

**UTAH ACADEMY
of
Sciences, Arts & Letters**

Established 1908

Annual Conference

March 19, 2022

Brigham Young University

UTAH ACADEMY OF SCIENCES, ARTS, & LETTERS

Annual Conference - Saturday, March 19, 2022

Brigham Young University Conference Center

9:00 a.m. – 10:00 a.m.

Check-in & Registration

2297B

10:00 a.m. – 10:05 a.m. – Dan Poole, President

2258

10:15 a.m. – 10:30 a.m. – Angela Banchemo-Kelleher, President-Elect

Distinguished Service Award Presentation

Adrienne Andrews

Rachel Keller, Past President

John and Olga Gardner Prize Presentation

Larry Smith

10:30 a.m. – 11:15 a.m.

O.C. Tanner Lecture

By Larry Smith

11:15 a.m. – 11:30 a.m.

Conference Photo

2258 or Outside

11:30 a.m. – 12:00 p.m.

Poster Session

Atrium

12:00 p.m. – 1:00 p.m.

Lunch

Atrium - Ballroom A and B

1:15 p.m. – 2:30 p.m.

Division Breakout Session

See “Division Session Room Assignments”

2:30 p.m. – 3:00 p.m.

Refreshment Break

Atrium - Ballroom A and B

3:00 p.m. – 4:30 p.m.

Division Breakout Session

See “Division Session Room Assignments”

5:00 p.m. – 6:00 p.m.

UASAL Board Meeting

Conference room 217

Division Sessions
Room Assignments

POSTER SESSION:

Session: Atrium
Zoom Link:

ARTS:

Session A: Ballroom C
Zoom Link:

BIOLOGICAL:

Session A: 2265
Zoom Link:

BUSINESS:

Session A:
Zoom Link:
Session B: 2295

EDUCATION:

Session A: 2267
Zoom Link:

ENGINEERING:

Session A: 2258
Session B: 2260

HUMANITIES/PHILOSOPHY/FOREIGN LANGUAGE:

Session A: 202
Zoom Link:

KINESIOLOGY AND HEALTH SCIENCES

Session A: 2287
Zoom Link:

LANGUAGES/LITERATURE:

Session A: 2269
Zoom Link:

PHYSICAL SCIENCES:

Session A: 2277
Session B: 2279

SOCIAL SCIENCES:

Session A: 2285
Zoom Link:

1. To Access Wireless Internet:
2. Please use “eduroam” wireless network to connect to the Internet.
3. Enter your university credentials for the username and password.
4. If your school does not participate in eduroam use BYU guest.
5. The log on and password will be provided at the conference

**Spring Excursion June 3 and 4, 2022 Colorado River Compact 1922 Centennial.
Meet June 3, 2022 in Kanab, Utah for a seminar then tour Glen Canyon Dam on Saturday
June 4, 2022 if permitted.**

RSVP to Laine Berghout hlberghout@weber.edu

Distinguished Service Award

Adrienne Andrews

The Distinguished Service Award is given in recognition of exceptional service to the higher education community in Utah.

Andrews earned a Bachelor of Arts degree in Political Science with minors in Ethnic Studies and Spanish in 1993 from the University of Utah. While there, she studied abroad in Cuernavaca, Mexico in addition to completing an internship at the U.S. Supreme Court. She next attended the University of Denver, College of Law as a Chancellor's Scholar, leaving in 1995 and returning to the U of U where she completed a second Bachelor of Arts in Women's Studies in 1996.

Her first master's degree was completed at Minnesota State University, Mankato (MSUM) in Women's Studies in 1997. She completed a master's degree in Political Science at Rutgers, the State University of New Jersey, in 2001.

She completed a postgraduate degree in Conflict Resolution & Mediation, received with honors from the U of U in 2006. Andrews is currently ABD in Education, Culture and Society at the University of Utah.

Career

Andrews has worked in a variety of government, higher education and non-profit capacities including:

- Director of the Center for Youth Policy and Programs for the State of New Jersey
- Staff Associate in the New Jersey Department of State
- Political Science Instructor at Rutgers
- Women's Studies Instructor at MSUM
- Graduate associate and research associate at the Eagleton Institute of Politics and the Center for American Women and Politics

Local Involvement

A native Utahn, Andrews was raised in Davis County and has a long history of advocacy in social justice and inclusion work with a special capacity for community building. Andrews currently serves as a member of the McKay-Dee and Layton Hospital Boards, the Boys & Girls Club of Weber-Davis Board, and as the Honorary Commander of the Hill Air Force Base 75th Wing. She most recently served on the Utah Governor's Martin Luther King, Jr. Human Rights Commission.

Honors

Andrews has received numerous honors, including:

- 2020 Living Color Gala and Utah Business Educator Award
- 2020 H. Aldous Dixon Award
- 2018 Omega Psi Phi Fraternity Community Service Award
- 2017 Ogden Weber Chamber Women in Business Athena Award

John & Olga Gardner Prize

Larry Smith

The Gardner Prize is awarded annually for exceptional achievement by an academic professional in Utah.

