Next TC.'s will observe in a classroom and again monitor for instructional strategies and observe student behaviors in relation to the teaching strategies that were implemented. Finally, TCs will develop a lesson plan to include ways to build mathematical reasoning and flexible thinking (group sharing of ideas and conjectures, solutions, connections). TC's will reflect on strategies that will use to engage students in their lesson.</p>	
9N	<p>use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.</p>	<p>Zaagi-idiwin (Loving & Caring)</p> <p>FlipGrid Tasks</p>	<p>Teacher candidates will learn how to provide culturally responsive experience to instruct mathematics through various technological programs. This includes Kahoot (assessment), FlipGrid, (video response), Padlet (online notes/discussion), GoFormative (assessment), and Google forms.</p> <p>HA8b TC's will create and execute tasks in FlipGrid format to record task responses in video format to communicate findings. Based on data collection and analysis, TCs will interpret the data from an online survey of Effective Math Teaching Practices (NCTM) in their journals recommend which kinds of tasks are best suited for this format to improve instructional practice and maximize student learning.</p>	

MN PELSB Content Standard	<i>Content Standards 8710.3200 Elementary Education</i>	Assignment & Assessment	How does this show students will meet the standard: Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
<p>H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;</p> <p>(1) concepts of mathematical patterns, relations, and functions, including the importance of number and the importance of the educational link between primary school activities with patterns and the later conceptual development of important ideas related to functions and be able to:</p>					
a	identify and justify observed patterns;	<p>14 Step Game Week 4</p> <p>Pattern Task with Geo Blocks Week 5</p>	<p>Teacher candidates (TC's) will play a strategy game as an introduction and formative assessment of spatial reasoning, the foundation of geometric thinking.</p> <p>Teacher Candidates (TC's) will familiarize themselves with Geo Blocks, a common manipulative used in primary classrooms by solving and creating various tasks in geometry including art integration, tangram puzzles, and numerical patterns.</p>		N/A
b	generate patterns to demonstrate a variety of relationships;	Algebraic Reasoning Across Grade Levels	TC's will participate in a matching activity to unpack K-6 algebraic math standards. Activities require TC's to connect tasks with pattern blocks and similar manipulatives to numeric patterns, as well as patterns in intermediate grades such as input/output tables, multiples, factors, and multistep equations, to become familiar with the scaffolding of algebraic reasoning.		
c	relate patterns in one strand of mathematics to patterns across the discipline;	<p>Equations in Real Life</p> <p>Patterns and Correlations in Assessment Data</p>	<p>TC's will learn to write equations from real life situations, as well as write contextualized situations to represent equations and expressions in algebra, probability, measurement, geometry, and data analysis.</p> <p>TC's will review sample data from popular assessments used in schools to measure proficiency, including Minnesota Comprehensive Assessments (MCA) Measurements of Academic Progress (MAP),</p>		



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



Achievement Improvement
Monitoring System (AIMS).

H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;

(2) concepts and techniques of discrete mathematics and how to use them to solve problems from areas including graph theory, combinatorics, and recursion and know how to:

a.	help students investigate situations that involve counting finite sets, calculating probabilities, tracing paths in network graphs, and analyzing iterative procedures	<p>One-to-One Correspondence Activities</p> <p>Fractions Games and Models for Primary</p> <p>Nintendo Wii Avatar Possible Outcomes</p> <p>Probability Trees and Anchor Charts in Common Games</p> <p>The Mathematics of Labor, Engineering, and Gaming</p>	<p>TC's will design and implement sample activities for the exploration of one-to-one correspondence with students (creating and matching quantity groups) then write lessons that include activities to improve one-to-one correspondence.</p> <p>TC's will play fraction games with students that include various fraction models including drawings, paper models, and real life objects for primary-age students.</p> <p>TC's will examine Wii avatar combinations as a way to explore possible outcomes, as an introduction to probability and then design/implement similar tasks to explore with students.</p> <p>TC's will extend their thinking in probability by connecting possible outcomes to specific outcomes, theoretically and experimentally. They will generate values for simple probability using spinners and dice. They will generate values for compound probability using combinations of these items. They will create a classroom math carnival of these games to be played by students.</p> <p>TC's will solve various tasks from real life professions. They will find solutions for reducing waste in building drop-tile ceilings in rectangular rooms. They will create solutions for bridges to maximize structural integrity using spaghetti noodles. They will play and analyze popular games like Minecraft and Roblox for</p>		<p>GIKENDAASO WIN <i>Knowing knowledge</i></p> <p>ZHAWENINDI WIN – Compassion</p>
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b.	apply these ideas and methods in settings as diverse as the mathematics of finance, population dynamics, and optimal planning;	Redlining in Indian Country	feedback frequency and write about how this relates to math tasks/instruction. TC's will participate in a classroom activity using network graphs and iterative procedures to compare/contrast socioeconomic factors in lending practices and statewide penalty/fine systems for traffic offenses.	DEBWEWIN <i>Honesty and integrity</i>
		Fraction Games and Models for Intermediate Grades	TC's will participate in classroom games to explore fractional thinking and partitioning numbers. They will write lesson ideas and modifications for these games to be played in grades 3-5.	
		Fractions in Graphing	TC's will apply fraction knowledge to intermediate standards/benchmarks and write solutions for graphing tasks involving fractions.	

