Archived Colloquiua for AYs 2018-2019 and 2019-2020

Thursday, March 5, 2020 - Jeffrey Craig (Wonderful Education)

11 am in PB 191

Title: *Potential Virtues of Wicked Problems in a Quantitative Literacy Curriculum*

Abstract: In this talk, I discuss my experiences co-designing and implementing two new undergraduate mathematics courses in quantitative literacy. These courses are organized around contextual modules that lend themselves to exploring the uses of quantitative reasoning. I found that quantitative literacy can initiate robust conversations about problems like climate change, poverty, or criminal justice, but that these conversations naturally drove toward a wider conceptualization than quantitative literacy alone. The concept of *wicked problems*, from design theory, resonated with my experiences facilitating deep conversations in these courses. I will discuss implications for curriculum, teaching, and learning.

Math Colloquium Series, Celebrating Women in Mathematics

Friday, March 6 – Dr. Andrea Arauza Rivera (CSU East Bay)

PB, Room 012 at 3:00 pm

Colloquium Title: *Fractals, Binary Counting, and Towers of Hanoi*

Abstract: A rather unexpected connection exists between binary counting, the Towers of Hanoi puzzle, and fractal geometry. Just as one can count using the digits 0 through 9, we may count in binary with just the digits 0 and 1. Binary counting can be used to generate an optimal solution to the Towers of Hanoi puzzle. This famous puzzle involves moving a collection of disks from one peg to another while never placing a large peg on top of a smaller peg. Once we find an optimal way to solve the Towers of Hanoi, we will explore the connection to fractal geometry and look further at what properties make fractal sets so complex

Short Bio: Dr. Andrea Arauza Rivera is a proud Chicana mathematician who began as a student at Modesto Junior College before transferring to CSU Stanislaus and then pursuing a PhD. She earned a PhD in Mathematics from the University of California, Riverside in 2018. Her research is in the areas of functional analysis and fractal geometry. She is now an Assistant Professor at CSU East Bay.

Tuesday, Feb. 25, 2020 - Matthew Voigt (San Diego State University)

11 am in PB 191

Title: *The role of departmental efforts and the impact of identity on student success in introductory mathematics courses*

Abstract: Supporting student success in introductory math courses is a growing national imperative in order to both diversify and increase the number of well-prepared STEM graduates. In the first part of the talk, I will share findings from my work on two large-scale National Science Foundation projects (Progress through Calculus and Student Engagement in Mathematics through an Institutional Network for Active Learning) aimed at understanding how math departments can best support student success in precalculus and calculus courses across the United States. Specifically, I will highlight how communities of practice help foster instructor implementation of active learning techniques and how multi-section course coordination can benefit both instructor and student experiences. Additionally, I will discuss how variations to the standard calculus course (e.g., Co-calculus, Calculus for Biology) can support students who had less exposure to mathematics before entering college.

In the second part of the talk I will present findings from my mixed-methods dissertation study examining the impact of student identity on experiences in undergraduate mathematics classrooms. This study examines how Lesbian, Gay, Bisexual, Queer and Asexual students, referred to as queer-spectrum, describe their mathematics classrooms and how they navigate their identity in STEM spaces. Quantitative analysis of student survey data (n=24,327) reveals differences in how queer-spectrum students interact with instructors, peers, and overall report lower levels of positive math affect (e.g., confidence, interest). Drawing on qualitative student interviews, I document the existence of mathematical discourses that erase queer-spectrum identity from STEM environments, such as sexual identity is viewed as irrelevant and inappropriate in mathematical settings. Findings from this study are situated within the context of other student identities (gender, race, first-generation status) on mathematical experiences. I conclude with recommendations for supporting student success in introductory mathematics courses.

Thursday, Feb. 27, 2020 - Christina Koehne (Texas State University)

11 am in PB 191

Title: *Elementary Preservice Teachers' Conceptions and Reflections of Student Autonomous Problem-Solving*

Abstract: Researchers have illustrated that teacher support of student autonomy can be beneficial for students. However, student autonomy is not specifically mentioned in policy documents that guide future teacher preparation. Thus, this study looks at how prospective elementary teachers, through the lens of supporting five mathematical practices, conceptualize and support student autonomous problem-solving. I share the case of one preservice teacher to illustrate how a future teacher who has completed her methods and content courses but has not yet begun elementary observations or student teaching, conceptualizes and supports student autonomous problem-solving. Moreover, we will

consider how this preservice teacher reflects on her own supports of student autonomous problem-solving. I will also situate this case in the larger research project and share implications for teaching and future research.

