

The fifty-fourth annual

Washington College Mathematics Conference

May 4 - 6, 2023 at Lake Chelan, Washington

Hosted by the Pierce College Math Department



Welcome to Lake Chelan!

We are very excited to welcome you to the 2023 Washington College Math Conference. It has been four years since we were last together and we have missed seeing you. Since then, the COVID pandemic has challenged all of us to face a multitude of serious new obstacles. While technology has allowed us to continue interacting with students and colleagues across the state, it is an inadequate substitute for face-to-face interactions.

Welcome! Welcome!

We are looking forward to hearing our speakers share their interests and insights and being able to ask questions directly. But of just as much importance, we are looking forward to the small, random, spontaneous conversations that will arise between sessions and the many friendships that will be renewed or created. These are a major reason for attending a conference in person.

There are six breakout sessions and two talks with our exciting, featured speakers, but outside of those there are mealtimes and activities such as socials, a walk, and bowling, where you can interact with others. Pierce College wants to make this a wonderful experience for everyone. If there is anything you need while at the conference, talk with any of the Pierce College faculty and we will do our best to help.

We hope you learn something new, make new friends, and have a wonderful time! We are delighted you are here.

Online Resources

For electronic access to materials from this year and past conferences, visit www.wamap.org and enroll in WAMAP course 14626 (no enrollment key required).

The website for the Washington College Math Conference is www.wamath.org

There you can find a history of the conference, past hosts, locations, and programs, and more.

Schedule of Events

Thursday, May 4

4:00 - 5:00 pm	Department Chair Meeting	Edmunds Room
4:30 - 7:25 pm	Registration	Stehekin Foyer
7:30 - 8:30 pm	Announcements and Opening Speaker	Centennial Ballroom
8:30 - 9:30 pm	Registration	Stehekin Foyer

Friday, May 5

7:15 - 9:15 am	Registration	Stehekin Foyer
7:30 - 9:00 am	Breakfast	Centennial Ballroom
9:20 - 10:20 am	Session 1	Stehekin A+B, River, Park Rooms
10:40 - 11:40 am	Session 2	Stehekin A+B, River, Park Rooms
11:45 am - 1:20 pm	Lunch	Centennial Ballroom
1:20 - 2:20 pm	Session 3	Stehekin A+B, River, Park Rooms
2:40 - 3:40 pm	Session 4	Stehekin A+B, River, Park Rooms
3:50 - 4:50 pm	WAMATYC Meeting	River Room
3:40 - 5:00 pm	Fun Activities	Meet in lobby
6:00 - 7:00 pm	Dinner and Awards	Centennial Ballroom
7:00 - 8:15 pm	Keynote Speaker	Centennial Ballroom

Saturday, May 6

7:30 - 9:00 am	Breakfast	Centennial Ballroom
	(Check out time is 11:00am, so you may wish	to check out before sessions begin.)
9:20 - 10:20 am	Session 5	Stehekin A+B, River, Park Rooms
10:40 - 11:40 am	Session 6	Stehekin A+B, River, Park Rooms

Fun Activities

Math Challenge

Pick one up at the front registration table. Turn it in by 7pm on Friday!

Thursday Evening Farmers Market

On your own

The Chelan Thursday Farmers Market is from 2:00 - 6:00 pm on Thursday at 218 S Emerson St (0.2 miles away). There will be live music and local vendors. This is the first market of the season! You can find more information at www.chelanfarmersmarket.org

Thursday Night Bowling

Organized by Dylan ArceJaeger, Pierce College

We will depart from Campbell's lobby at 8:35 pm Thursday. It is a 7-10 minute walk or a very short drive to Lake Chelan Lanes. The games are \$3/person, and \$4 for shoe rental.

Walk with Pete!

Organized by Pete Kaslik, Pierce College

Meet at 4pm Friday in the Campbell's lobby.

