

The 23rd Annual Conference
of the Special Interest Group of the
Mathematical Association of America
on
Research in Undergraduate Mathematics Education
(RUME)

Program
(without abstracts)



February 27th - February 29th, 2020
Boston, MA

Hosted by Boston University Wheelock College of Education
and Human Development

RUME Executive Committee

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Coordinator-Elect (2019):	<i>Nicole Engelke Infante (West Virginia University)</i>
Organizational Director (2019-2020):	<i>Shiv Smith Karunakaran (Michigan State University)</i>
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RUME 2020 Program Committee*

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* If you are interested in serving on future Program Committees, please contact Shiv Smith Karunakaran (karunak3@msu.edu)

2020 SIGMAA–RUME CONFERENCE SCHEDULE

Thursday	Friday	Saturday
8:00 AM – Noon RUME Working Group Meetings	7:00–8:45 AM Breakfast	7:00–8:30 AM Breakfast
	8:20–8:50 AM Special Session on NSF Funding for RUME – I	8:20–8:50 AM Special Session on NSF Funding for RUME – II
	9:00–9:30 AM Session 6 – Contributed Reports	9:00–9:30 AM Session 15 – Preliminary Reports
	9:40–10:10 AM Session 7 – Contributed Reports	9:40–10:10 AM Session 16 – Contributed Reports
	10:20–10:50 AM Coffee Break	10:20–10:50 AM Coffee Break
	10:50–11:20 AM Session 8 – Preliminary Reports	10:50–11:20 AM Session 17 – Contributed Reports
	11:30–Noon Session 9 – Contributed Reports	11:30–Noon Session 18 – Preliminary Reports
1:00 PM – 1:20 PM Opening Session	Noon–1:00 PM Lunch & Mentoring/Discussion Tables	Noon–1:00 PM Lunch & Business Meeting
1:30–2:00 PM Session 1 – Contributed Reports	1:10–1:40 PM Session 10 – Preliminary Reports	1:10–1:40 PM Session 19 – Preliminary Reports
2:10–2:40 PM Session 2 – Contributed Reports	1:50–2:20 PM Session 11 – Contributed Reports	1:50–2:20 PM Session 20 – Contributed Reports
2:50–3:20 PM Session 3 – Preliminary Reports	2:30–3:00 PM Session 12 – Contributed Reports	2:30–3:00 PM Session 21 – Contributed Reports
3:30–4:00 PM Coffee Break	3:00–3:30 PM Coffee Break	3:00–3:30 PM Coffee Break
4:00–4:30 PM Session 4 – Contributed Reports	3:30–4:00 PM Session 13 – Contributed Reports	3:30–4:00 PM Session 22 – Contributed Reports
4:40–5:10 PM Session 5 – Contributed Reports	4:10–4:40 PM Session 14 – Preliminary Reports	4:10–4:40 PM Session 23 – Preliminary Reports
5:20–6:20 PM Poster Session 1 & Cash Bar	4:50–6:10 PM Plenary Session <i>Dr. Eric Knuth</i>	4:50–5:50 PM Poster Session 2 & Cash Bar
6:30–8:00 PM Dinner & Plenary Session <i>Dr. Gregory Larnell</i>	<i>Dinner on your own</i>	6:00–7:30 PM Dinner & Plenary Session <i>Dr. Elise Lockwood</i>

Note: Theoretical Reports will be presented in the Contributed Report sessions

Program Highlights

Session Title	Time	Venue	Description
Welcome Session	1:00 PM, Thursday	Grand Master Ballroom	
Thursday Plenary & Dinner	6:30 PM, Thursday	Grand Master Ballroom	Dr. Gregory Larnell
Special Session on NSF Funding for RUME – I	8:20 AM, Friday	Bohea	Dr. Karen Keene. This session will focus on the CAREER program and general hints/insights into getting funded by NSF
Mentoring/Discussion Tables & Lunch	Noon, Friday	Grand Master Ballroom	Mentors from the RUME community will lead roundtable discussions various topics, including LGBTQ+ ally critical discussion, job search issues, seeking NSF funding, teaching various courses, etc. See abstract of session for complete details.
Friday Plenary	4:50 PM, Friday	Grand Master Ballroom	Dr. Eric Knuth
Special Session on NSF Funding for RUME – I	8:20 AM, Saturday	Bohea	Dr. Karen Keene. This session will focus on the EHR Core Research and Building Capacity in STEM Education solicitation
Business Meeting & Lunch	Noon, Saturday	Grand Master Ballroom	
Saturday Plenary & Dinner	6:00 PM, Saturday	Grand Master Ballroom	Dr. Elise Lockwood

Plenary Speakers

Dr. Gregory Larnell:



Gregory V. Larnell (@gvlarnell on Twitter) is an associate professor of mathematics education in the Department of Curriculum and Instruction at the University of Illinois at Chicago, where he teaches undergraduate courses on urban education, STEM education, and mathematics teaching and learning and graduate courses on mathematics education scholarship and curriculum studies. His research interests include empirical and theoretical study of learners' experiences amid transitions to postsecondary mathematics courses (especially introductory and pre-introductory/remedial/developmental courses), urban mathematics education, and issues concerning knowledge production in mathematics education scholarship (especially concerning race, equity, and injustice).

Dr. Eric Knuth:



Eric Knuth received a doctorate in mathematics education from the University of Colorado at Boulder, a master's degree in mathematics from San Diego State University, and a bachelor's degree in electrical engineering from the University of Illinois. For 18 years, he was a faculty member at the University of Wisconsin-Madison, and in 2017, he joined the faculty at the University of Texas at Austin, where he also serves as the Director of the STEM Center. His program of research concerns the meaningful engagement of students in mathematical practices and their development of increasingly more sophisticated ways of engaging in those practices. His research focuses, in particular, on practices related to algebraic reasoning and learning to prove. He has also served as co-chair of the AERA SIG for Research in Mathematics Education and as a member of the NCTM Research Committee.

Dr. Elise Lockwood:



Elise Lockwood is Associate Professor in the Department of Mathematics at Oregon State University. She received her PhD from Portland State University and held a postdoctoral fellowship at the University of Wisconsin – Madison. Her research focuses on undergraduate student reasoning about combinatorics, and, more recently, the role of computing within mathematics education -- both within combinatorics and in other content domains. Her work is funded by the National Science Foundation and Google. She received the 2018 John and Annie Selden Award, and she was awarded the 2019 Promising Scholar Award at Oregon State University. In 2019 she was named a Fulbright Scholar for a project in Norway, at the Center for Computing in Science Education at the University of Oslo. Elise's favorite part of her work is collaborating with wonderful colleagues and students, and she finds it particularly rewarding when ideas are developed and refined through rich conversations. She also loves working with and learning from her research participants. In her free time, Elise enjoys cooking, eating, playing board games, collecting Rocket Raccoon comics, cheering for the Portland Trail Blazers, relaxing with her two cats, and spending time with her friends and family.