Friday, October 25, 2019 – Justin Provchy (Amgen)

PB 032 between 9:00-10:00 am

Colloquium Title: ***Adapting to a Changing Lab: Custom Automated Solutions to New Problems***

Abstract: In this talk, a description of a custom platform for automating antibody purification using magnetic beads will be discussed. This technology enables antibody purification to be done significantly faster with reduced waste and lower costs. An overview will be given of the hardware and the software, both of which were entirely developed and fabricated internally. As part of this, I will give a brief introduction to Amgen and the Research & Automation Technologies group that I'm in. I will also give some of my background, focusing on how I went from Fresno State to Amgen and how my mathematics background influenced my current work.

NOTE: This presentation will be followed by a Q&A session from 10:00-11:00 am, and then pizza at 11 am.

Math Colloquia Series, Celebrating Women in Mathematics

March 8, 2019 – Katherine Urabe, M.A. (Kansas State University and U.S. Army Research and Analysis Center)

ED 140 between 11:00-12:00 pm

Colloquium Title: ***Using Mathematical Modeling and Data Analysis to Shape the Future***

Abstract: Interested in applying your STEM degree to solve real world problems? Do you want to make a global impact while informing multi-billion dollar decisions? We will discuss internship and career opportunities at The U.S. Army Research and Analysis Center (TRAC), what working for the Department of Defense is like as a civilian, and how we use math in our studies. We will do a deep dive into how optimization, network flows, and algorithms were used in the Future Vertical Lift study to determine what the helicopters of the future should look like.

Biography: Katie Urabe holds Bachelor's Degrees in Mathematics and Linguistics from Fresno State, where she was the 2012 President's Medalist. She received her Master's Degree in Mathematics from Fresno State in 2014. After graduation, she taught math at the local community colleges, then went into educational publishing as a math curriculum expert for DataWorks Educational Research and Edmentum. In 2016, Katie became an operations research analyst for the Department of Defense in Kansas City. She has worked on military studies using optimization, graph theory, and statistics. Her most notable achievement was a study on the creation and implementation of a Soldier Credentialing program that was

presented to Congress and recently passed legislation. In 2018, Katie was nominated for the Barchi Prize for her work on Future Megacities. She is currently pursuing a Master's Degree in Operations Research from Kansas State University and a Data Science Certificate from the Naval Postgraduate School.

March 15, 2019 – Candice Price, Ph.D. (University of San Diego)

PB 194 between 11:00-12:00 pm

Colloquium Title: ***The Tangle Model: An Application of Topology to Biology***
Abstract: The tangle model was developed in the 1980s by professors DeWitt Sumner and Claus Ernst. This model uses the mathematics of tangles to model protein-DNA binding. An N-string tangle is a pair (B,t) where B is a 3-dimensional ball and t is a collection of N non-intersecting curves properly embedded in B. N-string tangles are formed by placing 2N points on the boundary of B, and attaching N non-intersecting curves inside B. Tangles, like knots and links, are studied through their diagrams. In the tangle model for DNA site-specific recombination, one is required to solve simultaneous equations for unknown tangles which are summands of observed DNA knots and links. This discussion will give a review of the tangle model including definitions.
Biography: Candice Renee Price is an African-American mathematician and assistant professor at the University of San Diego. Born and raised in California, Candice has a bachelor's degree (2003) in Mathematics from California State University, Chico and a master's degree (2007) from San Francisco State University. She earned her doctoral degree (2012) in mathematics from the University of Iowa under the advisement of Isabel Darcy. Her area of mathematical research is DNA topology, that is, knot theory applied to the structure of DNA. She is an advocate for greater representation of women and people of color in the STEM fields.

March 22, 2019 – Jessica de Silva, Ph.D. (CSU Stanislaus)

PB 194 between 11:00-12:00 pm

Title: ***A Graph Theorist's Perspective on the Card Game SET***
Abstract: In mathematics, some of the best puzzles challenge us to take something we know well (e.g., graph theory) and try to find a way to relate it to something new and interesting (e.g., SET). SET is a card game played with a deck in which each card has four properties and each property takes on one of three values. Players compete to quickly find sets of three cards such that, with respect to each property, the cards have all the same or

all different values. We will explore one way to look at SET from a graph theoretic point of view, opening doors to many interesting questions and generalizations.

Biography: Jessica De Silva is an Assistant Professor of Mathematics at CSU Stanislaus. A Central Valley native, Jessica grew up in the small town of Hilmar, CA where the population of cows exceeds that of the people. She received her BA in Mathematics from CSU Stanislaus and then traveled half-way across the country to the University of Nebraska-Lincoln to pursue her Ph.D. in Mathematics. After 5 years in “Cornhusker Nation”, she is happy to be back home working with students who remind her of herself. As an undergraduate, Jessica benefited greatly from programs and conferences that supported women in their mathematical endeavors. In her current role, she is excited to give back by organizing conferences which celebrate the achievements of women in mathematics.