Nikola Tesla took long daily walks in a city park and claimed to have formed his ideas fully in his mind during these strolls before committing anything to paper. Steve Jobs insisted on "walking meetings" with business associates at Apple, especially when creative problem solving was required. In the spirit of these and many others, there will be a guided walk on the Chelan Riverwalk Park trail, easily accessed on foot from the Resort.

We will depart from the lobby of Campbell's at 4:00 pm on Friday. It will feel good to be moving around after a day of sitting. The walk is about 1 mile in total length and can be done at your own pace. You can walk alone and ponder or walk with others and chat.

Invited Speakers

Thursday, May 4

Mathematics of Global Climate

7:30 - 8:30 pm

Dargan Frierson, University of Washington

Centennial Ballroom

This talk will discuss the models used by the Intergovernmental Panel on Climate Change to assess future global warming based on emissions, and how solutions to these important equations can be calculated with tools from calculus.



Dargan Frierson holds a Ph.D. in Applied and Computational Mathematics from Princeton, and undergraduate degrees in mathematics and physics from North Carolina State University. A professor of atmospheric sciences at the University of Washington since 2007, his research focuses on simple models of climate to study rainfall patterns, climate feedbacks and climate solutions. He is the author of the open, interactive textbook Climate, Justice and Energy Solutions, and directs the UW EarthGames team, which hosts game jams and makes interactive educational games about climate.

Friday, May 5

To Be AnnouncedNathan Alexander, Morehouse College

7:00 - 8:15 pm Centennial Ballroom



Nathan Alexander is an assistant professor of data science and interdisciplinary studies at Morehouse College, and he teaches courses in mathematics, computational methods and education. His work explores the development of critical and justice-oriented practices in quantitative literacy development. This work sits at the intersection of the humanities, social sciences, mathematics and computational sciences, with a particular focus on Black history and futurity in national and global contexts. At Morehouse, he directs the Quantitative Histories Workshop, a community-centered teaching and learning lab for students and faculty in the Atlanta University Center.

Session Abstracts

Friday Session 1

9:20 - 10:20 am

Indelible Mathematical Moments

Stehekin A

Will Webber, Whatcom Community College

There are moments in my math education that are as clear in my mind today as the day they happened. These indelible moments have affected both the way I do and teach mathematics. In this presentation we will wander through the backwaters of my mathematical memories to ponder things like ice cream, parking the truck, the meaning of "of," and briefcase sized calculators, et al.

Finding the Least Squared Polynomial

Stehekin B

Tyler Wallace, Big Bend Community College

While doing partial derivatives, we often show our students how to derive the least squared line for bivariate data (aka regression line). This idea can be extended to find the least squared quadratic, cubic, or any polynomial. This presentation will walk through the process of identifying a pattern that can be extended to the general formula for the least squared polynomial.

Updating Bridge to College Math: What is Really Needed for Success in non-STEM?

River Room

Dawn Draus, Lower Columbia College

The statewide agreement for automatic placement into MATH& 107 and MATH& 146 for the HS Bridge to College Math course has been extended through the graduating class of 2027. This session describes recent significant shifts in the course with the intention of specifically addressing effective preparation for non-STEM math classes. The purpose of the session is to gather focused feedback from college math faculty on these shifts, explore what students really need for these courses, and discuss what further revisions might be needed to help students succeed in these courses.

Laplace Transform: A Motivational Approach

Park Room North

Hoewoon Kim, Columbia Basin College

The Laplace transform is one of integral transforms in solving differential equations in pure and applied mathematics. In particular, it can provide the students with an opportunity to experience the modern mathematics of operator theory and functional analysis. However, most undergraduate textbooks in ordinary differential equations just begin with the definition of Laplace transform as an improper integral on the half line, $(0, \infty)$, proceed with its properties, and apply them to solve initial value problems of differential equations. Many students just follow this procedure for their learning wondering how this integral transform method had been discovered and developed plausibly. In this talk we present a motivational way to derive the definition of Laplace transform using undergraduate mathematics and help students discover the general concept of integral transforms.