Day

Time

Session Type

Thursday

8:00 AM

Working Group

Working Group 1: Equity and the Rehumanization of Undergraduate Mathematics at the Classroom, Department, Institution, and Professional Levels

Room: Grand Master Ballroom

Working Group 2: Calculus I Concept Inventory Development

Room: Bohea

Working Group 3: Improving Teaching and Learning in Undergraduate Geometry Courses for Secondary Teachers

Room: Bigelow

Working Group 4: Research on Community College Mathematics

Room: Celestial

Working Group 5: Education Research at the Interface of Mathematics and Science: Perspectives on Quantitative Modeling

Room: Salada

Working Group 6: RUME Research in the Context of Mathematics Tutoring Centers

Room: Silver 1

Working Group 7: Research on College Mathematics Instructor Professional Growth

Room: Singlo

Working Group 8: Statistics and Data Science Education

Room: Silver 2

Working Group 9: Systemic Departmental Change in RUME

Room: Silver 3

Day	Time	Session Type
Thursday	1:00 PM	<i>Special</i>

Welcome Session

Room: Grand Master Ballroom

	Day	Time	Session Type
Session 1	Thursday	1:30 PM	<i>Theoretical Reports (TR)</i>

The Theory of Quantitative Systems: Deconstructing "Symbolic Algebra" to Understand Challenges in Linear Algebra Courses

*Sipes, Janet**

Room: Bohea

A Calculus Student's Thinking about the Idea of Constant Rate of Change

*Khan, Ishtesa**

Room: Singlo

Influence of Curriculum on College Students' Understanding and Reasoning about Limits

Dixon, Navy B; Carroll, Erin; Teuscher, Dawn*

Room: Salada

Promoting Instructor Growth and Providing Resources: Course Coordinator Orientations Toward their Work

Martinez, Antonio E; Gehrtz, Jessica; Rasmussen, Chris; LaTona-Tequida, Talia; Vroom, Kristen*

Room: Silver 2

Minding the Gaps: Algebra Skills of University Calculus Students

Kornelson, Keri; Moore-Russo, Deborah; Reeder, Stacy*

Room: Celestial

Mathematicians' Proof Repertoires: The Case of Proof by Contradiction

*Brown, Stacy**

Room: Silver 3

The Modeling Space: An Analytical Tool for Documenting Students' Modeling Activities

Czocher, Jennifer A; Hardison, Hamilton*

Room: Silver 1

	Day	Time	Session Type
Session 2	Thursday	2:10 PM	<i>Theoretical Reports (TR)</i>

A Tour of Cognitive Transformations of Semiotic Representations in Advanced Mathematical Thinking

Lajos, Jessica E; Stewart, Sepideh*

Room: Bohea

A Quantitative Reasoning Framing of Concept Construction

Moore, Kevin; Liang, Biyao ; Stevens, Irma E; Tasova, Halil I; Paoletti, Teo; Ying, Yufeng*

Room: Singlo

Mathematical Limitations as Opportunities for Creativity: An Anti-deficit Perspective

Adiredja, Aditya P; Zandieh, Michelle*

Room: Silver 2

Working Towards a Unifying Framework for Knowledge for Teaching Mathematics

Nuzzi, Jessica; Murray, Eileen; Golnabi, Amir*

Room: Salada

The Role of Gestures in Teaching and Learning Proof by Mathematical Induction

*Kokushkin, Vladislav**

Room: Silver 3

Operational Meanings for the Equals Sign

*Mirin, Alison**

Room: Silver 1

Interpreting Undergraduate Student Complaints about Graduate Student Instructors through the Lens of the Instructional Practices Guide

Yee, Sean P; Deshler, Jessica; Rogers, Kimberly C; Papalia, Nicholas; Lamarche, Alicia*

Room: Celestial

	Day	Time	Session Type
Session 3	Thursday	2:50 PM	<i>Preliminary Reports (PR)</i>

Students' Understanding of Infinite Iterative Processes

*Tiraphatna, Marcie **

Room: Salada

Identifying Covariational Reasoning Behaviors in Expert Physicists in Graphing Tasks

Zimmerman, Charlotte M; Olsho, Alexis; Loverude, Michael; White Brahmia, Suzanne*

Room: Singlo

Supporting Underrepresented Students in an Undergraduate Mathematics Program

*Tague, Jenna**

Room: Silver 2

Content-specific Confidence in Entry-level College Mathematics Courses: Relationships and Patterns

*Makowski, Martha**

Room: Bohea

Relational Interactions in Inquiry-Oriented Undergraduate Mathematics Classes

Mullins, Brooke; Serbin, Kaitlyn S; Johnson, Estrella*

Room: Silver 3

Multivariate Functions, Physical Representations, and Real World Connections

Heid, Mary K.; Black, Matthew*

Room: Silver 1

Adapting K-12 Teaching Routines to the Advanced Mathematics Classroom

Melhuish, Kathleen; Lew, Kristen M; Baumgard, Taylor; Ellis, Brittney*

Room: Celestial

Day	Time	Session Type
Thursday	3:30 PM	<i>Break</i>

Coffee Break

Room: Silver Foyer/Tea Gallery Foyer

	Day	Time	Session Type
Session 4	Thursday	4:00 PM	<i>Contributed Reports (CR)</i>

A Local Instructional Theory for the Guided Reinvention of a Classification Algorithm for Chemically Important Point Groups

*Bergman, Anna Marie**

Room: Bohea

A Theorization of Learning Environments to Support the Design of Intellectual Need-Provoking Tasks in Introductory Calculus

Weinberg, Aaron; Jones, Steven R*

Room: Singlo

Teaching Statistics with a Critical Pedagogy

*DiMella, Toni**

Room: Silver 2

A Potential Foundation for Trigonometry and Calculus: The Variable-Parts Perspective on Proportional Relationships and Geometric Similarity

Beckmann, Sybilla; Izsák, Andrew*

Room: Bigelow

An Investigation of a Student's Constructed Meanings for Animations in Construction of a Hypothetical Learning Trajectory

*Guy, Aysia M**

Room: Silver 1

Metacognition: An Overlooked Dimension in Connecting Undergraduate Mathematics to Secondary Teaching

