Mathematics Education Leadership Training

MELT 2018 Summer Institutes

Appalachian State University, Boone NC

Week 1: June 25-June 29, 2018

Face-to-face Institutes

- Math 1 (1st High School Math). (Math CEUs)
- Probability & Statistics (Grades 9-12). (Math CEUs)
- Mathematical Practices and Processes (Grades K-5). (Math CEUs)
- Mathematical Practices and Processes (Grades 6-8). (Math CEUs)
- STEM Content & Leadership (Grades K-5). (Math/Science/Digital Learning CEUs)

Online Institute

- Digital Learning & Mathematics Education Technology (Grades 6-12). (Math/Digital Learning CEUs) (**Not Eligible for Group Discount**)

Week 2: July 9-13, 2018

Face-to-face Institutes

- Math 3 (3rd High School Math). (Math CEUs)
- STEM Leadership (Grades 6-12). (Math/Science/Digital Learning CEUs)
- Numbers & Operations (Grades K-5). (Math CEUs)
- Numbers & Operations (Grades 6-8). (Math CEUs)
- Literacy in Mathematic (Grades K-8). (Literacy/Math CEUs)

Online Institute

- Differentiating Instruction and Assessment (Grades K-12). (Math CEUs) (**Not Eligible for Group Discount**)

Week 3: July 16-20, 2018

Face-to-face Institutes

- Math 2 (2nd High School Math). (Math CEUs)
- Instructional Leaders (Grades K-12). (Math CEUs)
- First 3-Year and & Lateral Entry Teachers (Grades K-12). (Math CEUs)
- Patterns & Algebraic Thinking (Grades K-5). (Math CEUs)
- Algebraic Reasoning & Algebra (Grades 6-8). (Math CEUs)

Online Institute

- Digital Learning & Mathematics Education Technology (Grades K-5). (Math/Digital Learning CEUs) (**Not Eligible for Group Discount**)

MELT weeklong Summer Institutes are open to all K-12 and community college faculty, curriculum personnel, and administrators. 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.

2018 Summer Institute Descriptions

Week 1: June 25-29, 2018

Math 1 (1st high school math). (FACE-TO-FACE)
This Institute exemplifies the integrated and inquiry-based nature of the content in the first high school math course as defined in the North Carolina state 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. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Probability & Statistics (Grades 9-12). (FACE-TO-FACE)
Data, probability, and statistics have an increased role in many of today's state standards and are woven throughout grades 9-12 courses. However, this content is integrated in courses in ways different than many teachers have traditionally seen in the past. Additionally, the investigation of this content through most state standards is much more inquiry-based and constructed upon mathematical modeling than in the past. This Institute considers probability and statistics content through experiences and techniques commensurate with the mathematics proposed in various state standards and through more advanced mathematics that sheds light on the probability and statistics at hand. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Mathematical Practices & Processes (Grades K-5). (FACE-TO-FACE)
Mathematical Practices & Processes (Grades 6-8). (FACE-TO-FACE)
These two Institutes – one for grades K-5 and another for grades 6-8 – focus on the Mathematical Practices commonly associated with the CCSSM (problem solving and perseverance; abstract and quantitative reasoning; construct and critique arguments; model with mathematics; strategically use appropriate tools; attend to precision; and find and use of structure) and the NCTM Process Standards (problem solving, reasoning and proof, communication, connections, and representation). These practices and processes describe both how students learn mathematics and goals for mathematics education. However, for teachers to fully understand these ideas and be prepared to implement them in their classrooms, they must experience them again. These experiences can then lead teachers to implement these ideas in their classroom and, thereby, improve student learning. These Institutes consider the natural curricula of the respective grade

bands. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

STEM Content & Leadership (Grades K-5). (FACE-TO-FACE)
The integration of mathematics and science content and habits of mind provides powerful tools in the classroom. What does STEM look like in the elementary grades? Participants in this Institute will: explore ways to conceptualize STEM integration; participate in inquiry-based investigations in topics such as biodiversity; critique and design challenging activities and investigations; and examine activities and investigations through the lenses of frameworks for STEM. This institute is most appropriate for teachers or instructional facilitators of mathematics and science in the elementary grades or others seeking to support them. The CEUs provided through this Institute are in combinations of Math, Science, and Digital Literacy. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Digital Learning & Mathematics Education Technology (Grades 6-12). (ONLINE)
This Institute will be offered ***synchronously online***. That means that all participants will use computers, webcams, microphones, and the internet to interactively, and in real time, participate in the live Institute. (This will not be simply watching videos.)