MN PELSB Content Standard	<i>8710.3200 Elementary Education: Subject Matter</i>	Assignment & Assessment	How does this show students will meet the standard: Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
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H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;

(3) concepts of numerical literacy:

a.	possess number sense and be able to use numbers to quantify concepts in the students' world;	One-to-One Correspondence & Counting Games	TC's will design and implement sample activities for the exploration of one-to-one correspondence with students (creating and matching quantity groups) then write lessons that include activities to improve one-to-one correspondence.	GIKENDAAS OWIN <i>Knowing knowledge</i>
		Tasks for Primary Manipulatives	TC's will experiment with various manipulatives used in classrooms to solve real-life sample tasks generated to reflect student interests and write about common misconceptions when developing number sense in primary-age children.	
		Expanding Mathematical Reasoning and Flexible Thinking	TC's will watch video samples and write about observations of live instruction for ways to build mathematical reasoning and flexible thinking (group sharing of ideas and	

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**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



		FlipGrid Video Task	conjectures, solutions, connections). TC's will complete FlipGrid responses to in-classroom tasks and journal the process of using this technology in their prospective classrooms.		
b.	understand a variety of computational procedures and how to use them in examining the reasonableness of the students' answers;	Number Talks Design Extending Base-10 Thinking to Generalized Forms Problems to Engage Zones of Proximal Development	TC's will participate in various Number Talks over the course of the semester by discussing alternative and invented solutions to computational tasks. They will also write lesson routines for Number Talks at various grade levels that promote abstract reasoning and analysis of peers' reasoning. TC's will use base-10 blocks to show solutions to various classroom tasks throughout the semester. They will journal partial procedures built from these concrete solutions to provide visual evidence for computational procedures and reasonableness of student conjectures. Extending Base-10 Thinking to Generalized Forms TC's will research and discuss Zones of Proximal Development in class, as related to levels of complexity in math reasoning and within computational procedures. They will present ideas to each other in the form of math tasks that intentionally move students from one level to the next.		GIKENDAAS OWIN <i>Knowing knowledge</i>
c.	understand the concepts of number theory including divisibility, factors, multiples, and prime numbers, and know how to provide a basis for exploring	Rehumanizing Proficiency	TC's will participate in a sorting activity to examine levels of proficiency from an older assessment: Iowa Test of Basic Skills. TC's will discuss the differences between "traditional" math proficiency based on computation vs. conceptual proficiency based on understanding.		GIKENDAAS OWIN <i>Knowing knowledge</i>

	number relationships; and	Golden Ratio and Multiples/Factors Proficiency of Multiplication and Division of Decimals	TC's will participate in a classroom activity to search for real life examples of the Golden Ratio, including examples from cultural environments and activities (i.e. powwows, sugarbush, wild rice gathering, etc). They will write a lesson task for using the Golden Ratio to develop student understanding of multiples and factors. TC's will participate in a classroom activity to unpack K-6 standards in multiplication and division procedures, to become familiar with 3 proficiencies (fact, procedural, conceptual).		
d.	understand the relationships of integers and their properties that can be explored and generalized to other mathematical domains;	14 Problems for Integers Operations with Integers: TikTok Edition Number Systems and Counterintuitive Thinking	TC's will discuss and journal 14 problems from Carpenter's framework that use integers to help intermediate students to conceptualize negative and positive values. TC's will create TikToks in a classroom activity to contextualize operations with fractions (i.e. compare thermometer readings in cold and hot water using a number sentence to quantify the difference in temperature). TC's will journal about various number systems (i.e. fractions, decimals, percents, integers) and compare to whole number understanding to examine the counterintuitive thinking demanded for each system.		GIKENDAAS OWIN <i>Knowing knowledge</i>
H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;					
(4) concepts of space and shape:					
HA4a	understand the properties and relationships of geometric figures	Wigwametry	TC's will build a scale structure wigwam and solve a variety of engineering problems in its construction. TC's will journal solutions to problems involving geometric shapes and mathematical relationships between them.		GIKENDAAS OWIN <i>Knowing knowledge</i>
HA4b	understand geometry and measurement from both abstract	Wigwametry	TC's will build a scale structure wigwam and solve a variety of engineering problems in its construction.		