*Lefcourt, Tamara**

Room: Salada

	Day	Time	Session Type
Session 5	Thursday	4:40 PM	<i>Contributed Reports (CR)</i>

Coordinate Representation of Vectors and Matrix Representations of Linear Transformations in a DGS Assisted Linear Algebra Learning Environment: The Case of Polynomial Vector Space

*Caglayan, Gunhan**

Room: Bohea

Changing the Script: How Teaching Calculus using Team-Based Learning Misaligns with Students' Views of how Learning Mathematics Occurs

*Bolles, Heather *; Jurgenson, Kari; Baker, Amanda*

Room: Singlo

Investigating the Effects of Culturally Relevant Pedagogy on College Algebra Students' Attitudes towards Mathematics

*Downing, Gregory A**

Room: Silver 2

A Proposed Framework of Student Thinking around Substitution Equivalence: Structural versus Operational Views

*Wladis, Claire**

Room: Bigelow

Making Sense of Irrational Exponents: University Students Explore

Marmur, Ofer; Zazkis, Rina*

Room: Silver 1

Undergraduates' Perceptions of the Benefits of Working Tasks Focused on Analyzing Student Thinking as an Application for Teaching in Abstract Algebra

Alvarez, James A Mendoza; Kercher, Andrew C; Turner, Kyle*

Room: Salada

	Day	Time	Session Type
Session Poster	Thursday	5:20 PM	<i>Poster</i>
<hr/> I'm Still Confused in the Most Basic Way: How Responsibilities Impact Mathematics Learning While Video Watching			
<i>Kelley, Suzanne*</i>			
Liberty Hall (T1)			
<hr/> Comics as Pedagogical Tools in First-year Linear Algebra			
<i>Garcia, Amanda*; Sellaroli, Giuseppe; Wolczuk, Dan</i>			
Liberty Hall (T2)			
<hr/> The Implications of Attitudes and Beliefs on Interactive Learning in Statistics Education			
<i>Berens, Florian*; Hobert, Sebastian</i>			
Liberty Hall (T3)			
<hr/> Reconceptualizing Mathematics Teacher Knowledge in Domain Specific Terms			
<i>Wilmot, Eric M*</i>			
Liberty Hall (T4)			
<hr/> Exploring Mathematical Connections Between Abstract Algebra and Secondary Mathematics from the Perspectives of Mathematics Faculty and Practicing Teachers			
<i>Gray, Cammie*</i>			
Liberty Hall (T5)			
<hr/> Mathematics Stretch Courses: Implementation and Assessment			
<i>Hobson, Natalie*; Byrne, Martha</i>			
Liberty Hall (T6)			
<hr/> Student Engagement and Gender Identity in Undergraduate Introduction to Proof			
<i>Barton Odro, Emmanuel*</i>			
Liberty Hall (T7)			

Racial Differences and the Need for Post-Secondary Mathematics Remediation

Houston, Scotty; Harrell-Williams, Leigh M; Xu, Yonghong*

Liberty Hall (T8)

The Connection between Perception of Utility in Careers with Math and STEM Career Interest

*Howell, Elizabeth**

Liberty Hall (T9)

Undergraduates' Geometric Reasoning of Complex Integration

Soto, Hortensia; Oehrtman, Michael*

Liberty Hall (T10)

Investigating the Influence of Gender Identity and Sexual Orientation in Group Work

*Bernier, Jeremy R**

Liberty Hall (T11)

Exploring Student Understanding of Implicit Differentiation

*Chu, Connor**

Liberty Hall (T12)

Student Interpretation of Cartesian Points and Trends of a Chemical Reaction Coordinate Diagram with Abstracted Physical Dimensions

Parobek, Alexander P; Chaffin, Patrick; Towns, Marcy*

Liberty Hall (T13)

Investigating Student Reasoning about the Cauchy-Riemann Equations and the Amplitwist

*Troup, Jonathan D; Troup, Jonathan**

Liberty Hall (T14)

“Meaning Making with Math”: A Mathematical Modeling Approach to Supporting Conceptual Reasoning in Undergraduate Chemistry

*Lazenby, Katherine**; *Rodriguez, Jon-Marc G*; *Becker, Nicole*

Liberty Hall (T15)

The Mathematical Inquiry Project: Effecting Widespread, Sustainable Instructional Change

*Ireland, Josiah G**; *Cook, John Paul*; *Dorko, Allison*; *Jaco, William*; *Oehrtman, Michael*; *Richardson, April*; *Tallman, Michael A*

Liberty Hall (T16)

Pre-service Mathematics Teachers’ Engagement with Cognitive Demand of Mathematics Tasks

*Rahman, Zareen**

Liberty Hall (T17)

An Overview of the Orchestrating Discussion Around Proof (ODAP) Project

*Hicks, Michael D**; *Guajardo, Lino*; *Melhuish, Kathleen*; *Lew, Kristen M*; *Dawkins, Paul*

Liberty Hall (T18)

Informing the Community About Advancing Students’ Proof Practices in Mathematics through Inquiry, Reinvention, and Engagement

*Brown, David**; *Alzaga Elizondo, TENCHITA*; *Vroom, Kristen*

Liberty Hall (T19)

Logical Implication as an Object and Proficiency in Proof by Mathematical Induction

*Kokushkin, Vladislav**; *Arnold, Rachel*; *Norton, Anderson*

Liberty Hall (T20)

Multiplication by Sunlight: How can a Geometric Definition be Realized in a Physical Tool?

*Dimmel, Justin**; *Pandiscio, Eric*; *Godet, Adam*

Liberty Hall (T21)

Calculus Students' Visualization of Volume

Gine, Roser; Davis, Tara*

Liberty Hall (T22)

Exploring the Development of Mathematical Problem Solving Strategies in the Transition from Novice to Experienced Mathematicians

*Kercher, Andrew C**

Liberty Hall (T23)

A Framework for Meaning in Mathematics

*Chowdhury, Ahsan**

Liberty Hall (T24)

Aligning Assessment with Instruction in a Creativity in Mathematics Course

Monahan, Ceire H; Munakata, Mika; Vaidya, Ashwin*

Liberty Hall (T25)

Student Thinking about the Graphs of Functions of Two Variables via Software Visualization

*Bettersworth, Zachary S**

Liberty Hall (T26)

Myriad Issues in Teaching College Geometry

Prasad, Priya; Boyce, Steven*

Liberty Hall (T27)

Building GTAs' Knowledge & Motivation to Promote Equity in Undergraduate Mathematics

Webb, Jessica J; Manzanares, RaKissa; Houston, Scotty; Gomez, Josias; Harrell-Williams, Leigh M*

Liberty Hall (T28)

How can regional RUME conferences support inclusion into the larger RUME community?