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 North Carolina state standards for high school and middle grades mathematics courses. This Institute will occasionally consider postsecondary mathematics often needed to demonstrate even elementary mathematical ideas through technology. Thus, this Institute simultaneously investigates both mathematics and appropriate technology. The CEUs provided through this Institute are in combinations of Math and Digital Literacy. The tuition for this Institute **DOES NOT qualify** for the Buy-One-Get-One discount.

Week 2: July 9-13, 2018

Math 3 (3rd high school math). (FACE-TO-FACE)
This Institute exemplifies the integrated and inquiry-based nature of the content in the third high school math course as defined in the North Carolina 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. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

STEM Content & Leadership (Grades 6-12). (FACE-TO-FACE)
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 initiatives? Participants in this Institute will: explore ways to conceptualize STEM integration; participate in inquiry-based investigations in selected STEM topics; 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 and will review recent literature and policy related to STEM education, including the NC DPI STEM rubrics. This Institute is most appropriate for school or district-level STEM leaders. The CEUs provided through this Institute are in combinations of Math, Science, and Digital Literacy. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Numbers & Operations (Grades K-5). (FACE-TO-FACE)
Numbers & Operations (Grades 6-8). (FACE-TO-FACE)
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 two Institutes – one for grades K-5 and another for grades 6-8 – 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. The CEUs provided through these Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Literacy in Mathematics (Grades K-8). (FACE-TO-FACE)
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. When appropriate, activities will be differentiated to address the needs of teachers in their respective grades. Some of the learning intentions addressed in this institute include: differentiating between what literacy looks like in ELA and in Mathematics; identifying the difficulties in learning the language of mathematics; developing strategies to overcome the difficulties; and developing strategies to help students interpret problems without reading and interpreting for them. Please note that this Institute is not simply an overview of children's books. The CEUs provided through this Institute are in combinations of Literacy and Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Differentiating Instruction and Assessment (Grades K-12). (ONLINE)
No one size fits all and no one activity fits all students. With varying abilities and understandings, different students often need for mathematical examples, activities, and assessments to differentiated according to their individualized needs. Often times, activities and assessments can be quite readily differentiated to increase or decrease complexity while maintaining the central

mathematical concept of the activity. This Institute will consider how to accomplish this and will provide participants opportunity to practice these skills and return the ideas to their schools or districts. In addition to meeting the needs of classroom teachers, this Institute can benefit all mathematical school leaders (e.g., informal leaders, department chairs, instructional coaches/facilitators, and curriculum developers). The CEUs provided through this Institute are in Math. The tuition for this Institute **DOES NOT qualify** for the Buy-One-Get-One discount.

Week 3: July 16-20, 2018

Math 2 (2nd high school math). (FACE-TO-FACE)
This Institute exemplifies the integrated and inquiry-based nature of the content in the second high school math course as defined in the North Carolina state 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. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Instructional Leaders (e.g., informal leaders, department chairs, instructional coaches/facilitators, and curriculum developers) (Grades K-12). (FACE-TO-FACE)
The responsibilities of instructional leaders of all types (e.g., informal leaders, department chairs, instructional coaches/facilitators, and curriculum developers) differ from those of the classroom teacher. Instructional leaders provide resources and recommendations to classroom teachers and interact primarily with adults to enhance the learning of students. This Institute will: assist instructional leaders in locating and evaluating excellent curricular and assessment materials; investigate the role of the instructional leader as a change agent in the school and district; consider aspects of leadership through various leadership frameworks; provide some ideas regarding evaluating teaching, providing guidance to teachers, discuss vertical curriculum alignment, and reporting to administrators. Depending on the needs of the participants, this Institute may also consider how to use school, district, and state assessment data to improve instruction and student learning. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

