

RUME XVII CONFERENCE SCHEDULE

THURSDAY, FEBRUARY 19, 2015

1:00 - 1:15 pm

OPENING SESSION

*Grand Ballroom
Salons 2-4*

1:25 - 1:55 pm

SESSION 1 – CONTRIBUTED REPORTS

City Center A

Abstract Algebra and Secondary School Mathematics: Identifying Mathematical Connections in Textbooks

Ashley Suominen

*Grand Ballroom
Salon 5*

It's about time: How instructors and students experience time constraints in Calculus 1

Jessica Ellis, Estrella Johnson and Chris Rasmussen

*Marquis
Ballroom B*

Opportunity to learn the concept of group in a first class meeting on abstract algebra

Tim Fukawa-Connelly

2:05 - 2:35 pm

SESSION 2 – PRELIMINARY REPORTS

City Center A

Generalization in undergraduate mathematics education

Allison Dorko, Eric Weber and Steven Jones

City Center B

A preliminary categorization of what mathematics undergraduate students include on exam “crib sheets”

Antony Edwards and Birgit Loch

*Marquis
Ballroom A*

The textbook, the teacher, and the derivative: Examining community college instructors’ use of their textbook when teaching about derivatives in a first semester calculus class

Linda Leckrone

*Grand Ballroom
Salon 5*

Discourse in mathematics pedagogical content knowledge

Shandy Hauk, Allison Toney, Reshmi Nair, Nissa Yestness and Melissa Troutt

*Marquis
Ballroom B*

Components of a formal understanding of limit

Stephen Strand

*Marquis
Ballroom C*

An analysis of sociomathematical norms of proof schemes

Brian Katz, Rebecca Post, Milos Savic and John Paul Cook

2:35 – 3:05 pm

COFFEE BREAK

3:05 – 3:35 pm

SESSION 3 – CONTRIBUTED REPORTS

*Grand Ballroom
Salon 5*

Mathematicians' uses of examples when developing conjectures

Elise Lockwood, Alison G. Lynch, Amy B. Ellis and Eric Knuth

*Marquis
Ballroom A*

Roles of proof in an undergraduate inquiry-based transition to proof course

Sarah Bleiler and Jeffrey Pair

*Marquis
Ballroom B*

An investigation of beginning mathematics graduate teaching assistants' teaching philosophies

Kedar Nepal

*Marquis
Ballroom C*

Leveraging historical number systems to understand number and operation in base 10

Eva Thanheiser and Andrew Riffel

3:45 – 4:15 pm

SESSION 4 – CONTRIBUTED REPORTS

*Marquis
Ballroom A*

**Pedagogical challenges of communicating mathematics with students:
Living in the formal world of mathematical thinking**

Sepideh Stewart, Ralf Schmidt, John Paul Cook and Ameya Pitale

*Grand Ballroom
Salon 5*

**The Structure, content, and feedback of Calculus I homework at
doctoral degree granting institutions and the role of homework in
students' mathematical success**

Jessica Ellis, Kady Hanson, Gina Nunez and Chris Rasmussen

*Marquis
Ballroom B*

Teachers' meanings for the substitution principle

Stacy Musgrave, Neil Hatfield and Patrick Thompson

*Marquis
Ballroom C*

A model of the structure of proof construction

Tetsuya Yamamoto

4:20 – 4:50 pm

SESSION 5 – PRELIMINARY REPORTS

*Grand Ballroom
Salon 5*

Connecting research on students' common misconceptions about tangent lines to instructors' choice of graphical examples in a first semester calculus course

Brittany Vincent and Vicki Sealey

City Center A

Undergraduate students' experiences in a remedial mathematics classroom

Durrell Jones and Beth Herbel-Eisenmann

City Center B

Differentiating instances of knowledge of content and students (KCT): Responding to student conjectures

Kristin Noblet

*Marquis
Ballroom A*

Business faculty perceptions of the calculus content needed for business courses

Melissa Mills

*Marquis
Ballroom B*

Knowledge for teaching: Horizons and mathematical structures

Nicholas Wasserman and Ami Mamolo

*Marquis
Ballroom C*

Undergraduate students reading and using mathematical definitions: Generating examples, constructing proofs, and responding to true/false statements