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



	and concrete perspectives and identify real world applications		They will complete a digital or paper poster to demonstrate various solution strategies (concrete to abstract).		
HA4c	know how to use geometric learning tools such as geoboards, compass and straight edge, ruler and protractor, patty paper, reflection tools, spheres, and platonic solids	Wigwametry	TC's will build a scale structure wigwam and solve a variety of engineering problems in its construction. They will familiarize themselves with various geometric tools in the process, including geoboards, compasses, rulers, protractors, and manipulatives.		
<p>H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;</p> <p>(5) data investigations:</p>					
HA5a	apply numerical and graphical techniques for representing and summarizing data;	Graphs for Primary	TC's will participate in classroom activities designed to engage primary learners in graphing activities. They will journal creative ideas from these activities for conceptual understanding of pictographs, bar graphs, and 10 frames.		ZHAWENIND IWIN – Compassion
HA5b	apply numerical and graphical techniques for representing and summarizing data;	Graphs for Intermediate	TC's will participate in classroom activities designed to engage intermediate learners in graphing activities, including a human line plot, and a Skittle activity to examine bar graphs, pie graphs, central angles, and percentages.		ZHAWENI NDIWIN – Compassion
HA5c	interpret and draw inferences from data and make decisions in a wide range of applied problem situations; and	<p>The Math Behind Viral Videos</p> <p>Counterexamples with Graphs</p> <p>3 Truths and a Lie: Input Output Tables</p>	<p>TC's will solve a rate problem using data from a popular culture phenomenon known as "viral videos."</p> <p>TC's will draw and journal graphs that represent common and familiar contexts like "Screen Time for Children" and "Study Time vs. Grades" using incorrect graphs to reinforce conceptual fluency.</p> <p>TC's will participate in a game with function tables to examine a common social</p>		DEBWEW IN Honesty and integrity

			game to learn how to teach and use input/output tables.		
HA5d	help students understand quantitative and qualitative approaches to answering questions and develop students' abilities to communicate mathematically	Words with Class Sentence Starters Partner Cinema: Acting out Productive Discourse	TC's will plan and use a discussion strategy similar to a popular online game called "Words with Friends" to encourage students to use math vocabulary during class time activities. This activity requires TC's to tally and record the number of student statements that include the topic's vocabulary. TC's will write a plan for using a common literacy strategy to help students practice using language for communicating mathematical reasoning to peers. TC's will select and model sentence starters that are appropriate (and intentionally inappropriate) for certain situations, as a qualitative approach for students to communicate mathematically. TC's will reenact classroom situations involving student-to-student discourse and the potential challenges in various grade levels in small groups, as well as how to address challenges. Students will be required to give qualitative and quantitative feedback observed in the reenacted situations, using a co-developed survey of "math dialogue."		ZHAWEN NDIWIN – Compassion
<p>H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;</p> <p>(6) concepts of randomness and uncertainty:</p>					
HA6a	probability as a way of describing chance in simple and compound events	The Seating Chart Task: Abby, Bobby, Chris, Denise	TC's will create and record multiple levels of solutions (tree diagram, sample space with specified event, equations) to solve for various probabilities in the same context, the seating chart.		ZHAWEN INDIWIN – Compassion



