MELT 2017 Summer Institutes
Appalachian State University, Boone NC

Week 1: June 26-30, 2017
• Math 3 (3rd high school math)
• Integrating Technology into Mathematics (Grades 6-12)
• Numbers, Operations, & Meaning (Grades K-5)
• Numbers, Operations, & Meaning (Grades 6-8)

Week 2: July 10-14, 2017
• STEM & Leadership (Grades 6-12)
• Math 2 (2nd high school math)
• Literacy in Mathematics (Grades K-8)
• Algebraic Thinking, Algebra, & Functions (Grades K-5)
• Algebraic Thinking, Algebra, & Functions (Grades 6-8)

Week 3: July 17-21, 2017
• Math 1 (1st high school math)
• Math 4 (4th high school math)
• Formative Assessment & Learning (Grades 6-12)
• Fractions, Ratios, Proportions, & Geometry (Grades K-5)
• Fractions, Ratios, Proportions, & Geometry (Grades 6-8)

MELT weeklong Summer Institutes are open to all K-12 and community college faculty. During each week of Institutes, offerings are provided for teachers of K-5, 6-8, and 9-12 mathematics, with some institutes spanning grades 6-12. Only one week-long Institute can be taken by a participant per week. Participant housing in hotels is available. Costs of the Institutes and housing and more information regarding the Institutes can be found at http://melt.appstate.edu and on the MELT Registration Form. The registration fee will provide each participant with instruction, curriculum materials, supplies, parking, and daily snacks.
2017 Summer Institute Descriptions

Week 1: June 26-30, 2017

**Math 3 (3rd high school math) (Math CEUs)** This Institute exemplifies the integrated and inquiry-based nature of the content in the third high school math course as defined in numerous state and national content and pedagogy standards. Institute experiences include instruction and learning through: inquiry based methods; mathematical modeling; using technology; assessment strategies; reasoning and problem solving; standards on mathematical content, teaching, learning, and practices; and investigating teacher and student beliefs. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants. In order to shed light on the mathematics in these courses, some of the mathematical topics and approaches in this Institute transcend high school mathematics.

**Integrating Technology into Mathematics (Grades 6-12) (Math CEUs)** Few fields have at their disposal as many technology tools as does mathematics. These tools can be differentiated by epistemological (learning) tools and pedagogical (teaching) tools, with some tools working effectively, albeit differently, as both. Through various implementations of mathematical technology, this institute will investigate mathematical concepts and problems found in various state standards for high school and middle grades mathematics courses. This Institute will additionally consider post secondary mathematics often needed to demonstrate even elementary mathematical ideas through technology. Thus, this Institute simultaneously investigates both mathematics and appropriate technology.

**Numbers, Operations, & Meaning (Grades K-5) (Math CEUs)**

**Numbers, Operations, & Meaning (Grades 6-8) (Math CEUs)** Standards for mathematical content, teaching, learning, and practices require that teachers provide students with opportunities to think deeper and make connections among concepts. While the strands of numbers and operations are woven throughout most state standards for mathematics, notably absent in instructional practices are investigations regarding the meaning of the mathematics and why concepts and skills are valid. Thus, these Institutes integrate the notions of number, operations and meaning. Through inquiry-based instructional techniques that model best educational practices, these Institutes investigate topics in these strands, use problem solving and modeling, and have participants do and develop activities commensurate with these strands in grades K-5 and 6-8. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants.

Week 2: July 10-14, 2017

**STEM & Leadership (Grades 6-12) (Math/Science CEUs)** The integration of mathematics and science content and habits of mind provides powerful tools in the classroom. But how can teacher-leaders employ similar techniques to create meaningful school or district-wide STEM or STEAM initiatives? Participants in this Institute will: explore ways to conceptualize
STEM/STEAM integration; participate in inquiry-based investigations in topics such as biodiversity; design challenging activities and investigations; and examine activities and investigations through the lenses of frameworks for leadership. Additionally, participants will: consider a variety of tools for supporting STEM leadership; develop an action plan for a classroom or school-based initiative; and will review recent literature and policy related to STEM education, including the NC DPI STEM rubrics. This Institute is most appropriate for middle or secondary level teachers of mathematics or science or for school or district-level STEM leaders.

**Math 2 (2nd high school math)** (Math CEUs) This Institute exemplifies the integrated and inquiry-based nature of the content in the second high school math course as defined in numerous state and national content and pedagogy standards. Institute experiences include instruction and learning through: inquiry based methods; mathematical modeling; using technology; assessment strategies; reasoning and problem solving; standards on mathematical content, teaching, learning, and practices; and investigating teacher and student beliefs. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants. In order to shed light on the mathematics in these courses, some of the mathematical topics and approaches in this Institute transcend high school mathematics.