Valeria Aguirre Holguin

5:00 – 5:30 pm

SESSION 6 – CONTRIBUTED REPORTS

*Grand Ballroom
Salon 5*

How do mathematics majors translate informal arguments into formal proofs

Dov Zazkis, Keith Weber and Juan Pablo Mejia-Ramos

*Marquis
Ballroom C*

Developing a creativity-in-progress rubric on proving

Milos Savic, Gulden Karakok, Gail Tang and Houssein El Turkey

*Marquis
Ballroom B*

Application of multiple integrals: From a physical to a virtual model

Ivanete Siple and Elisandra Figueiredo

*Marquis
Ballroom A*

Pre-Service Teachers' Inverse Function Meanings

Teo Paoletti, Irma E. Stevens, Natalie L. F. Hobson, Kevin R. Laforest and Kevin C. Moore

5:30 – 6:20 pm

POSTER SESSION & RECEPTION

Grand Foyer

The Efficacy of projects and discussions in increasing quantitative literacy outcomes in an online college algebra course

Luke Tunstall

Students' reasoning about marginal change in an economic context

Thembinkosi Mkhathshwa and Helen Doerr

Challenges and resources of learning mathematics in English for a 'mathematically intelligent' student weak English background

Balarabe Yushau

Code-switching and mathematics assessment: Some anecdotal evidence of persistence of first language

Balarabe Yushau

Students' conceptions of rational functions

Nicholas Fortune and Derek Williams

Using journals to support student learning: The case of an elementary number theory course

Christina Starkey, Hiroko Warshauer and Max Warshauer

Developing abstract knowledge in advanced mathematics: Continuous functions and the transition to topology

Daniel Cheshire

Prospective secondary mathematics teachers' (PSMTs') understanding of abstract mathematical structures

Younhee Lee

When mathematicians grade students' proofs, why don't the scores agree?

Robert C. Moore

Formal logic and the production and validation of proof by university level students

Sarah Mathieu-Soucy

Unconventional use of mathematical language in undergraduate students' proof writing

Kristen Lew and Juan Pablo Mejia-Ramos

Embodied world thinking: The calculus laboratory

Sepideh Stewart

Understanding participants' experiences in a flipped large lecture calculus course

Erin Glover

Learning in one classroom: Developmental mathematics students and prospective mathematics teachers

Kenneth Bradfield, Raven McCrory, Aditya Viswanathan and Kristen Bieda

An examination of college students' reasoning about trigonometric functions with multiple representations

Soo Yeon Shin

An RME-based instructional sequence for change of basis and eigentheory

Megan Wawro, Michelle Zandieh, Chris Rasmussen and Christine Larson

Students' visual attention while answering graphically-based Fundamental Theorem of Calculus questions

Rabindra Bajracharya, John Thompson and Jennifer Docktor

Domain, Co-domain and causation: A study of Britney's conception of function

Nathan Phillips

An intended meaning for the argument of a function

Ashley Duncan

6:30 – 9:00 pm

*Grand Ballroom
Salons 2-4*

DINNER AND PLENARY

Charles Henderson

FRIDAY, FEBRUARY 20, 2015

8:35 – 9:05 am

SESSION 7 – CONTRIBUTED REPORTS

*Grand Ballroom
Salon 5*

Variation in implementation of student-centered instructional materials in undergraduate mathematics education

Christine Andrews-Larson and Valerie Kasper

*Marquis
Ballroom A*

Balancing formal, symbolic and embodied world thinking in first year calculus lectures

Sepideh Stewart, Clarissa Thompson, Keri Kornelson, Lucy Lifschitz and Noel Brady

*Marquis
Ballroom B*

Students' understanding of concavity and inflection points: Graphical, symbolic, verbal, and physical representations

Michael Gundlach and Steven Jones

*Marquis
Ballroom C*

An analysis of students' difficulties with the opening stage of proof construction

Tetsuya Yamamoto

9:15 – 9:45 am

SESSION 8 – PRELIMINARY REPORTS

*Grand Ballroom
Salon 5*

Students' perceptions of the disciplinary appropriateness of their approximation strategies