Rahman, Zareen; Miller, Erica R; Satyam, V. Rani; Rahman, Zareen G*

Liberty Hall (T29)

GTAs' Conceptualization of Active Learning in Undergraduate Mathematical Sciences Courses

Houston, Scotty; Gomez, Josias; Harrell-Williams, Leigh M; Webb, Jessica*

Liberty Hall (T30)

Using Successful Affective Measures Among Native Populations in the U.S.

*Luecke, Danny**

Liberty Hall (T31)

Using the Learning Cycle and Mathematical Models to Engage Students in Sensemaking Involving Metamodeling Knowledge in Chemistry

Rodriguez, Jon-Marc G; Lazenby, Katherine ; Becker, Nicole*

Liberty Hall (T32)

Examining Academic Performance and Student Experiences in an Emerging Scholars Program

*McNeilly, Jennifer R**

Liberty Hall (T33)

Investigation of Affective Factors Which May Influence Women's Performance in Mathematics

*Benjamin, Judy I.**

Liberty Hall (T34)

Reforming Introductory Math Courses to Support Success for Underserved Students Who Place in Developmental Math

*Matz, Becky**

Liberty Hall (T35)

Analysis of Collaborative Curriculum Adaptation

Brummer, Josh; Wakefield, Nathan; Yee, Sean P*

Liberty Hall (T36)

Descriptions of Mathematics Graduate Teaching Assistants' Growth as Teachers

Beisiegel, Mary; Gibbons, Claire; Rist, Alexis*

Liberty Hall (T37)

A Framework of Covariational Reasoning in Introductory Physics

Olsho, Alexis; White Brahmia, Suzanne; Zimmerman, Charlotte M*

Liberty Hall (T38)

Using Didactical Engineering to Teach Mathematical Induction

Postelnicu, Valentina; Gonzalez, Mario A.*

Liberty Hall (T39)

Day	Time	Session Type
Thursday	6:30 PM	<i>Meal</i>

Dinner

Room: Grand Master Ballroom

Day	Time	Session Type
Thursday	7:00 PM	<i>Plenary</i>

Remediating Mathematics and Remediating Racialized Access: Lessons from a decade of study

Gregory Larnell

Room: Grand Master Ballroom

Day	Time	Session Type
Friday	7:00 AM	<i>Meal</i>

Breakfast

Room: Grand Master Ballroom

Day	Time	Session Type
Friday	8:20 AM	<i>Special</i>

Special Session on NSF Funding for RUME - I

Karen Keene

Room: Bohea

	Day	Time	Session Type
Session 6	Friday	9:00 AM	<i>Contributed Reports (CR)</i>

"What Happened to the Vector?" Felix's Emerging Conception of Translations

*Sipes, Janet**

Room: Bohea

Students' Understanding of Partial Derivatives

*Mkhatshwa, Thembinkosi P**

Room: Singlo

Every Mathematics Class is Online: Students' Use of Internet Resources for Self-Directed Learning

*Erickson, Ander**

Room: Silver 2

Characterizing Student Engagement in a Post-Secondary Precalculus Class

Fifty, David; Buchbinder, Orly; McCrone, Sharon*

Room: Salada

Students' Interpretations of the Prompts for Proving Tasks: "Prove" and "Show"

*Hwang, Jihye *; Karunakaran, Shiv S*

Room: Silver 3

An Investigation of an Effective Mathematical Reader and His Interactions and Beliefs About Mathematics and Mathematics Textbooks: The Case of Shawn

*Judson-Garcia, Julia G. *; Villatoro, Barbara; Lee, Inyoung*

Room: Silver 1

Chavrusa-Style Learning in Mathematics Classrooms: Instructor and Student Perspectives

Flint, Rochy; Mei, Baldwin*

Room: Celestial

	Day	Time	Session Type
Session 7	Friday	9:40 AM	<i>Contributed Reports (CR)</i>

Student Reasoning with Graphs, Contour Maps, and Rate of Change for Multivariable Functions

*Wangberg, Aaron D**

Room: Singlo

Measuring the Effectiveness of Social Justice Pedagogy on K-8 Preservice Teachers

Downing, Gregory A; Black, Brittney*

Room: Silver 2

Metacognition in College Algebra: An Analysis of "Simple" Mistakes

Ryals, Megan; Hill-Lindsay, Sloan; Burks, Linda; Pilgrim, Mary E*

Room: Bohea

Coordinating Two Meanings of Variables in Proofs that Apply Definitions Repeatedly

Dawkins, Paul; Roh, Kyeong Hah*

Room: Silver 3

A Preservice Teacher's Emerging Concept Image of Function: The Case of Sofia

Beach, Janessa M; Alvarez, James A Mendoza*

Room: Salada

Quantitative Reasoning and Symbolization Activity: Do Individuals Expect Calculations and Expressions to Have Quantitative Significance?

*O'Bryan, Alan E**

Room: Silver 1

What is Encompassed by Responsiveness to Student Thinking?

*Gehrtz, Jessica**

Room: Celestial

Day	Time	Session Type
Friday	10:20 AM	<i>Break</i>

Coffee Break

Room: Silver Foyer/Tea Gallery Foyer

	Day	Time	Session Type
Session 8	Friday	10:50 AM	<i>Preliminary Reports (PR)</i>

Student Mathematical Activity During Analogical Reasoning in Abstract Algebra

*Hicks, Michael D**

Room: Salada

Exploring the Relationship between Textbook Format and Student Outcomes in Undergraduate Mathematics Courses

Mesa, Vilma; Gerami, Saba; Liakos, Yannis*

Room: Singlo

Math Outreach- A Learning Opportunity for University Students

*Ghosh Hajra, Sayonita**

Room: Silver 2

The Role of Mathematical Meanings for Teaching and Decentering Actions in Productive Student-Teacher Interactions

Rocha, Abby E; Carlson, Marilyn*

Room: Bohea

Proving Activities of Abstract Algebra Students in a Group Task-based Interview

Lew, Kristen M; Melhuish, Kathleen; Dawkins, Paul*

Room: Silver 3

When Covariational Reasoning Does Not “Work”: Applying Coordination Class Theory to Model Students’ Reasoning Related to the Varied Population Schema and Distribution Graphs

Rodriguez, Jon-Marc G; Becker, Nicole; Stricker, Avery*

Room: Silver 1

Shifting Pedagogical Beliefs into Action through Teaching for Mathematical Creativity

Tang, Gail; Savic, Milos; Cilli-Turner, Emily; Regier, Paul; Karakok, Gulden; El Turkey, Houssein*