Kacey Diemert & Suzanne Rousseau, Lewis-Clark State College

Summative assessments in mathematics courses have historically been at best a singular snapshot of what a student knows in that moment of time and at worst an exercise in mathematics and testing anxiety. But summative assessments in mathematics are important, including exams. If we truly believe students are capable of learning mathematics, potentially with additional time and resources, is there a vehicle for them to do so? Unlike corrections or redos, which often showcase students' errors and inability, "Not Yet" grading allows students the power and hope to continue learning mathematics and to showcase their gained knowledge on mathematics assessments. In this short session, we will discuss our use of a "Not Yet" grading schema and its impact on our mathematics courses for future Elementary Teachers.

Resources and Ideas for Christian Mathematicians

Stehekin A

Dusty Wilson, Highline College

Over the past several years, the presenter has been researching the intersection between faith, spirituality and teaching mathematics. In this talk you will learn about resources for Christian faculty (all disciplines) and Christian mathematicians in particular as gathered through work with Faculty Commons, the Association of Christians in the Mathematical Sciences, and multiple sabbaticals studying the philosophy of mathematics.

Habits of Graphing Stehekin B

Natalie Hobson and Sharon Hobson, Tacoma Community College

Imagine a rider at a carnival going around a Ferris wheel at a constant speed. What is the graph of the rider's height and the total distance the rider traveled around the wheel? This may sound like a typical problem asked in a trigonometry or calculus class, however, what ways of thinking about the graph are influenced by our image of the situation itself rather than the mathematics involved? What habits of graphing prevent us from accurately representing the quantities in a situation? In this talk, we explore certain habits of graphing that might constrain students from developing consistent understandings of relationships. We will play with a collection of animated tasks to see what habits of graphing we have formed and what we can learn from these habits in designing meaningful mathematical activities for students.

Innovative Teaching that Excites Future Math Educators

River Room

Suzanne Rousseau and Kacey Diemert, Lewis-Clark State College

Have you ever taught a future K-12 educator who really doesn't like math? Or maybe they like math because it's so black and white and you just "follow the rules" to find the answer? How disappointing for their future students!? In this session we'll introduce some of the innovative teaching techniques, interactive classroom activities, and creative projects used in our courses to excite those same educators about mathematics and the teaching of mathematics.

Spurious and Hilarious Proofs

Park Room North

Tyler Wallace, Big Bend Community College

This talk will look at several false proofs to show that 2=1, that -1=1, that 2=0, that 3=0, that 0=1, that 4=5, that 2<1, that the hypotenuse of a triangle can be 0, and more! Finding the errors in these proofs can help students identify key components of algebra, trig, and calculus and when properties can and cannot be used and help them understand why they are important.

Non-STEM Co-Regs, a conversation

Stehekin A

Kate Cook and Allie Dykes, Clark College

Let's share what is happening at our respective colleges and gain new insights from each other. Clark College is launching Math& 146 and Math& 107 co-reqs in Fall '23. Many of you already have co-reqs going, while others are preparing to start. This is a sharing session, so come prepared to talk about what's happening at your school.

Learn About Systems by Playing a Game

Stehekin B

Pete Kaslik, Pierce College

In this session, you will be introduced to a game to teach systems thinking. This will be a competitive event between schools, so interested schools should come ready to play. It is possible to play on a phone, but more desirable if teams play on a laptop with internet connection. Details will be provided at the start of the session, but the goal is to see which school can earn the most money (in the game, not real money) and bragging rights.

Increasing Student Success with OER and ALEKS

River Room

Tammy Louie and Hanora McCarty, McGraw-Hill Education

Join us with ALEKS implementation manager and former Portland Community College Math faculty, Tammy Louie, as she speaks from personal experience on how ALEKS partners with OER. ALEKS is an affordable solution available standalone (no textbook) or can be aligned with your own OER course materials. ALEKS gives you the flexibility to assign homework, share curated content, review progress, and provide student support anytime, anywhere. Meet students where they are and identify gaps in their prerequisite knowledge. Students take an initial assessment and the results form an individualized path through the topics in your course. Each course includes a complete set of content authored in-house by vetted subject matter experts. This team creates everything from the questions to the immediate feedback and tools that support students' learning. We provide direct support for you to identify your goals, build a course that complements your teaching, and provide the training and resources.