Danielle Champney, David Kato, Jordan Spies and Kelsea Weber

City Center A

Math Teachers' Circles: Connections to teacher leadership

Diana White and Jan Yow

City Center B

Silence: A case study

Matthew Petersen

*Marquis
Ballroom A*

Social networks among communities of calculus-teaching faculty at PhD-granting institutions

*Marquis
Ballroom B*

The use of examples in the learning and teaching of proof writing

Sarah Hanusch

*Marquis
Ballroom C*

The purpose of Calculus I labs: Instructor, TA, and student beliefs and practices

Yuliya Melnikova

9:45 – 10:15 am

COFFEE BREAK

10:15 – 10:45 am **SESSION 9 – PRELIMINARY REPORTS**

*Marquis
Ballroom A*

Digging in deep: From instrumental to logical understanding in calculus

Douglas Riley and Maria Stadnik

*Marquis
Ballroom C*

Conditions for cognitive unity in the proving process

Kelly Bulp

*Grand Ballroom
Salon 5*

Solving linear systems: Augmented matrices and the reconstruction of X

Michelle Zandieh and Christine Andrews-Larson

*Marquis
Ballroom B*

Formative assessment and classroom community in calculus for life sciences

Rebecca Dibbs and Brian Christopher

10:55 – 11:25 am **SESSION 10 – CONTRIBUTED REPORTS**

*Grand Ballroom
Salon 5* **A discursive approach to support teachers' development of student thinking about functions**

Beste Gucler and Heather Trahan-Martins

*Marquis
Ballroom A* **Instructional practices and student persistence after Calculus I**

Lisa Manitini and Kitty Debock

*Marquis
Ballroom B* **Best practices for the inverted (flipped) classroom**

Spencer Bagley

*Marquis
Ballroom C* **Seeking solid ground: A study of novices' indirect proof preferences**

Stacy A. Brown

11:35 – 12:05 pm **SESSION 11 – CONTRIBUTED REPORTS**

Grand Ballroom **Variation in successful mathematics majors proving**

Salon 5

Dov Zazkis, Keith Weber and Juan Pablo Mejia-Ramos

Marquis **The generalization of the function schema: The case of parametric**
Ballroom A **functions**

Harrison Stalvey and Draga Vidakovic

Marquis **Linear algebra in the three worlds of mathematical thinking: The effect**
Ballroom B **of permuting worlds on students' performance**

John Hannah, Sepideh Stewart and Michael Thomas

Marquis **Promoting students' construction and activation of the multiplicatively-**
Ballroom C **based summation conception of the definite integral**

Steven Jones

12:05 – 1:05 pm **LUNCH**

Grand Ballroom

Salons 2-4

1:05 – 1:35 pm **SESSION 12 – PRELIMINARY REPORTS**

City Center A **Elementary mathematics pre-service teachers' consequential transitions from formal to early algebra**

Charles Hohensee and Siobahn Young

*Grand Ballroom
Salon 5* **A mathematician's experience flipping a large-lecture calculus course**

Erin Glover

City Center B **Implementing inquiry-oriented instructional materials: A comparison of two classrooms**

Hayley Milbourne

*Marquis
Ballroom A* **Partial unpacking and the use of truth tables in inquiry-based-transition-to-proofs course**

Jeffrey Pair and Sarah Bleiler

*Marquis
Ballroom B* **A study of connectivism as a support for research on meaning-making for mathematics**

Luciane Santos, Ivanete Siple and Gabriela Lopes

*Marquis
Ballroom C* **The effects of using spreadsheets in business calculus on student attitudes**

Melissa Mills

1:45 – 2:15 pm **SESSION 13 – THEORETICAL REPORTS**

*Grand Ballroom
Salon 5* **Examining individual and collective level mathematical progress**

Chris Rasmussen, Megan Wawro and Michelle Zandieh

*Marquis
Ballroom C* **Shape thinking and students' graphing activity**

Kevin Moore and Patrick Thompson

*Marquis
Ballroom A* **Value judgments attached to mathematical proofs**

Eyob Demeke

*Marquis
Ballroom B* **Conceptualizing equity in undergraduate mathematics education:
Lessons from K-12 research**