Room: Celestial

	Day	Time	Session Type
Session 9	Friday	11:30 AM	<i>Contributed Reports (CR)</i>

Synthetic vs. Analytic Formalism of Matrix Representations in Linear Algebra: What it Means to Diagonalize a Linear Transformation

*Caglayan, Gunhan**

Room: Salada

Students' Interpretations of Expressions from Calculus Statements in the Graphical Register

*Parr, Erika D**

Room: Singlo

You Don't Want to Come Into a Broken System: Critical and Dominant Perspectives for Increasing Diversity in STEM among Undergraduate Mathematics Program Stakeholders

Tremaine, Rachel; Hagman, Jessica E; Gehrtz, Jessica; Voigt, Matthew K*

Room: Silver 2

One Mathematician's Epistemology of Proof and its Implications for her Comments and Marks on Students' Proofs

*Kontorovich, Igor'**

Room: Silver 3

Reasoning Covariationally about Constant Rate of Change: The Case of Samantha

Tallman, Michael A; Weaver, John*

Room: Bohea

Empirical Re-Conceptualization: Bridging from Empirical Patterns to Insight and Understanding

Ellis, Amy; Lockwood, Elise; Lynch, Alison G.*

Room: Silver 1

Factors That Influence Graduate Student Instructors' Pedagogical Empathy

*Uhing, Karina**

Room: Celestial

Day	Time	Session Type
Friday	12:00 PM	<i>Meal</i>

Lunch

Room: Grand Master Ballroom

Mentoring/Discussion Tables

Room: Grand Master Ballroom

	Day	Time	Session Type
Session 10	Friday	1:10 PM	<i>Preliminary Reports (PR)</i>

Examining the Qualities of Schema in Topology

Berger, Ashley; Stewart, Sepideh*

Room: Salada

Supporting Students' Construction of Dynamic Imagery: An Analysis of the Usage of Animations in a Calculus Course

Mirin, Alison; Yu, Franklin; Khan, Ishtesa*

Room: Singlo

For Women in Lecture, How They Feel Matters – A Lot

Keller, Rachel E; Johnson, Estrella; Keene, Karen; Andrews-Larson, Christine; Fortune, Nicholas*

Room: Silver 2

Comparison of a Pre-requisite to Co-requisite Model of Remedial Mathematics

Tague, Jenna; Nuñez, Dahlia R; Czocher, Jennifer A*

Room: Bohea

Physics Students' Implicit Connections Between Mathematical Ideas

Smith, Trevor I; White Brahmia, Suzanne; Olsho, Alexis; Boudreaux, Andrew*

Room: Bigelow

An Example of Computational Thinking in Mathematics

Purdy, Branwen; Lockwood, Elise*

Room: Silver 1

Communication and Community: GTA Perceptions on a Professional Development Program

Ho, Anne M.; Pilgrim, Mary E*

Room: Celestial

	Day	Time	Session Type
Session 11	Friday	1:50 PM	<i>Contributed Reports (CR)</i>

Get That Basket! Deciphering Student Strategies in the Linear Algebra Game Vector Unknown

Mauntel, Matthew; Levine, Benjamin; Plaxco, David; Zandieh, Michelle*

Room: Bohea

In the Driver's Seat: Course Coordinators as Change Agents for Active Learning in University Precalculus to Calculus 2

Williams, Molly; Rasmussen, Chris; Uhing, Karina; Smith, Wendy; Apkarian, Naneh; Martinez, Antonio; Zigterman, Rachel; Wakefield, Nathan*

Room: Singlo

Construction of a Mathematics Learning Assistant's Fragile Mathematics Identity

*Kress, Nancy**

Room: Silver 2

A Model for Assessing ITP Students' Ability to Validate Mathematical Arguments

*Fagan, Joshua B**

Room: Silver 3

Secondary Prospective Teachers' Strategies to Determine Equivalence of Conditional Statements

Buchbinder, Orly; McCrone, Sharon*

Room: Salada

Student Verification Practices for Combinatorics Problems in a Computational Environment

*De Chenne, Adaline E**

Room: Silver 1

Knowledge for Teaching at the Undergraduate Level: Insights from a STEM-wide Literature Review

Speer, Natasha; Shultz, Ginger; Andrews, Tessa C*

Room: Celestial

Exploring the Knowledge Base for College Mathematics Teaching

Corey, Doug; West, Linlea; Kaluhiokalani, Kamalani*

Room: Bigelow

	Day	Time	Session Type
Session 12	Friday	2:30 PM	<i>Contributed Reports (CR)</i>

What Comes to Mind? A Case Study of Concept Images In Topology

Gallagher, Keith; Engelke Infante, Nicole*

Room: Bigelow

Calculus Students' Epistemologies of Mathematics: The Case for a Dynamic Interpretation

*Merighi, Caroline**

Room: Singlo

Math and Moral Reasoning in the Age of the Internet: Undergraduate Students' Perspectives on the Line Between Acceptable Use of Resources and Cheating

Levin, Mariana; Smith, John; Karunakaran, Shiv S; Kuchle, Valentin; Gady, Sarah; Hwang, Jihye ; Elmore, Bob; Bae, Younggon*

Room: Silver 3

A Conceptual Analysis for Optimizing Two-Variable Functions in Linear Programming

Liang, Biyao; Ying, Yufeng; Moore, Kevin*

Room: Bohea

How Do Students Engage with 'Practice Another Version' in Online Homework?

*Dorko, Allison**

Room: Silver 1

A Confirmatory Factor Analysis of EQIPM, a Video Coding Protocol to Assess the Quality of Community College Algebra Instruction

Mesa, Vilma; Lamm, Rik; Watkins, Laura; Duranczyk, Irene; Ström, April; Kohli, Nidhi*

Room: Salada

How problem posing can impact student motivation: A case study

*Regier, Paul**

Room: Celestial

Day	Time	Session Type
Friday	3:00 PM	<i>Break</i>

Coffee Break

Room: Silver Foyer/Tea Gallery Foyer

	Day	Time	Session Type
Session 13	Friday	3:30 PM	<i>Contributed Reports (CR)</i>

Student Meanings for Eigenequations in Mathematics and in Quantum Mechanics

Wawro, Megan; Thompson, John ; Watson, Kevin L*

Room: Salada

Departmental Change in Reaction to the Threat of Losing Calculus: Three Cases

Alzaga Elizondo, Tenchita; Ellis, Brittney; Apkarian, Naneh; Sanchez-Robayo, Brigitte; Robbins, Claire; Johnson, Estrella*

Room: Singlo

A Tale of Two Sides: Students' Feedback Preference and Professors' Feedback Provision

Schraeder, Nurul; Miller, David*

Room: Silver 3

Differentiating between Quadratic and Exponential Change via Covariational Reasoning: A Case Study