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



		<p>Probability Trees for Real Life Problems</p> <p>Deal or No Deal</p>	<p>TC's will journal tasks and solutions for real life events that can be visually solved using probability trees to show possible and desired outcomes.</p> <p>TC's will watch and analyze videos of a popular TV game show. They will try to predict banker "offers" in specific clips, given a number of cases. They will also determine mathematically if contestants have made "good deals."</p>	
HA6b	the role of randomness and sampling in experimental studies	<p>The Randomness of Monopoly</p> <p>Which Dart Game is Harder: 701 or Cricket</p> <p>The Fish Population Problem</p>	<p>TC's will play Monopoly and journal probability tasks for grades 4-6. They will record data from dice rolls and analyze for randomness.</p> <p>TC's will calculate the geometric probability of two dart games that seem random, and compare them to the outcomes of other experiments done in class.</p> <p>TC's will simulate a practice used by Anishinaabe tribes to calculate lake populations of fish. They will use Goldfish crackers to generate random data samples for computation.</p>	<p>DEBWEW IN <i>Honesty and integrity</i></p> <p>ZHAWEN INDIWIN – Compassion</p>
<p>H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;</p> <p>(7) mathematical processes:</p>				
HA7a	know how to reason mathematically, solve problems, and communicate mathematics effectively at	Proficiency of Multiplication and Division	TC's will participate in classroom discussions and an activity comparing student work samples to benchmark proficiencies amongst concrete and abstract solution pathways.	ZHAWEN INDIWIN – Compassion

	different levels of formality	Alternative and Invented Procedures in Arithmetic	<p>The pathways in multiplication and division with whole numbers, fractions, and decimals will demonstrate developmental stages of reasoning at various levels of formality for TC's.</p> <p>TC's will observe and record classroom interactions to gauge proficiency of students based on MCA test specs and guidelines for "answers." They will summarize and correlate interactions to varying levels of proficiency in problem solving and communication of mathematical ideas.</p> <p>TC's will notate in journals solutions that are non-standard and discuss the language (or lack thereof) used to explain mental math or partial solutions. They will journal questions that can be used to assist students in coherent explanations of mathematical thought.</p>	
HA7b	understand the connections among mathematical concepts and procedures, as well as their application to the real world	<p>Fraction Games and Models:</p> <p>Number Line Game</p> <p>Making a Whole, Given a Fraction</p> <p>Fraction Cover Up</p>	<p>TC's will participate in classroom games and discuss connections found in them to mathematical reasoning strategies. Games played will apply to the real world and will provide exposure to various math tools used to reinforce mathematical reasoning including number lines, repeated counting, and tape diagrams.</p>	<p>ZHAWENI NDIWIN – Compassion</p> <p>DEBWEW IN Honesty and integrity</p>
HA7c	understand the relationship between mathematics and other fields	The Drop Tile Ceiling Problem	<p>TC's will solve problems in the labor field, using models, drawings, and manipulatives to demonstrate the mathematics involved in various vocations.</p>	GIKEND AASOWI N Knowing knowledge



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



		Spaghetti Bridge Contest	TC's will design and build a bridge using physical science concepts such as force, weight, and rigidity. They will measure and test the strength of their bridges to compare against conjectures.	
		Gaming: Frequent Feedback in Mathematics	TC's will discuss and play popular games like Mario Kart and Angry Birds to journal about feedback in mathematics. They will discuss and journal ideas for providing similar forms of feedback in the math classroom.	
		Math in Context	TC's will analyze and design a mini unit (5 lessons) of tasks involving STEAM activities from sample curricula that use integrated approaches to multiple content areas.	
HA7d	understand and apply problem solving, reasoning, communication, and connections	Teaching via Process Standards	TC's will experiment with and write reflection papers on instructional strategies used in field experience based on process standards (Problem Solving, Reasoning, Communication, Connections).	ZHAWENI NDIWIN – Compassion
		Connecting Solution Pathways	TC's will observe, note, and journal about individual students for specific solution pathways from direct modeling to deriving (mental math). They will write a descriptive paper about a student with whom they have made a connection and their thinking pathways.	
		Day Court: Strategies for Classroom Discourse	TC's will write a plan for and attempt to implement a strategy for creating debate	

			within a classroom. Debate is the highest form of classroom discourse in a math classroom that is fostered using process standards (Problem Solving, Reasoning, Communication, Connections).		
<p>H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;</p> <p>(8) mathematical perspectives:</p>					
HA8a	understand the history of mathematics and the interaction between different cultures and mathematics	<p>Comparing Division of Fraction Problems from Chinese Teachers</p> <p>Quipu Strings and the Ojibwe Number System</p>	<p>TC's will discuss and journal about pedagogical differences between Chinese and American teachers. They will further discuss and journal which approach is more equitable for Anishinaabe students and diverse learners.</p> <p>TC's will participate in classroom activities involving traditional Indigenous number systems of the Incan and Anishinaabe people, and discuss the similarities/differences in the American number system.</p>		ZHAWENI NDIWIN – Compassion
HA8b	know how to integrate technological and nontechnological tools with mathematics.	<p>Using Padlet for Response Variation</p> <p>FlipGrid Tasks</p> <p>Number Pieces and NLVM</p>	<p>TC's will learn to use and respond to classroom tasks using free online software. They will create their own accounts and prompts for future tasks at various grade levels.</p> <p>TC's will create and execute tasks in FlipGrid format to record task responses in video format. They will journal about which kinds of tasks are best suited for this format.</p> <p>TC's will solve numerous in-class tasks involving multi-digit and decimal numbers using free digital resources to model solutions and make connections to abstract algorithms/equations.</p>		N/A



