



The Vermont Mathematics Initiative
Series in Mathematics Education Leadership
Post-master's Certificate Program

Rationale for the Mathematics Leadership courses (courses 1 and 4)

“If one seeks to improve the quality of education and the quality of student achievement, enhancing, empowering, energizing and engaging teachers and teaching has always been and will continue to be the optimal choice” (Leinwand, 2010).

Creating effective classrooms and learning environments in every school and district will take principals, coaches, specialists and other school leaders who are committed to supporting teachers in their efforts to engage students in important mathematics and who fully understand mathematics teaching practices for effective instruction and assist teachers in constantly planning and implementing them (NCTM, 2014). In addition, research suggests that school-wide structures and collaborative cultural norms are foundational to effective instruction for all students. In the most effective schools teachers describe the impact of teacher collaboration on student learning by improving classroom practice and promoting data use (Poulos et al, 2014). One impactful structure for teacher collaboration is the professional learning community. In fact, “professional learning communities have emerged as arguably the best, most agreed upon means by which to continuously improve instruction and student performance” (Schmoker, 2006).

Rationale for the Mathematics courses (courses 2, 3 and 5):

“Mathematics must be understood as a human activity, a social phenomenon, part of human culture, historically evolved, and intelligible only in a social context. Mathematical objects are created by humans...from the needs of science and daily life.” (Hersch, 1997)

This truth immediately calls into question the structure of the mathematics curriculum, particularly the sequential nature of courses that lead to calculus. A curriculum in which much coursework serves primarily as prerequisite for the next course does not reflect content that was created from the “needs of science and daily life” but instead the needs of the next class. This seminar aims to break this cycle by introducing participants to a new methodology for the classroom where “the starting points for mathematical inquiry are the multiple live issues that students possess [and] mathematics becomes the set of tools from which they can choose to help carry out their inquiry.” (Stemhagen & Smith, 2008).

The teacher in this classroom is no longer a source of content but is instead “*a skilled guide who can help shape student inquiries, aiding in the construction of mathematical models and the selection of appropriate mathematical tools of inquiry and in supervising the evaluation of such activities.*” (ibid., 2008). There is less need for prior knowledge when mathematics is no longer a set of absolute truths understood in the context of other absolute truths. Instead, the true requisite prior knowledge in this classroom model is a shared understanding of the importance of the human need that led to the content.



Course Information:

Please note, the order of courses 2-5 is subject to change depending on instructor availability. Course numbers may also change as they are assigned by VTSU each semester.

Course 1: INT-5710-S09 *Leading Instructional Change I - 3 credits (semester 1)*

This seminar examines the key aspects of effective mathematics teaching and learning, with a particular focus on issues and implications for educational leadership. Seminar participants will study the foundational mathematics topics across grades K-8 with attention to the intimate connections among mathematical concepts that are often seen as disparate and how attention to these connections can improve mathematics instruction and student learning. Participants will examine related topics including the relationships among mathematics standards, student assessment and effective mathematics instruction for all students.

Course 2: INT-5710-TBD *Algebra for All - 3 credits (semester 2, 3, or 4)*

This seminar will explore accessible and equitable mathematics educational practices in Algebra. That is, teaching Algebra in a way that allows all students to engage, and which requires a minimum of prior knowledge. Seminar participants will review the history of Algebra, its representation in educational standards, associated educational technology, and contemporary utility. Participants will design a highly accessible Algebra lesson for middle or secondary grade students that relies on a minimum of prior knowledge.

Course 3: INT-5710-TBD *Geometry for All - 3 credits (semester 2, 3, or 4)*

This seminar will explore accessible and equitable mathematics-educational practices in teaching Geometry. That is, teaching Geometry in a way that allows all students to engage, and which requires a minimum of prior knowledge. Seminar participants will review the history of Geometry as a topic at the secondary level, its representation in educational standards, associated educational technology, and contemporary utility. Participants will design a highly accessible Geometry lesson for secondary level students that relies on a minimum of prior knowledge.

Course 4: INT-5710-TBD *Fractions for All - 3 credits (semester 2, 3, or 4)*

This seminar will explore accessible and equitable mathematics educational practices in teaching fractions. That is, teaching fractions in a way that allows all students to engage, and which requires a minimum of prior knowledge. Seminar participants will review the history of fractions, their representation in educational standards, associated educational technology, and contemporary utility. Participants will design a highly accessible lesson on fractions that relies on a minimum of prior knowledge.

Course 5: INT-5710-TBD *Leading Instructional Change II - 3 credits (semester 5)*

This seminar examines specific characteristics of effective mathematics teaching and learning, with a particular focus on leadership issues related to common school and district mathematics education initiatives. Specifically, participants will study the attributes of effective school-based math professional development, assessment issues in mathematics including the history of student assessment, statistical concepts related to student assessment, accurate interpretation of both formative and summative assessment results, and strategies for acting on assessment findings. Participants will also study intervention systems in mathematics with a focus on both the structure of effective math intervention and considerations for instruction. Finally, participants will examine systemic teacher support systems such as teacher coaching and structuring and effectively using PLC meetings.