Spilling the Tea: Dismantling BEdA and Math Misconceptions

Park Room North

Dawn Draus, Catie Graham, and Marcus Antonio Gunn, Lower Columbia College

As math educators, we aim to serve our students and help them progress quickly. To do that successfully, the two options (Basic Education for Adults (BEdA) and Math) must be allies. But how do you ally with someone you don't truly know? What misconceptions and biases get in the way of unity and keep the sides separated? This session will bring those critical and sometimes harsh assumptions to the light and help everyone dismantle them. In addition to analyzing the faculty and students of these departments, we'll also look at the learning objectives BEdA follows; we could find unity there too.

Implementing Corequisites and Self Placement in Math at Tacoma Community College

Stehekin A

Christopher Willett and Kendra Feinstein, Tacoma Community College

Moving from a prerequisite based model of mathematics education to a co-requisite based model has many challenges. In this presentation, we will describe why TCC was dissatisfied with pre-requisites and placement tests, why we moved to co-requisites, and how we reformed placement to fit in the new scheme. We will present basic information regarding our algebra, pre-calculus, and statistics co-requisite courses and take a deeper look at the statistics co-requisite course. The directed self placement tool that was developed will also be discussed. Our goal in the presentation is to show why we made the changes, how we made the changes, and to empower attendees to try something similar at their institution.

Introduction to Systems

Stehekin B

Pete Kaslik, Pierce College

We know mathematics is useful for helping us understand the relationship between two variables, but what if there are more than two variables interacting with each other to form a complex dynamic system? Two strategies for thinking about systems, causal loop diagrams and system dynamics, will be introduced at the Math& 107 level.

Putting the "Fun" in Functions with Virtual Reality

Park Room North

Robin Angotti, University of Washington Bothell

Mathematical functions can be abstract and intimidating when introduced with traditional methods of pencil and paper. Many students find the concept dry, boring, and irrelevant. However, many of these students are engaged when playing interactive video games. Thus a potentially effective approach to engage learners would be to integrate embodied cognition with a gamification learning system. This talk will discuss the development of a virtual reality prototype where learners are immersed in a virtual 3D world with mathematical functions as simple subjects of play and interaction. The results from the prototype demonstrated initial success and encouraged further development and investigation.

Modeling and Analyzing STEM Student Course-Taking Sequences using Network Graphs

Park Room North

Jen Nimtz, Kimihiro Noguchi, and Jothi Ramesh, Western Washington University

Student success is typically measured by grades in coursework and 6-year graduation rates (York, Gibson, & Rankin, 2015). We are developing network analysis statistical methods to provide a deeper understanding of student success, specifically success in first-year mathematics prerequisite courses as well as the STEM courses they serve. We consider the many possible student course-taking sequences (paths) as a complex network system. We model the paths that students take using a network of vertices (courses) and edges (links between courses) by using multiple years of registrar data to generate vertex and adjacency matrices and associated graphical representations (e.g., heat maps and network graphs). We also will share initial analysis to determine the importance of certain mathematics courses and the importance of transitions between courses.

WAMAP Update Stehekin A

David Lippman, Pierce College

Learn about what's new in WAMAP and support for OER. There will be plenty of time for your WAMAP questions.

Gravity, Lunar Landing, Drag, Falling Aircraft, Algebra to Calculus

Stehekin B

Yves Nievergelt, Eastern Washington University

Data from the Dark Ages show free fall exactly proportional to squared time: constant acceleration. Piecewise constant acceleration was also programmed in the Apollo Guidance Computer in the Lunar Excursion Module to adjust thrust close to landing. Some air drag on discs is also approximately proportional to squared speed. Other objects may encounter different drag approximated by different formulae. Examples, exercises, and problems provide material for presentation in the classroom and activities for homework at levels from algebra to calculus then to logarithms hence to differential equations thence perhaps to a little multivariable calculus for the last examples.