**Literacy in Mathematics (Grades K-8)** (Literacy CEUs) Literacy in mathematics is fundamental to learning. In order to learn and communicate mathematical ideas, students must be able to read and write in the content of mathematics. Notably, research has clearly demonstrated that, in a number of ways, reading and writing in the content of mathematics is different from reading in other subject areas. This K-8 Institute will focus on techniques to improve students’ mathematical reading and writing skills and teachers’ awareness of the differences in mathematical literacy versus literacy in other areas. This Institute provides CEUs in literacy (not in mathematics).

**Algebraic Thinking, Algebra, & Functions (Grades K-5)** (Math CEUs)
**Algebraic Thinking, Algebra, & Functions (Grades 6-8)** (Math CEUs) Standards for mathematical content, teaching, learning, and practices require that teachers provide students with opportunities to think deeper and make connections among concepts. While the strands of algebraic thinking, algebra, and functions are woven throughout most state standards for mathematics, notably absent in instructional practices are investigations regarding the meaning of the mathematics and why concepts and skills are valid. Thus, these Institutes integrate these notions and infuse them with meaning. Through inquiry-based instructional techniques that model best educational practices, these Institutes investigate topics in these strands, use problem solving and modeling, and have participants do and develop activities commensurate with these strands in grades K-5 and 6-8. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants.
Math 1 (1st high school math) (Math CEUs)
Math 4 (4th high school math) (Math CEUs) In 2015-16, North Carolina revised standards and alignment for Math 1, 2, & 3. This year, Math 4 is scheduled to undergo the same processes. As soon as those recommendations are published, this Institute will address the newest recommendations. These Institutes exemplify the integrated and inquiry-based nature of the content in the first and fourth high school math course, respectively, as defined in numerous state and national content and pedagogy standards. Institute experiences include instruction and learning through: inquiry based methods; mathematical modeling; using technology; assessment strategies; reasoning and problem solving; standards on mathematical content, teaching, learning, and practices; and investigating teacher and student beliefs. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants. In order to shed light on the mathematics in these courses, some of the mathematical topics and approaches in this Institute transcend high school mathematics.

Formative Assessment and Learning (Grades 6-12) (Math CEUs) In the past, one of MELT’s most popular Institutes was Building Mathematical Thinkers through Assessment and Inquiry. This new Institute considers some of the best elements of the previous Institute and introduces some new materials and ideas. Most state standards focus not only on the content that students are to learn and instructional techniques for bringing students to this learning, they also demonstrate the desire for students to become mathematical thinkers. This is accomplished through the standards for mathematical teaching, learning, and practices, mathematical modeling, and inquiry-based learning. In line with these standards, this Institute focuses on formative and summative assessment strategies to aid teachers in evaluating student understanding, help students both recognize their own deficiencies and learn the content, and assist students in becoming mathematical thinkers. The mathematics investigated in this Institute includes both the mathematics commensurate with grades 6-12 and post secondary mathematics intended to challenge teachers and have them experience again the role of the student and the nature of learning and assessment.

Fractions, Ratios, Proportions, & Geometry (Grades K-5). (Math CEUs)
Fractions, Ratios, Proportions, & Geometry (Grades 6-8). (Math CEUs) Standards for mathematical content, teaching, learning, and practices require that teachers provide students with opportunities to think deeper and make connections among concepts. While the strands of fractions, ratios, proportions, and geometry are woven throughout most state standards for mathematics, notably absent in instructional practices are investigations regarding the meaning of the mathematics and why concepts and skills are valid. Thus, these Institutes integrate these notions and infuse them with meaning. Through inquiry-based instructional techniques that model best educational practices, these Institutes investigate topics in these strands, use problem solving and modeling, and have participants do and develop activities commensurate with these strands in grades K-5 and 6-8. Regardless of the state from which a participant comes, MELT will ensure that the content and style of this Institute is sufficiently individuated to meet the needs of all participants.
Structural Background of Summer Institutes

All MELT Institutes are developed to address the seemingly continual revision of state and national standards. Each Institute is modified annually in order to meet the most recent state and national standards recommendations. Furthermore, each Institute is developed in a manner that will allow for participant experiences to be commensurate with the needs of their students, school, district, and state. Regardless of the state from which a participant comes and which set of standards that state is using, MELT will ensure that the content and style of each Institute is sufficiently individuated to meet the needs of all participants. As registrations are received, MELT personnel and instructors collaborate to ensure that the class instruction and experiences are appropriate for all participants and specifically address each respective set of standards.

All MELT Institutes use a framework that integrates the domains of content, pedagogy, technology, and leadership. This framework is represented in the accompanying figure.