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



		Extending Base-10 Thinking to Generalized Forms	TC's will use base-10 blocks and base-10 drawings to show solutions for various classroom tasks throughout the semester. They will journal partial procedures built from these concrete solutions to provide visual evidence for computational procedures and reasonableness of student conjectures.		
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Course Requirements & Assessment descriptions:

1. Become confident in the ability to teach mathematics.
2. Learn the value of mathematics and problem solving.
3. Develop a perspective on the nature of mathematics and the role of mathematics in culture and society.
4. Understand the applications of mathematics.
5. Study mathematics content and mathematics pedagogy.
6. Understand that what students learn is fundamentally connected to how students learn it.
7. Identify problem types in mathematics
8. Understand the scope and sequence of elementary mathematics in knowledge, skills, and attitudes.
9. Be familiar with and able to use a variety of materials and manipulatives that are developmentally appropriate.
10. Understand and be able to use various methods and materials appropriate for teaching reluctant learners.
11. Understand how to teach mathematics as process rather than a finished product
12. Understand that problem solving is not an isolated concept but a process.
13. Create a ready-reference problem-solving interactive journal.
14. Examine elementary textbook series throughout the course to compare and contrast the presentation of concepts and skills.
15. Develop ways to reason mathematically, solve problems, and communicate mathematics effectively.
16. Learn how to create learning environments that support and encourage mathematical reasoning.
17. Understand the teacher's role in discourse.
18. Understand the impact of historical trauma on mathematical ability.
19. Develop lessons using a variety of instructional materials, resources, and strategies.
20. Understand assessment as an integral part of math instruction.
21. Become familiar with techniques for diagnosing and assessing students' needs.

22. Become familiar with and designs lessons around teaching technology.
23. Learn how to integrate other academic content into mathematics.

Requirements and Points:

**Full descriptions of Competencies and Cultural Standards contained in the Appendix*

To meet the program requirements, students must pass the course with 70% or above.

Grade	%	Points
A	100-90	900-1000
B	89-80	800-899
C	79-70	700-799
D	69-60	600-699

Book Discussions: 240pts
 Participation: 320pts

Course Schedule: Please attach the course schedule/outline

Week	Class Activity-Topic	Assignment: Due
Week 1 8/21	Pre-Assessment Instruction, MCA Practice Test 3 rd Grade Review of Field Experience Syllabus Review HA7d	
Week 2 8/28	Dave’s 5 th Grade Task Video Danielson Framework Measures Standards Navigation on MDE MN Process Standards Intro Chapters 1-2 Van de Walle HA8b	Alignment practice
Week 3 9/11	Jackie 3 rd Grade Video J-Factor and Engagement Visual Pathways in Reasoning (Boaler, 2015) Matching Problem-types to MCA Items Writing Multistep Problems Chapter 19 Van de Walle (Geometry) See HA8a	Class Discussion Review 3 rd grade solutions strategies for various problem types
Week 4 9/18	14 Step Game & Spatial Reasoning Unpack K-12 Standards for Patterns Benchmarks Discourse Techniques Geoboard Activity Chapter 13 Van de Walle (Algebra) edTPA Review See HA1a, HA5d	(Looking for Patterns Standards) (Words with Class, Sentence Starters)
Week 5 9/25	Pattern Tasks with Geo Blocks Algebraic Reasoning Across Grade Levels Equations in Real Life	