Utilizing Neuroeducation & Microlearning to Support Student Success

River Room

Alec Bacon, Hawkes Learning

Join Educational Courseware Specialist Alec Bacon to discuss how educators can utilize emerging neuroeducation trends and microlearning to support student success. During the presentation, he will also demonstrate how Hawkes' self-paced modules offer a unique mastery-based solution that utilizes microlearning in bite-sized chunks to build steady student success. Join for a chance to win one of three \$25 Amazon Gift Cards!

Professional Development for Community College Faculty

Park Room North

Kristen Harvey, Walla Walla Community College

Have you ever thought about going back to school and getting another degree? If you are a state employee, you are eligible for tuition waivers at Washington State University! There are four community college faculty members currently in the PhD in Math and Science Education program at WSU. We are attending part time (mostly via Zoom) and are only paying \$5 per semester. If this intrigues you and you want to hear further details, come by and ask questions! (No, this is NOT a paid advertisement, even though it sounds like it. I'm just dumbfounded that more people haven't heard of this amazing opportunity and want to share the news.)

Weigh in on PNWCC's Developmental Mathematics Program Redesign

Park Room North

Diana Petty, Pacific Northwest Christian College

As a new 2-year college in Washington state (founded in 2008), we strive to ensure the transferability of our courses to local 4-year institutions and universities. We recently redesigned our developmental through college-level math courses to include STEM and non-STEM pathways which will significantly increase student satisfaction and shorten the path to graduation. We will give a brief overview of the redesign, hoping to solicit your input and future collaboration.

Mathematical Escape Rooms

Stehekin A

Dusty Wilson, Highline College

Professor X has finally won the lottery after several years of attempts. He plans to go off and buy a small island where he never has to look at another email again, and can sip on specialty root beers while listening to BTS. Before his final goodbyes, Professor X has left his faculty colleagues some valuable treasure, but thought it would be more fun if he made his fellow math instructors work for it! Come solve Professor X's mathematical escape room, unlock the treasure, and get a taste for how a mathematical escape room might be a valuable addition to your curriculum.

Japanese Entrance Exam Problems: Bringing Problem-Solving to Pre-Calculus

Stehekin B

Salah M. Abed, Big Bend Community College

For some time now, I've endeavored to revamp my teaching style and curriculum to move away from rote memorization in favor of higher-level thinking, even (especially) in pre-calculus classes. I aspire to show my students mathematics as I see it: as a toolbox rather than a set of formulas and recipes. I happen to be a longtime student of the Japanese language. I've started using this skill to acquire knowledge about the Japanese education system and learn from Japan's (notoriously difficult) college entrance exams. In the main portion of this talk, I'll show you what I've observed: through-lines in the exam problems; linguistic differences that could affect understanding; Japan's national education system vis-à-vis Washington State standards. In the latter portion, I'd like to hear your thoughts on how we can get students thinking outside the formula.

Show Cause, A Faculty Perspective

River Room

Ben Tschida, North Idaho College

North Idaho College has received a sanction of Show Cause from NWCCU. This is an extraordinary situation in which the concerns are with management of the college and not with academics or with financials. I will give an overview of events that lead to the sanction and provide the faculty perspective as well as some lessons learned.

Rearranging Calculus I

Park Room North

Jeff Eldridge, Edmonds College

A differential calculus course typically begins with a review of precalculus topics, followed by a discussion of limits and continuity that students often find mystifying. This talk will demonstrate an approach — utilizing algebra and geometry — in which students can begin Calculus I by finding derivatives of all of the usual "nice" (continuous, smooth) functions, postponing the treatment of subtler topics involving limits and continuity until later in the course.

When $0.1 + 0.2 \neq 0.3$

Park Room North

David Lippman, Pierce College

Learn about why the binary representation of floating point numbers by computers will lead a computer to tell you that $0.1 + 0.2 \neq 0.3$

A space for notes, calculations, doodles...