Each MELT Institute attempts to best mirror the nature, philosophy, structure and intent of the standards. MELT Institutes assist teachers in understanding the nature of the state-specific standards and help them to translate content and instructional techniques to their own classrooms to support student learning.

The content and delivery of each Institute is considered through a number of perspectives. Course appropriate and integrated mathematical content is experienced in every Institute offering. Although a course may be denoted as addressing only a few mathematical topics, integration of a far greater number of topics commonly occurs. Some of these topics include algebra, geometry, probability, statistics, discrete math, and mathematical modeling. The content mirrors the style and content proposed in respective state standards and significantly extends upon such both in depth and through connections. This ensures that MELT participants gain both the content knowledge and the confidence to replicate and extend the content covered in these Institutes in their own classrooms.

Within the instructional and learning experiences in each MELT Institute, integrated pedagogical and epistemological considerations and experiences are paramount and accompany the mathematical content. Among others, these experiences include instruction and learning through: inquiry based methods, mathematical modeling, using technology, assessment strategies, reasoning and problem solving, standards on mathematical teaching, learning, and practices, and investigating teacher and student beliefs.

Each Institute is infused with consideration of the nature and practice of leadership. Participants will consider means and techniques of bringing what they have learned back to their classrooms, schools and districts. What it means to be a Mathematics Education Leader, what might that look like, and the many forms that may take in individual schools and districts is investigated.
Information about MELT Institutes

MELT Institutes are week-long, residential professional development training opportunities. MELT instructors are university faculty and master K-12 teachers with decades of experience both in classrooms and in curriculum development.

All MELT Institutes are held in Walker Hall on the campus of Appalachian State University, 121 Bodenheimer Dr., Boone, NC 28608. Institutes run 8:30-4:30 Monday-Thursday and 8:30-noon on Friday of each week.

The MELT program negotiates discount rates with a number of Hotels in Boone. Participants who cannot commute to ASU can make use of these hotels or find other housing options. (MELT no longer uses dorm rooms as possible housing.)

MELT Institutes can be taken for either 3 CEUs (most common) or 2 graduate credits. Information regarding graduate credits are on following pages.

All MELT registrations are submitted through an online application form. The online registration system will open in January 2017. Registrations will be accepted first-come-first-served until Institutes are filled.

Tuition for an Institute is $300 per person per week-long Institute. North Carolina teachers can use the Buy-One-Get-One group discount. Groups of teachers from other states may also request group discounts, but they must be approved through the MELT program Director.

After May 26th, 2017, MELT tuitions are non-refundable. Prior to this date, cancellations received in writing will receive a full refund less a $25 processing fee. ASU and the MELT program reserve the right to cancel Institutes no less than three weeks before the first day of the Institute. If Institutes are cancelled, affected registrants will receive 100% reimbursement for their MELT Registration fees. Questions or concerns should be directed to Dr. Michael Bossé, bossemj@appstate.edu; Office Phone: (828) 262-2862

For more information regarding the MELT Program and MELT Institutes, contact

Michael J. Bossé
Distinguished Professor of Mathematics Education and MELT Program Director

Dept. of Mathematical Sciences, 243 Walker Hall, 121 Bodenheimer Dr., Appalachian State University, Boone NC 28608-2092
Phone: (828) 262-2862
MELT Institutes for CEUs or Graduate Credits

For each Institute, participants will elect to earn either 30 clock hours of renewal credits (3 CEUs) or, for an additional fee, credit for a two semester graduate course. While any MELT Institute can be taken for Continuing Education Units (CEUs) and without graduate course credit, some participants may wish to earn graduate credits to assist them in their graduate program pursuit.

MELT Collaboration with Graduate Studies at Appalachian State University

MELT offerings (Institutes and Workshops) carry the option for students to earn up to 12 graduate credits applicable to a number of graduate programs offered through Appalachian State University. One of these is the Master of Arts in Mathematics Education offered through the Department of Mathematical Sciences. The MELT courses are approved electives in the Secondary Teaching Concentration. Courses in this program focus on broadening students' mathematical knowledge, deepening their understanding of secondary-level school mathematics and mathematics pedagogy, and developing students' identities as professional educators. For more information about the Mathematics MA for Secondary Teachers, please contact graduate program director, Dr. Holly Hirst, at hirsthp@appstate.edu or 828-262-2869 or look at www.mathsci.appstate.edu/students/graduate-programs. For additional graduate programs housed in other departments, contact the respective graduate coordinator for the program.

For more information regarding the MELT Program and MELT Institutes, contact
Michael J. Bossé
Distinguished Professor of Mathematics Education and MELT Program Director
Dept. of Mathematical Sciences, 243 Walker Hall, 121 Bodenheimer Dr.,
Appalachian State University, Boone NC 28608-2092
Phone: (828) 262-2862