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



	Classroom Management Chapter 7, 14 Van de Walle edTPA Planning See HA1a, HA1b, HA1c	
Week 6 10/2	One-to-One Activities for K-2 Fraction Games and Models for Primary Shading Half vs. Conceptualizing Half Growth Mindset for Math Agency Chapters 15 VdW edTPA Instruction See HA2a,	(Using Complex Shapes)
Week 7 10/9	Redlining in Indian Country Fraction Games and Models: Intermediate Fractions in Graphing Randomosity for Engagement and Community Building in Classrooms Using Padlet for Response Variation edTPA Instruction Chapters 8-9 Van de Walle See HA2a, HA2b, HA5d	(Graphing to Understand Socioeconomic Aspects)
Week 8 10/16	One-to-One Correspondence Games Tasks for Primary Manipulatives Expanding Mathematical Reasoning and Flexible Thinking (Cooperative Groups) Design a FlipGrid Video Task edTPA Assessment Chapters 1-3 Parrish See HA3a	
Week 9 10/23	Number Talks Design Extending base-10 Thinking to Generalized Forms Problems to Engage ZPD's edTPA Development Chapters 4-6 Parrish See HA3b	
Week 10 10/30	Golden Ratio and Multiples/Factors Proficiency of Multiplication and Division Rehumanizing Proficiency Chapters 22 Van de Walle edTPA Presentations See HA3c	(The 3 Fluencies of Mathematics)
Week 11 11/6	14 Problems for Integers Operations with Integers: TikTok Number Systems and Counterintuitive Thinking Birchbark House Chapter 1	

	edTPA Presentations See HA3d ,	
Week 12 11/13	Wigwametry – Teaching Through Context Connecting Content and Practice Chapter 20 Van de Walle See HA4a, HA4b, HA4c	
Week 13 11/20	Graphs for Primary Human Line Plot (Graphs for Intermediate) The Skittles Color Sort (graphing real data) Chapter 21 Van de Walle See HA5a, HA5b, HA5c	
Week 14 11/27	Social Media Data Interpretation Chapters 21 VdW See HA6a, HA6b	
Week 15 12/4	Probability Trees and Anchor Charts Avatar Task (Possible Outcomes) Construction Math, Engineering Math, Gaming Industry Chapters 1-2 VdW See HA2a	
Week 16	Final Exam (100pts)	

Appendix A FDLTCC Competencies Across the Curriculum (CAC)

Information Literacy – the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information.

Ability to Communicate – the ability to listen, read, comprehend, and/or deliver information in a variety of formats.

Problem Solving – The ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.

Culture – knowledge of Anishinaabe traditions and culture, knowledge of one’s own traditions and culture, knowledge of others’ traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.

Conceptual Framework

Vision

The vision of the FDLTCCC Education Unit is to be transformational leaders in culturally responsive pedagogy and Indigenous knowledge by embracing Niindaa’iwedaa o’o gikendaasowin, which



Anishinaabe and American Elementary Education Program

Fond du Lac Tribal and Community College



means sending knowledge into the future by embedding Anishinaabe knowledge, culture, and traditions into the curriculum and instilling these teaching practices in our future educators.

Mission

The mission of the FDLTCC Education Unit is to work within our communities to prepare caring, competent educators by promoting equitable, inclusive, and transformative educational practices that are based on Anishinaabe knowledge, traditions, and culture.

GIKENDAASOWIN – Knowing Knowledge

To prepare our teacher candidates to be problem solvers who strive for continuous learning and growth.

Disposition: [Integrates Content and Pedagogical Knowledge](#)

Teacher candidates demonstrate their ability to integrate content and pedagogical knowledge by weaving the following into their teaching:

- *Technology:* Use technology effectively to improve student learning.
- *Theory to Practice:* Applies current theory, research, and best practices to improve one's professional practice as a teacher.
- *Critical and Connected Thinking:* Engages in critical thinking that reflects analysis, problem solving, and incorporates world views and community knowledge to create culturally relevant instruction.
- *Reflective Practice:* Demonstrates self-reflection and incorporates professional feedback to adjust for continuous improvement in professional practices and effective instruction.

Professional Outcome: [Content and Pedagogical Knowledge](#)

To develop teachers who value and utilize knowledge, learning, and critical thinking that is central to Indigenous and other ways of knowing.

GWAYAKWAADIZIWIN – Living a Balanced Way

To provide teacher candidates the opportunity to recognize the importance of living in harmony with the community and are prepared to use a collective approach to understanding and deciding on a course of action.

Disposition: [Communication and Collaboration](#)

Teacher candidates demonstrate professional interpersonal and communication skills. These skills are used to promote positive collaborative partnerships with students, families, colleagues, other school professionals, and the global community to support achievement of student learning outcomes.

- *Reflective Collaboration*: Uses insights and inspiration of others to improve practice and can occur in:
 - Professional Learning Communities
 - Mentoring Programs
 - Peer Observations
 - Critical Friends Groups
- *Community Involvement*: Demonstrates positive collaborative skills in interactions with instructors, advisors, students, colleagues, parents/guardians/caregivers, school teams, and those in the wider community.
- *Communication*: Effectively and accurately communicates ideas, thoughts or visions (oral and written) and engages in active listening based on audience and community cultural norms.