Vishnubhotla, Madhavi; Paoletti, Teo*

Room: Bohea

A Case of Learning How to Use and Order Quantified Variables by Way of Defining

*Vroom, Kristen**

Room: Silver 1

Analyzing Collegiate Mathematics Observation Protocols: Attending to the Instructional Triangle and Inquiry-Based Mathematics Education Practices

Miller, Erica R; Rogers, Kimberly C; Yee, Sean P*

Room: Celestial

Future Teachers' Use of Multiplication and Division to Formulate Linear Equations

Izsák, Andrew; Beckmann, Sybilla*

Room: Bigelow

	Day	Time	Session Type
Session 14	Friday	4:10 PM	Preliminary Reports (PR)

How Mathematicians Assign Homework Problems in Advanced Mathematics Courses

Fukawa-Connelly, Tim; Johnson, Estrella; Hegg, Meredith; Weber, Keith; Rupnow, Rachel L*

Room: Salada

University Students' Defining Conceptions of Linearity

*Samuels, Jason**

Room: Singlo

Self-Efficacy in a Flipped Calculus II Classroom

*Kerrigan, John A**

Room: Silver 1

Undergraduate Learning Assistants and Mathematical Discourse in an Active-Learning Precalculus Setting

Savic, Milos; Simmons, Katherine; Moore-Russo, Deborah; Andrews, Candace; Kornelson, Keri*

Room: Bohea

Defining Key Developmental Understandings in Congruence Proofs from a Transformation Approach

St. Goar, Julia; Lai, Yvonne*

Room: Silver 3

How Different is Different? Examining Institutional Differences Prior to Scaling Up a Graduate Teacher Training Program to Improve Undergraduate Mathematics Outcomes

Harrell-Williams, Leigh M; Olson, Gary A; Webb, Jessica; Houston, Scotty; Gomez, Josias*

Room: Celestial

Day	Time	Session Type
Friday	4:50 PM	<i>Plenary</i>

The Role and Use of Examples in Proving-related Activity

Eric Knuth

Room: Grand Master Ballroom

Day	Time	Session Type
Saturday	7:00 AM	<i>Meal</i>

Breakfast

Room: Grand Master Ballroom

Day	Time	Session Type
Saturday	8:20 AM	<i>Special</i>

Special Session on NSF Funding for RUME - II

Karen Keene

Room: Bohea

	Day	Time	Session Type
Session 15	Saturday	9:00 AM	Preliminary Reports (PR)

Mathematical Modeling Competitions from the Participants' Perspective

Roan, Elizabeth A; Czocher, Jennifer A*

Room: Salada

Active Learning Approaches and Student Self-Confidence in Calculus: A Preliminary Report

Fuller, Edgar; Castillo, Adam; Watson, Charity; Duran, Pablo; Potvin, Geoff; Kramer, Laird*

Room: Singlo

Attending Mathematics Conferences as a Means for Professional Development: A Preservice Teacher's Evolving Identity

Hall, William; Whitehead, Ashley*

Room: Bohea

Would You Take Another Inquiry-Based Learning Mathematics Course? Links to Students' Final Exam Grades and Reported Learning Gains

Bubb, Kelly; Hallman-Thrasher, Allyson; Shaw, Otto; Budhathoki, Deependra*

Room: Silver 3

Linking Terms to Physical Significance as an Evaluation Strategy

Akinyemi, Abolaji R; Thompson, John ; Loverude, Michael*

Room: Silver 1

Implementing an Open Educational Platform in Blended Learning

*Kim, Minsu**

Room: Celestial

	Day	Time	Session Type
Session 16	Saturday	9:40 AM	<i>Contributed Reports (CR)</i>

Linear Algebra Thinking in the Embodied, Symbolic and Formal Worlds: Students' Reasoning behind Preferring certain Worlds

Stewart, Sepideh; Epstein, Jonathan*

Room: Bohea

Development of Students' Shared Understanding in Guided Reinvention of a Formal Definition of the Limit - from Commognitive Perspective

Park, Jungeun; Martin, Jason H; Oehrtman, Michael*

Room: Salada

The Decision to use Inquiry-Oriented Instruction: Why Don't Beliefs Align with Practice?

Shultz, Mollee c; Herbst, Patricio*

Room: Silver 2

An Analysis of Opportunities for Reasoning-and-Proving in a University Precalculus Textbook

Geteregechi, Joash M; Waswa, Anne N*

Room: Silver 3

Using RME to Support PSTs' Meanings for Quadratic Relationships

Mohamed, Mustafa M; Vishnubhotla, Madhavi; Limbere, Alfred; Banner, Abiodun; Paoletti, Teo*

Room: Celestial

Undergraduate Students' Perspectives on What Makes Problem Contexts Engaging

*Stark, Tamara; Jones, Steven R**

Room: Silver 1

Theorizing Teachers' Mathematical Learning in the Context of Student-Teacher Interaction: A Lens of Decentering

*Liang, Biyao **

Room: Singlo

Day	Time	Session Type
Saturday	10:20 AM	<i>Break</i>

Coffee Break

Room: Silver Foyer/Tea Gallery Foyer

	Day	Time	Session Type
Session 17	Saturday	10:50 AM	Contributed Reports (CR)

Dimensions of Variation in Group Work within the “Same” Multi-Section Undergraduate Course

Smith, John ; Kuchle, Valentin; Gady, Sarah; Karunakaran, Shiv S; Bae, Younggon; Hwang, Jihye ; Levin, Mariana; Elmore, Bob*

Room: Salada

Folding Back in the Arzela Ascoli Theorem

Reed, Zackery K ; Oehrtman, Michael*

Room: Bohea

University Calculus Students’ Use and Understanding of Slope Conceptualizations

Bateman, Susan M. ; Moore-Russo, Deborah; Nagle, Courtney; Pawlikowski, Michael*

Room: Bigelow

Affective Pathways of Undergraduate Students While Engaged in Proof Construction Tasks

*Satyam, V. Rani**

Room: Silver 3

A Meanings-Based Framework for Textbook Analysis

*Hatfield, Neil J**

Room: Silver 1

The Role of Lines and Points in the Construction of Emergent Shape Thinking

Tasova, Halil I ; Liang, Biyao ; Moore, Kevin*

Room: Singlo

Assessing the Uptake of Research Based Instructional Strategies by Postsecondary Mathematics Instructors

Apkarian, Nanah ; Johnson, Estrella; Raker, Jeffrey; Stains, Marilyne; Henderson, Charles; Dancy, Melissa*