Attendees

Bates Technical College

Nancy Landeis Emilie Pulido

Bellevue College

Michael Broome Rini Chakrabarti Ricardo Chavez Jennifer Laveglia Patrick Torres Andria Villines

Bellingham Technical College

Linda Hegeberg Andrea Johnson Calhan Ring Lee Newton

Big Bend Community College

Salah Abed Tyler Wallace

Cascadia College

Sharon Saxton Lise Trivett Srividhya Venkatraman

Centralia College

Teri Adams Dan Taylor Roberta Ziegler

CHOICE High School

Sharon Hobson

Clark College

Paul Casillas Kate Cook Allie Dykes Sarah Luther Robert Weston

Clover Park Technical College

Dion Alexander Loreta Sandoval

Columbia Basin College

Alexandria Anderson Meg Bartrand Robert DeLorto Nicholas Gardner Jenny Hughes Hoewoon Kim Rebecca Luttrell Martijn Oostrom Ryan Orr John Spence Limin Zhang David Mackay

Complete College America

Laura Schueller

Eastern Washington University

Yves Nievergelt

Edmonds College

Mary Anderson
Pat Averbeck
Jeff Eldridge
Terry Goldstick
Melissa Hope
Tiffany Ledford
Nancy Marx
Gabrielle McIntosh
Uzair Muhammad
Doug Owen

Green River College

Allison Beckwith Sarah Edwards Michelle Haigh Rochelle Mitchell Shelley Pahlow Michele Wallace

Highline College

Charly Cohen
Shana Friend
Shane Kibler-Trimboli
Rashmi Koushik
George Lopez
KhoiNguyen Nguyen
Dusty Wilson

Lake Washington Institute of Technology

Jim Francis Sherry McLean

Lewis-Clark State College

Kacey Diemert

Lower Columbia College

Dawn Draus Catie Graham Terri Skeie

North Idaho College

Angela Earnhart Eric Mack Ben Tschida Bob Vogeler

North Seattle College

Sam Wilson

Olympic College

Elisabeth Briggs Eva Kimble Elizabeth O'Neil Donald Robertson Joe White

Pacific Northwest Christian College

Diana Petty

Pierce College

Dylan ArceJaeger Chad Bemis Stewart Jaffe Pete Kaslik Rajesh Lal David Lippman Judy Petkovsek

Melonie Rasmussen Roya Sabeti Erica Shannon Larry Wiseman

Seattle Central College

Jonny Ursin

Shoreline Community College

Steven Bogart Trevor Pelletier Dr. Tatiana Rudneva Marek Wyzgowski

Skagit Valley College

Abel Gage Charles Stevens

South Puget Sound Community College

Jason Barnett Emily Boyce Maia Langenberg Julia Trude

Spokane Community College

Nicole Duvernay

Spokane Falls Community College

Chris Cary
Greg Cripe
Jessica Hoppe
Ashlee McQueen
Pete Wildman

State Board for Community & Technical Colleges

Katelynn Orellana

Tacoma Community College

Jared Abwawo Kendra Feinstein Kevin Harris Natalie Hobson Jack Lelko Dr. Christopher Willett

University of Washington

Bothell

Robin Angotti

University of Washington

Tacoma

Haley Skipper

Walla Walla Community College

Nicole Griggs Kristen Harvey Jennifer Leber Halley McCormick Chris Mehl Megan Schoessler Linda Soper

Western Washington

University

Jen Nimtz

Whatcom Community College

Jody DeWilde Kourosh Ghaderi Tyler Honeycutt Dr. Will Webber Leslie Glen

Yakima Valley College

Steven Mock

Vendors

FlatWorld Publishing

Jessica Lollino

Hawkes Learning

Alec Bacon

Macmillan

Anthony Hill

McGraw-Hill

Hanora McCarty

Pearson

Kim Razey

WAMAP

David Lippman

This list includes everyone who registered on or before April 29.

Thursday Schedule At-A-Glance					
7:30 - 8:30 pm	Announcements an	d Opening Speaker Darga	Centennial Ballroom		
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