Professional Outcome: Community and Collaboration

To develop teachers who are reflective, connected educators who understand the interrelatedness of educating the whole child by including the community.

ZOONGIDE’EWIN – Strong Hearted

To provide a foundation on which we build and strengthen each teacher candidate’s resilience, innovation, and passion.

Disposition: Vision and Leadership

Teacher candidates demonstrate the vision and skills necessary to lead and manage classrooms and schools as complex, adaptive systems in a changing world.

- Demonstrates skills and qualities that lead to meaningful change.
- Models and fosters respect for all cultures, identities, and perspectives in words and actions and considers historical pasts to prepare for the future.
- Listens and responds to community needs and understands cultural norms as opportunities for growth and development.

Professional Outcome: Transformational Leadership

To increase the teachers’ leadership capacity to live and walk with a strong heart, respectful and open to new ideas and courageous enough to confront the accepted truths of history and society.

AANGWAAMIZIWIN – Diligence and Caution

To develop teacher candidates’ capacity to proceed carefully, after identifying, discussing and reflecting on logical and ethical dimensions of political, cultural, social, and personal life.

Disposition: Ethical Behavior

Teacher candidates demonstrate professional integrity through behaviors and actions that reflect state and FDLTCC ethical and cultural standards.

- Demonstrate professional and ethical conduct with faculty, faculty supervisors, cooperating teachers, students, parents, colleagues, and community.
- Practices, complies, and understands the school site and the college and unit policies (e.g., academic honesty), as well as Minnesota Code of Ethics for Teachers.



Anishinaabe and American Elementary Education Program

Fond du Lac Tribal and Community College



- Adheres to all professional standards, including the use of technologies (e.g., accesses authorized websites, social media and other applications, and uses personal electronic devices as appropriate).

Professional Outcome: Ethical Practitioner

To develop teachers' capacity to be ethically responsive in respecting their role as an educator and understanding community needs.

DEBWEWIN – Honesty and Integrity

Encourage teacher candidates to develop a deeper appreciation of their own worldview and the worldview of others.

Disposition: Data-Informed Practice

Teacher candidates demonstrate ability to make data-driven decisions as they plan, implement, and evaluate instruction.

- Uses student data to plan and implement instructional strategies and activities.
- Uses assessment data to identify student strengths and deficiencies and adjusts practice based on results.
- Uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual and social development of the student.

Professional Outcome: Assessment and Use of Data

To expand teachers' potential to think and act with honesty and integrity as they use multiple types of assessment strategies to evaluate student progress and guide student learning and development.

ZAAGI' IDIWIN – Loving and Caring

To encourage the teacher candidates' development of healthy, caring relationships built on respect for all.

Disposition: Equity, Social Justice, and Inclusion

Teacher candidates demonstrate fairness, empathy and compassion based on their belief that everyone can learn. Candidates actively seek out multiple perspectives and diverse experiences to address the academic, interpersonal, and emotional needs of all students.

- Demonstrates and appreciation of the languages, communities, and experiences students bring to the classroom.
- Advocates for and supports Indigenous and other diverse communities and individuals.
- Respects the dignity and essential worth of all individuals.
- Interacts with sensitivity to community and cultural norms.

- Values and responds to all aspects of a child’s developmental well-being (cognitive, emotional, psychological, social, and physical).
- Promotes the diversity of opinions, ideas, and backgrounds.

Professional Outcome: Diversity

Promote teachers’ acceptance and respect of the diversity within their school, community and environment.

ZHAWENINDIWIN – Compassion

To encourage teacher candidates to develop an empathetic appreciation of the arts and humanities as a way to understand the human experience.

Disposition: Life-long Learner

Teacher candidates engage in professional growth and encourage curiosity and inquiry as reflective agents of change by sharing knowledge responsibly and participating as a community resource.

- Demonstrates commitment to professional development and intellectual curiosity.
- Practices current skills while demonstrating ability to adapt and develop new skills.
- Actively participates or fosters the positive professional learning environment within the school community as well as the school- home relationships.
- Analyzes various professional contexts, resulting in more informed decision-making about professional practice.

Professional Outcome: Generation of New Knowledge

To expand teachers’ knowledge of the human condition and cultures, and the importance of compassion especially in relation to behavior, ideas, and values.