Room: Celestial

	Day	Time	Session Type
Session 18	Saturday	11:30 AM	<i>Preliminary Reports (PR)</i>

Features of Discourses Regarding Linear Independence Concept

*Dogan, Hamide**

Room: Salada

Adapting the Norm for Instruction: How Novice Instructors of Introductory Mathematics Courses Align an Active Learning Approach with the Demands of Teaching

*Bennett, Amy B**

Room: Bohea

Assessing the Disciplinary Perspectives of Introductory Statistics Students

Findley, Kelly P; Berens, Florian*

Room: Silver 3

Student responses to an unfamiliar graphical representation of motion

*Loverude, Michael**

Room: Bigelow

Links between Engagement in Self-Regulation and Performance

Pilgrim, Mary E; Burks, Linda; Hill-Lindsay, Sloan; Ryals, Megan*

Room: Silver 1

How Mathematicians Attend to Learning Goals for Teachers

Ahrens, Sara; Lai, Yvonne*

Room: Celestial

Day	Time	Session Type
Saturday	12:00 PM	<i>Meal</i>

Lunch

Room: Grand Master Ballroom

Day	Time	Session Type
Saturday	12:00 PM	<i>Special</i>

Business Meeting

Room: Grand Master Ballroom

	Day	Time	Session Type
Session 19	Saturday	1:10 PM	Preliminary Reports (PR)

The Use of Nonstandard Problems in an Ordinary Differential Equations Course for Engineering Students Reveals Commognitive Conflicts

*Rogovchenko, Svitlana *; Rogovchenko, Yuriy V; Treffert-Thomas, Stephanie*

Room: Salada

Getting Back to Our Cognitive Roots: Calculus Students' Understandings of Graphical Representations of Functions

*Sencindiver, Benjamin D**

Room: Singlo

“f(x) Means y”’: Students’ Meanings for Function Notation

VanVliet, Fern; Mirin, Alison*

Room: Bohea

Novice and Expert Evaluation of Generic Proofs

Kuster, George; Fogarty, Neville; Bradie, Adam*

Room: Silver 3

A Conceptual Blend Analysis of Physics Quantitative Literacy Reasoning Inventory Items

White Brahmia, Suzanne; Olsho, Alexis; Smith, Trevor I; Boudreaux, Andrew; Zimmerman, Charlotte M*

Room: Bigelow

Students’ Approaches to Solving First Law Problems Following Calculation-Intensive Thermodynamics Coursework

Parobek, Alexander P; Towns, Marcy*

Room: Silver 1

Developing a Framework for the Facilitation of Online Working Groups to Support Instructional Change

Fortune, Nicholas; Chikhany, Ralph E; Hall, William; Keene, Karen*

Room: Celestial

	Day	Time	Session Type
Session 20	Saturday	1:50 PM	Contributed Reports (CR)

Students' Meanings for the Derivative at a Point

*Yu, Franklin**

Room: Singlo

A Comprehensive Hypothetical Learning Trajectory for the Chain Rule, Implicit Differentiation, and Related Rates: Part I, the Development of the HLT

Jeppson, Haley P; Jones, Steven R*

Room: Bigelow

Interactions between Student Engagement and Collective Mathematical Activity

Williams, Derek; López Torres, Jonathan; Barton Odro, Emmanuel*

Room: Salada

Ask Me Once, Ask Me Twice: An Initial Psychometric Analysis of Pre-Service Mathematics Teachers' Responses on a Retrospective Pre-Post Format of the Self-Efficacy to Teach Statistics (SETS-HS) Instrument

Harrell-Williams, Leigh M; Azmy, Christina; Lee, Hollylynne; Roberts, Shelby; Webb, Jessica*

Room: Silver 3

Characteristics and Evaluation of Ten Mathematics Tutoring Centers

Byerley, Cameron O; Moore-Russo, Deborah; James, Carolyn M; Rickard, Brian S.; Burks, Linda; Mills, Melissa; Ferreira, Melissa; Oien, Janet; Heasom, William ; Farthing, Cynthia; Mammo, Behailu; Moritz, Daniel*

Room: Silver 1

Exploring the Genetic Decomposition of Interior and Exterior Angles of Polygons with the Use of Computer Programming and GeoGebra

Jackson, Jay L; Stenger, Cynthia*

Room: Celestial

	Day	Time	Session Type
Session 21	Saturday	2:30 PM	<i>Contributed Reports (CR)</i>

Tasks to Foster Mathematical Creativity in Calculus I

El Turkey, Houssein; Karakok, Gulden; Tang, Gail; Regier, Paul; Savic, Milos; Cilli-Turner, Emily*

Room: Silver 1

A Comprehensive Hypothetical Learning Trajectory for the Chain Rule, Implicit Differentiation, and Related Rates: Part II, a Small-Scale Teaching Experiment

Jeppson, Haley P; Jones, Steven R*

Room: Bigelow

Investigating Combinatorial Provers' Models of Multiplication

Erickson, Sarah A; Lockwood, Elise*

Room: Silver 3

Framework for Characterizing University Students' Reorganization of School Mathematics Understandings in Their Collegiate Mathematics Learning

*Lee, Younhee**

Room: Singlo

Varieties of Sameness: Instructors' Descriptions for Themselves and Students

*Rupnow, Rachel L**

Room: Salada

Tutoring Beyond Show and Tell: An Existence Proof

*Johns, Carolyn**

Room: Celestial

Day	Time	Session Type
Saturday	3:00 PM	<i>Break</i>

Coffee Break

Room: Silver Foyer/Tea Gallery Foyer

	Day	Time	Session Type
Session 22	Saturday	3:30 PM	<i>Contributed Reports (CR)</i>

Students' Language about Basis and Change of Basis in a Quantum Mechanics Problem

Serbin, Kaitlyn S; Storms, Rebecah; Wawro, Megan*

Room: Singlo

Investigating Instructors' Perceptions of IBL: A Systemic Functional Linguistic Approach

Gerami, Saba; Mesa, Vilma*

Room: Salada

Student Self- and Simulated Peer-Evaluation of Proof Comprehension: Tina

Kemp, Aubrey; Chamberlain Jr., Darryl J; Cooley, Laurel; Miller, Valerie; Vidakovic, Draga*

Room: Celestial

Calculus for Teachers: Visions and Considerations of Mathematicians

Yan, Xiaoheng (Kitty); Marmur, Ofer; Żazkis, Rina*

Room: Bigelow

	Day	Time	Session Type
Session 23	Saturday	4:10 PM	<i>Preliminary Reports (PR)</i>