Aditya Adiredja, Nathan Alexander and Christine Andrews-Larson

2:25 – 2:55 pm **SESSION 14 – THEORETICAL REPORTS**

Grand Ballroom **Neural correlates for action-object theories**

Salon 5

Anderson Norton

Marquis **Conceptualizing the notion of a task network**

Ballroom A

Ami Mamolo, Robyn Ruttenberg-Rozen and Walter Whiteley

Marquis **An extended theoretical framework for the concept of the derivative**

Ballroom B

David Roundy, Tevian Dray, Corinne A. Manogue, Joseph F. Wagner, and Eric Weber

Marquis **Frames of reference**

Ballroom C

Surani Joshua, Stacy Musgrave, Neil Hatfield and Patrick Thompson

2:55 – 3:25 pm **COFFEE BREAK**

3:25 – 3:55 pm **SESSION 15 – PRELIMINARY REPORTS**

City Center A **“What if we put this on the floor?”: Mathematical play as a mathematical practice**

J. Brooke Ernest

Marquis Ballroom A **Mathematicians’ ideas when proving**

Melissa Troudt, Gulden Karakok, and Michael Oehrtman

Grand Ballroom Salon 5 **Extending multiple choice format to document student thinking**

Michelle Zandieh, David Plaxco, Megan Wawro, Chris Rasmussen, Hayley Milbourne, and Katherine Czeranko

Marquis Ballroom B **The influence of function and variable on students' understanding of calculus optimization problems**

Renee LaRue and Nicole Engelke

Marquis Ballroom C **A comparison of self-inquiry in the context of mathematical problem solving**

Todd Grundmeier, Dylan Retsek and Dara Stepanek

4:05 – 4:35 pm

SESSION 16 – CONTRIBUTED REPORTS

*Marquis
Ballroom A*

Commognitive conflicts in the discourse of continuous functions

Gaya Jayakody

*Marquis
Ballroom B*

Cluster analysis of STEM gender differences

Ian Mouzon, Ulrike Genschel and Xuan Hien Nguyen

*Grand Ballroom
Salon 5*

The transition from AP to college calculus: Students' perceptions of factors for success

Megan Ryals and Karen Keene

*Marquis
Ballroom C*

Bundles and associated intentions of expert and novice provers: The search for and use of counterexamples

Shiv Karunakaran

4:45 – 5:15 pm **SESSION 17 – CONTRIBUTED REPORTS**

*Marquis
Ballroom C*

Students' understanding of composition of functions using model analysis

David Miller, Nicole Engelke Infante and Solomon Adu

*Grand Ballroom
Salon 5*

Mathematics majors' example and diagram usage when writing calculus proofs

Juan Pablo Mejia-Ramos and Keith Weber

*Marquis
Ballroom B*

Students' generalizations of single-variable conceptions of the definite integral to multivariate conceptions

Steven Jones, Allison Dorko and Eric Weber

5:30 – 6:30 pm **PLENARY SESSION**

*Grand Ballroom
Salons 2-4*

Nicole McNeil

6:30 pm **DINNER ON YOUR OWN**

SATURDAY, FEBRUARY 21, 2015

8:35 – 9:05 am **SESSION 18 – CONTRIBUTED REPORTS**

*Marquis
Ballroom A* **Exploring practices and beliefs related to the teaching of mathematical ways of thinking and doing at university**

Alon Pinto

*Marquis
Ballroom B* **John's lemma: How one student's proof activity informed his understanding of inverse**

David Plaxco

*Marquis
Ballroom C* **Teachers' meaning for average rate of change in the U.S.A. and Korea**

Hyunkyoungh Yoon, Cameron Byerley and Patrick W. Thompson

*Grand Ballroom
Salon 5* **Studying student's preferences and performances in a cooperative mathematics classroom**

Sayonita Ghosh Hajra and Natalie Hobson

9:15 – 9:45 am **SESSION 19 – PRELIMINARY REPORTS**

City Center A **The simple life: An exploration of student reasoning in verifying trigonometric identities**