MN PELSB SEP and/or Content Standards

8710.2000 Standards of Effective Practice MN PELSB: Standards 8710.2000 Standards of Effective Practice (SEP)

Subpart 3. Standard 2, student learning. A teacher must understand how students learn and develop and must provide learning opportunities that support a student's intellectual, social, and personal development. The teacher must:

- 3F. link new ideas to familiar ideas; make connections to a student's experiences; provide opportunities for active engagement, manipulation, and testing of ideas and materials; and encourage students to assume responsibility for shaping their learning tasks;

Subpart 4. **Standard 3, Diverse Learners:** A teacher must understand how students differ in their approaches to learning and create instructional opportunities that are adapted to students with diverse backgrounds and exceptionalities.

- 4R. identify and apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



Subpart 5. **Standard 4, Instructional Strategies:** A teacher must understand and use a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.

5A. understand Minnesota's graduation standards and how to implement them;

5D. nurture the development of student critical thinking, independent problem solving, and performance capabilities;

Subpart 9. **Standard 8, assessment.** A teacher must understand and be able to use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the student. The teacher must:

9A. be able to assess student performance toward achievement of the Minnesota graduation standards under chapter 3501;

9B. understand the characteristics, uses, advantages, and limitations of different types of assessments including criterion-referenced and norm-referenced instruments, traditional standardized and performance-based tests, observation systems, and assessments of student work;

9 K. monitor teaching strategies and behaviors in relation to student success to modify plans and instructional approaches to achieve student goals;

9N. use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

Licensing Rule 8710.3200 Subp. 3. Subject matter standards, elementary education

H. A teacher of children in kindergarten through grade 6 must demonstrate knowledge of fundamental concepts of mathematics and the connections between them. The teacher must know and apply;

(1) concepts of mathematical patterns, relations, and functions, including the importance of number and the importance of the educational link between primary school activities with

patterns and the later conceptual development of important ideas related to functions and be able to:

- (a) identify and justify observed patterns;
- (b) generate patterns to demonstrate a variety of relationships; and
- (c) relate patterns in one strand of mathematics to patterns across the discipline;

(2) concepts and techniques of discrete mathematics and how to use them to solve problems from areas including graph theory, combinatorics, and recursion and know how to:

- (a) help students investigate situations that involve counting finite sets, calculating probabilities, tracing paths in network graphs, and analyzing iterative procedures; and
- (b) apply these ideas and methods in settings as diverse as the mathematics of finance, population dynamics, and optimal planning;

(3) concepts of numerical literacy:

- (a) possess number sense and be able to use numbers to quantify concepts in the students' world;
- (b) understand a variety of computational procedures and how to use them in examining the reasonableness of the students' answers;
- (c) understand the concepts of number theory including divisibility, factors, multiples, and prime numbers, and know how to provide a basis for exploring number relationships; and
- (d) understand the relationships of integers and their properties that can be explored and generalized to other mathematical domains;

(4) concepts of space and shape:

- (a) understand the properties and relationships of geometric figures;
- (b) understand geometry and measurement from both abstract and concrete perspectives and identify real world applications; and
- (c) know how to use geometric learning tools such as geoboards, compass and straight edge, ruler and protractor, patty paper, reflection tools, spheres, and platonic solids;

(5) data investigations:

- (a) use a variety of conceptual and procedural tools for collecting, organizing, and reasoning about data;
- (b) apply numerical and graphical techniques for representing and summarizing data;
- (c) interpret and draw inferences from data and make decisions in a wide range of applied problem situations; and



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**



- (d) help students understand quantitative and qualitative approaches to answering questions and develop students' abilities to communicate mathematically;
- (6) concepts of randomness and uncertainty:
 - (a) probability as a way of describing chance in simple and compound events; and
 - (b) the role of randomness and sampling in experimental studies;
- (7) mathematical processes:
 - (a) know how to reason mathematically, solve problems, and communicate mathematics effectively at different levels of formality;
 - (b) understand the connections among mathematical concepts and procedures, as well as their application to the real world;
 - (c) understand the relationship between mathematics and other fields; and
 - (d) understand and apply problem solving, reasoning, communication, and connections;and
- (8) mathematical perspectives:
 - (a) understand the history of mathematics and the interaction between different cultures and mathematics; and
 - (b) know how to integrate technological and nontechnological tools with mathematics.

Reference List:

Hall, E. T. (1977). *Beyond Culture*. Anchor Books.



**Anishinaabe and American
Elementary Education Program**

**Fond du Lac Tribal and
Community College**