Exploring and supporting physics students' understanding of basis and projection

Schermerhorn, Benjamin; Passante, Gina; Sadaghiani, Homeyra; Pollock, Steve*

Room: Salada

The Motivations and Perceived Success of Different Calculus Course Variations

Alzaga Elizondo, Tenchita; Vroom, Kristen; Voigt, Matthew K*

Room: Bigelow

A Prospective Teacher's Mathematical Knowledge for Teaching of Inverse Functions

*Serbin, Kaitlyn S**

Room: Singlo

Analyzing the Beliefs and Practices of Graduate and Undergraduate Mathematics Tutors

Pilgrim, Mary E; Miller, Erica R; Hill-Lindsay, Sloan; Segal, Rebecca*

Room: Celestial

	Day	Time	Session Type
Session Poster	Saturday	4:50 PM	<i>Poster</i>

Conflicts During Mathematical Modeling

*Kandasamy, Sindura Subanemy**

Bohea (S1)

The Ant Farm Task – The Case of Ginny

Kandasamy, Sindura Subanemy; Lee, Hwa Young; Guajardo, Lino*

Bohea (S2)

Group Testing in Calculus - How do Students in Groups Work Together Equitably?

*Quinn, Candice M**

Bohea (S3)

Quantitative Reasoning Skills for Successfully Working with Real-world Data

*Peterson, Franziska**

Bohea (S4)

My math journey: The mathematical autobiographies of four future secondary mathematics teachers

Rice, Lisa; Lambertus, Amanda*

Bohea (S5)

Student Reasoning about Determinants, Invertibility, and Linear Independence

Smith, Jessica; Andrews-Larson, Christine*

Bohea (S6)

Perspective Outside and Within Spatial Diagrams: Pre-service Elementary Teachers' Investigations of Shearing

Bock, Camden G; Dimmel, Justin*

Bohea (S7)

Characterizing Undergraduate Students' Proving Processes out of Their "Stuck Points"

*Lu, Yaomingxin**

Bohea (S8)

Coordinating Two Levels of Units in Calculus: The Story of Rick

Grabhorn, Jeffrey; Boyce, Steven*

Bohea (S9)

Contextualized Instruction as a Motivational Intervention in College Calculus

*Akbuga, Enes**

Bohea (S10)

Using Activity Theory to Understand Tensions in an Extra-Curricular Mathematical Modeling Project with Biology Undergraduates

*Rogovchenko, Yuriy V**

Bohea (S11)

Operations Requiring Transforming Quantities by Fractions

*Jung, Eun**

Bohea (S12)

Engaging Students in Reflective Thinking in Precalculus

*Chiorescu, Marcela**

Bohea (S13)

Online course discussion and Student Performance

DiScala, Elizabeth; Akl, Yasmine*

Bohea (S14)

The Interaction between Instructor and Students in Community College Algebra Classrooms

*Lim, Dexter**

Bohea (S15)

Justifying and Reconstructing in the Generalizing Process: The Case of Jolene

*Graysay, Duane**

Bohea (S16)

College Mathematics Instructors Learning to Teach Future Elementary School Teachers

Hauk, Shandy; Tsay, Jenq-Jong; Jackson, Billy*

Bohea (S17)

Replacing Remedial Algebra With a Credit Bearing Math Education Course

Tepper, Michael; Brown, Rachael E*

Bohea (S18)

A Comparison of Students' Quantitative Reasoning Skills in STEM and Non-STEM Math Pathways

Elrod, Emily; Park, Joo Young*

Bohea (S19)

Using Commognition to Study Student Routines Performed in the Context of Ring Theory

*Küchle, Valentin**

Bohea (S20)

An Analysis of Racialized and Gendered Logics in Black Women's Interpretations of Instructional Events in Undergraduate Pre-calculus and Calculus Classrooms

Marshall, Brittany L; McNeill, Taylor; Leyva, Luis; Battey, Dan*

Bohea (S21)

Relationships Between Lisa's Units Coordination and Interpretations of Integration

Boyce, Steven; Grabhorn, Jeffrey*

Bohea (S22)

Chase that Rabbit! Designing Vector Unknown: A Linear Algebra Game

Levine, Benjamin; Mauntel, Matthew; Zandieh, Michelle; Plaxco, David*

Bohea (S23)

Designing Proof Comprehension Tests in Real Analysis

Amman, Kristen; Athey, Brooke; Guajardo, Lino; Olsen, Joseph; Orr-Woods, Christian; Mejia-Ramos, Juan Pablo*

Bohea (S24)

Influence of University Teachers' Meanings on Their Interpretation of Student Meanings

*Thackray, Ian**

Bohea (S25)

What Meanings of Concavity Might Students Construct in a Dynamic Online Environment?

*Thackray, Ian**

Bohea (S26)

Prospective and In-service Mathematics Teachers' knowledge in the Teaching of Statistics

*Erskine, Abigail**

Bohea (S27)

A tale of two approaches: Comparison of evaluation strategies in physics problem solving between first- and third-year students

Akinyemi, Abolaji R; Thompson, John; Loverude, Michael*

Bohea (S28)

Student Use of Dirac Notation to Express Probability Concepts in Quantum Mechanics

*Riihiluoma, William**; *Thompson, John*

Bohea (S29)

Using Morphemes to Understand Vocabulary in College Algebra

*Jones, Anedra W**

Bohea (S30)

Defining and Measuring Sense-Making and Procedural Flexibility in Community College Algebra Classrooms

*Lim, Dexter**; *Akoto, Bismark*

Bohea (S31)

Using Diagnostic Testing to Challenge Barriers to Access and Inform Instruction in Calculus 1

*Seashore, Kimberly**; *Aguilar, Alexandra*

Bohea (S32)

Navigating College Algebra in 2019: a Case of Internet Resources as a Guide

*Higgins, Abigail L**; *Minnors, Jessamyn*

Bohea (S33)

Elementary School Geometry to University Level Calculus: Building Upon Learning Trajectories Rooted in Covariational Reasoning with Area Contexts to Support Covariational Reasoning Related to Implicit Differentiation

*Stevens, Irma E**

Bohea (S34)

Is Research in a Lower-Level Mathematics Class RUME?

*Aly, Geillan D**

Bohea (S35)

Using Primary Sources to Improve Classroom Climate and Promote Shared Responsibility

*Venkatesh, Anil; Bagley, Spencer**

Bohea (S36)

Day	Time	Session Type
Saturday	6:00 PM	<i>Meal</i>

Dinner

Room: Grand Master Ballroom

Day	Time	Session Type
Saturday	6:30 PM	<i>Plenary</i>

Making Room in RUME for Computational Activity: Using Programming to Support Students' Mathematical Reasoning

Elise Lockwood

Room: Grand Master Ballroom