Benjamin Wescoatt

Marquis Ballroom A **The transfer of knowledge from groups to rings: An exploratory study**

John Paul Cook, Brian Katz and Milos Savic

Marquis Ballroom C **Undergraduate students' understandings of functions and key calculus concepts**

Caroline Hagen

Grand Ballroom Salon 5 **Gains from the incorporation of an approximation framework into calculus instruction**

Jason Martin and Michael Oehrtman

City Center B **Studying the understanding process of derivative based on representations used by students**

Sarah Dufour

Marquis Ballroom B **The effectiveness of clickers in large-enrollment calculus**

Xuan Hien Nguyen, Heather Bolles, Adrian Jenkins and Elgin Johnston

9:45 – 10:15 am **COFFEE BREAK**

10:15 – 10:45 am **SESSION 20 – THEORETICAL REPORTS**

*Marquis
Ballroom A*

Bidirectionality and covariational reasoning

Kevin Moore and Teo Paoletti

*Marquis
Ballroom B*

Integrated mathematics and science knowledge for teaching framework

Shawn Firouzian and Natasha Speer

*Grand Ballroom
Salon 5*

A theoretical perspective for proof construction

John Selden and Annie Selden

*Marquis
Ballroom C*

Adding explanatory power to descriptive power: Combining Zandieh's derivative framework with analogical reasoning

Kevin Watson and Steven Jones

10:55 – 11:25 am **SESSION 21 – CONTRIBUTED REPORTS**

*Grand Ballroom
Salon 5* **Mathematicians' views of mathematical practice**

Elise Lockwood and Eric Weber

*Marquis
Ballroom A* **How Might Students Come to See First Order Differential Equations as Functions of Two Variables**

George Kuster and Morgan Dominy

*Marquis
Ballroom B* **Investigating the effectiveness of an instructional video game for calculus: Mission Prime**

Keri Kornelson, Yu-Hao Lee, Sepideh Stewart, Scott Wilson, Norah Dunbar, William Thompson, Ryan Ralston, Milos Savic and Emily Lennox

*Marquis
Ballroom C* **Proof expectations of students: The effects on proof validation**

Ashley L. Suominen, Hyejin Park and Annamarie Conner

11:35 – 12:05 pm **SESSION 22 – CONTRIBUTED REPORTS**

*Grand Ballroom
Salon 5* **Instantiation practices during conjecturing activity: Implications from the use of technology**

Jason Belnap and Amy Parrott

*Marquis
Ballroom A* **An analysis of students' difficulties with proving in light of the structure of proof construction**

Tetsuya Yamamoto

*Marquis
Ballroom C* **Examining proficiency with operations on irrational numbers**

Sarah Hanusch and Sonalee Bhattacharyya

*Marquis
Ballroom B* **Painter's paradox: Epistemological and didactical obstacle**

Chanakya Wijeratne and Rina Zazkis

12:05 – 1:50 pm **LUNCH & PANEL DISCUSSION**

*Grand Ballroom
Salons 2-4*

1:50 – 2:25 pm **SESSION 23 – CONTRIBUTED REPORTS**

*Marquis
Ballroom A*

Modeling outcomes in combinatorial problem solving: The case of combinations

Elise Lockwood, Craig A. Swinyard and John S. Caughman

*Marquis
Ballroom C*

Exploration of undergraduate students' and mathematicians' perspectives on creativity

Gail Tang, Houssein El Turkey, Milos Savic and Gulden Karakok

*Grand Ballroom
Salon 5*

Guiding reinvention of conventional tools of mathematical logic: Students' reasoning about mathematical disjunctions

Paul Dawkins and John Paul Cook

2:30 – 3:00 pm **SESSION 24 – PRELIMINARY REPORTS**

City Center A **Pre-service teachers' conceptual understanding of arithmetic in base-ten and bases other than ten**

Benjamin Wescoatt and Iwan Elstak

Marquis Ballroom A **The purpose of reading a proof: A case study of Lagrange's Theorem**

Eyob Demeke and May Chaar

Grand Ballroom Salon 5 **Calculus students' understanding of making predictions using slope and derivative**