First 3-Year and & Lateral Entry Teachers (Grades K-12). (FACE-TO-FACE)
Early career and lateral entry teachers have unique needs over veteran teachers with significant experience. The early years often define a teacher's career and success. Habits – both positive and negative – are formed early and are often, particularly for the lateral entry teacher, framed by previous experiences and backgrounds. Some aspects of daily teaching differ from a career in teaching. This institute will consider the pedagogical and content needs of early career teachers and help them understand where their curriculum fits within grade bands and effective teaching and assessment strategies. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

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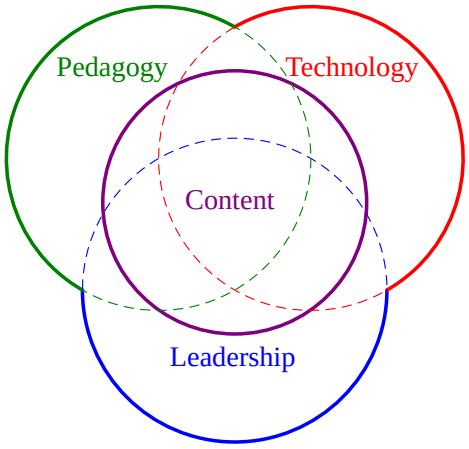
Patterns & Algebraic Thinking (Grades K-5). (FACE-TO-FACE)
Algebraic Reasoning & Algebra (Grades 6-8). (FACE-TO-FACE)
Standards for mathematical content, teaching, learning, and practices require that teachers provide students with opportunities to think deeper and make connections among concepts. While 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. The CEUs provided through this Institute are in Math. The tuition for this Institute qualifies for the Buy-One-Get-One discount.

Digital Learning & Mathematics Education Technology (Grades K-5). (ONLINE)
This Institute will be offered ***synchronously online***. That means that all participants will use computers, webcams, microphones, and the internet to interactively, and in real time, participate in the live Institute. (This will not be simply watching videos.)
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 North Carolina state standards for elementary and middle grades mathematics courses. This Institute will occasionally consider secondary mathematics often needed to demonstrate even elementary mathematical ideas through technology. Thus, this Institute simultaneously investigates both mathematics and appropriate technology. The CEUs provided through this Institute are in combinations of Math and Digital Literacy. The tuition for this Institute **DOES NOT qualify** for the Buy-One-Get-One discount.

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, 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 2018. Registrations will be accepted first-come-first-served until Institutes are filled.

Tuition for an Institute is $300 per person per week-long Institute. MELT also provides a Buy-One-Get-One free Group Discount on Institute tuitions. Any teacher, school, or district that buys any seat in any eligible MELT Summer Institute can get one seat in either that same Institute or another eligible Institute tuition free. Pairs of teachers **DO NOT** need to be in the same institute or even in the same week. This discount is even applicable to one teacher who wishes to attend two eligible Summer Institutes for the price of one. Groups of teachers can organize this group discount or a school or district can organize this through the MELT program.

After May 30th, 2018, 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 should be directed to Dr. Michael Bossé, MELT@appstate.edu; Office Phone: (828) 262-2862

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

Michael J. Bossé
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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

Participants who wish to receive academic credit for graduate courses associated with the MELT institutes (2 credits per institute) may do so for the additional cost of graduate tuition and fees. In addition to attending the institute, you will be required to complete several graded assignments under the supervision of the MELT Director.

The process for receiving academic credit depends on your current status as a student at Appalachian:

(A) If you are a current graduate student enrolled in Spring classes at Appalachian, you will be registered for the course by the MELT program upon receipt of the institute application form and institute fee. You will be billed for tuition and fees separately by the University through your student account.

(B) If you are not enrolled in Spring classes at Appalachian, you will need to seek admission to the School of Graduate Studies by completing the online application at https://www.gradadmissions1.appstate.edu/gradweb/default.asp.

- Students who HAVE completed a graduate course at Appalachian in the last seven years must apply to be readmitted as a graduate student. There is no fee for readmission.
- Students who HAVE NOT completed a graduate course at Appalachian in the last seven years will need to apply for admission. There is a one-time application fee (currently $65), that you will be charged during the online application process.

You will be registered for the course by the MELT program coordinator upon notification of admission from the School of Graduate Studies and receipt of the institute application form and fee.

If you have additional questions or need assistance with the process for academic credit, please contact Dr. Holly Hirst, Mathematics Graduate Program Co-Director, hirsthp@appstate.edu.

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

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