Jennifer Tyne

Marquis Ballroom B **Secondary mathematics teachers' perceptions of real analysis in relation to their teaching practice**

Nicholas Wasserman, Matthew Villanueva, Juan Pablo Mejia-Ramos and Keith Weber

Marquis Ballroom C **Creating opportunities for students to address misconceptions: Student engagement with a task from a reform-oriented calculus curriculum**

Sarah Enoch and Jennifer Noll

3:00 – 3:30 pm **COFFEE BREAK**

3:30 – 4:00 pm **SESSION 25 – PRELIMINARY REPORTS**

City Center A **Marginalizing, centralizing, and homogenizing: An examination of inductive-extending generalizing among preservice secondary educators**

Duane Graysay

City Center B **Impacts on learning and attitudes in an inverted introductory statistics course**

Emily Cilli-Turner

Marquis Ballroom A **Calculus students' understanding of logical implication and its relationship to their understanding of calculus theorems**

Joshua Case

Marquis Ballroom B **A mathematics teacher educator's use of technology in a content course focused on covariational reasoning**

Kevin Laforest

Grand Ballroom Salon 5 **Calculus students' meanings for difference**

Stacy Musgrave, Neil Hatfield and Patrick Thompson

Marquis Ballroom C **Public versus private mathematical activity as evaluated through the lens of examples**

Tim Fukawa-Connelly

4:10 – 4:40 pm **SESSION 26 – CONTRIBUTED REPORTS**

*Grand Ballroom
Salon 5* **Undergraduate students' construction of existence proofs**

Kyeong Hah Roh and Yong Hah Lee

*Marquis
Ballroom A* **Examining the pedagogical implications of a secondary teacher's
understanding of angle measure**

Michael Tallman

*Marquis
Ballroom B* **The equation has particles! How calculus students construct definite
integral models**

Kritika Chhetri and Michael Oehrtman

*Marquis
Ballroom C* **Determining what to assess: A methodology for concept domain
analysis as applied to group theory**

Kathleen Melhuish

4:50 – 5:20 pm **SESSION 27 – CONTRIBUTED REPORTS**

*Grand Ballroom
Salon 5* **Semantic and logical negation: Students' interpretations of negative predicates**

Paul Dawkins and John Paul Cook

*Marquis
Ballroom A* **Students' reasoning when constructing quantitatively rich situations**

Teo Paoletti

*Marquis
Ballroom B* **An analysis of proof-based final exams**

Mindy Capaldi

5:20 – 6:15 pm

POSTER SESSION

Grand Foyer

Unifying concepts in the introductory linear algebra course

Spencer Payton

Analyzing data from student learning

Bernard Ricca and Kris Green

An exploration of students' conceptions of rational functions while working in a CAS-enriched dynamic environment

Derek Williams

Creating online videos to help students to overcome exam anxiety in statistics class

Anna Titova

Students' generalizations from single variable function to multi variable function in the context of limit

Sarah Kerrigan, Erin Glover, Eric Weber and Allison Dorko

Multiple representations of the group concept

Annie Bergman, Kate Melhuish and Dana Kirin

The role of examples in understanding quotient groups

Carolyn James

Psychometric analysis of the Calculus Concept Inventory

Matt Thomas, Jim Gleason, Spencer Bagley, Lisa Rice, Nathan Clements and Diana White

Student understanding of solution

Rebecca Walker

Beyond good teaching: The benefits and challenges of implementing ambitious teaching

Kathleen Melhuish, Erin Glover, Sean Larsen, and Annie Bergman

Can mathematics be a STEM pump?

William Bond and John Mayer

Some preliminary results on the influence of dynamic visualizations on undergraduate calculus learning

Julie M. S. Sutton

Investigating backward transfer effects in calculus students

Siobahn Young

A study of mathematical behaviors

Nadia Hardy

Effects of engaging students in the practices of mathematics on their concept of mathematics

Duane Graysay, Shahrzad Jamshidi, and Monica Smith Karukaran

6:30 – 9:00 pm

*Grand Ballroom
Salons 2-4*

DINNER AND PLENARY

Matthew Inglis