Larry Smith was raised in Provo, Utah in a family of educators. His interest in math and physics was sparked early and he devoured the Dewey Decimal 500s and 600s in his junior high library. He also signed up for beginning band and chose to play the clarinet, which he continued through high school. Upon returning to BYU after two years in Chile he picked up the clarinet again, but spent more time on his double major in physics and math. After graduating from BYU Larry earned a master's degree in physics and a PhD in science education from The University of Texas at Austin. While in graduate school Larry married Holly and they were blessed with two little Texans. He also played in the Austin Community Orchestra.

Larry then accepted a teaching position at Snow College in physics and math. Over time Larry and Holly added three little Utahns to their family. At Snow College he has served as chair of the Physics Department twice, as dean of the Division of Natural Sciences and Mathematics, as director of faculty development, and as president of the Faculty Senate. His recent research has centered on the mathematics of music. Larry is involved in the Honors Program and the Great Teachers Movement. His heart remains in the classroom. After the new science building opened he became the director of the Snow College Planetarium where he can often be found hosting shows for school groups and the public.

Inspired by the Citizenship in the Community merit badge as a Boy Scout, he served six years on the Ephraim Public Library Board and twelve years on the South Sanpete School Board and played his clarinet in the Sanpete Valley Community Orchestra for 25 years. As much as he loves education his higher priority is his family.

O.C. Tanner Lecture

"Visualizing the Sciences and Art of Math and Music"

Dr. Larry Smith

Musicians do not need to be expert mathematicians in order to produce beautiful music, but music is based on mathematical principles that require some choices on the part of musicians, so an understanding of the mathematical underpinnings of music theory is useful. Logarithms are a constructive way to represent frequency or pitch. Ratios of frequencies are used to construct intervals and scales. Mathematical visualizations provide insight into various musical tunings and temperaments. Preferences and choices have changed over time. An understanding of math can enhance the aesthetic enjoyment of music.

Journal of the Utah Academy Publication Policy

The Journal of the Utah Academy of Sciences, Arts, and Letters publishes works in all of the fields of study encompassed in the Academy's mission. Papers published in The Journal of the Utah Academy of Sciences, Arts, and Letters are drawn from papers presented by members in good standing at the annual conference of the Utah Academy. The Journal of the Utah Academy is a refereed journal. To qualify for publication, the papers must be recommended through a refereeing system.

Presenters are encouraged to publish their paper in The Journal of the Utah Academy. The Journal's criteria are that a submission is (1) fresh, meaningful scholarly insight on its subject; (2) readable and well written; and (3) of general interest for an academic readership beyond the author's field.

If you wish your paper to be considered for publication in The Journal, please submit a Microsoft Word document to the chair of the appropriate division by June 1st 2022. Contact information for division chairs is available on the Utah Academy's website (www.utahacademy.org). Editorial responses will be forthcoming after the resumption of school the following fall when referees have returned their comments to the division chairs.

Papers should be between ten and twenty double-spaced pages. Detailed instructions to authors are available at <http://www.utahacademy.org/>.

Poster Presentations

Poster Session

Division Chair: Jacque Westover
Utah Valley University

SESSION A:

Session Leader: Jacque Westover

Biological Sciences

In-Person

Title: The Predicted Structure of a Thermophilic Malate Synthase

Presenters: Shaelee Nielsen and Jantzen Orton

Authors: Shaelee Nielsen, Jantzen Orton, and Bruce R. Howard

Affiliation: Southern Utah University

In-Person

Title: Single Sample Survey of Halophilic Host and Phage Pairs

Presenter: Preston D. Capener and Joshua R. Mott

Authors: Preston D. Capener, Joshua R. Mott, Matthew B. Crook, Matthew J Domek

Affiliation: Weber State University

In-Person

Title: In sickness and health: Student perceptions of viruses pre- and post- pandemic

Presenter: Kayci Younger

Authors: Kayci K. Younger, Landon K. McKinnon, Jennifer L. Momsen, Lisa B. Wiltbank

Affiliation: Weber State University

In-Person

Title: Selective Media for the Isolation of *Paucilactobacillus wasatchensis*

Presenter: Chase Wahlstrom

Authors: Chase Wahlstrom, Matthew Domek, Michele Culumber and Craig Oberg

Affiliation: Weber State University

In-Person

Title: Effects of the Flavonoid, Epicatechin, on Mitochondrial Respiration and Glucose-Regulated Glucagon Secretion in the Pancreatic Alpha Cell

Presenter: Ethan Crawford

Authors: Chad Mourino and Ethan Crawford

Affiliation: Brigham Young University

Virtual

Title: Conserving parasites and their symbiotic microbes, keystone species in Great Basin Desert life zones

Presenter: Robert L. Bossard

Author: Robert L. Bossard

Affiliation: Bossard Consulting

Virtual

Title: Characterization of metformin's repression of chemokine reduction in triple-negative breast cancer cells

Presenter: B. Drake Alton

Author: B. Drake Alton

Affiliation: Weber State University

Physical Science

In-Person

Title: Particle Detector and Einstein's Theory of Relativity

Presenter: Sota Nakahama

Author: Sota Nakahama

Affiliation: Southern Utah University

In-Person

Title: PDMS Frit Fabrication and Applications

Presenter: Kylee Stoddard

Authors: Kylee Stoddard, Christopher F. Monson

Affiliation: Southern Utah University

In-Person

Title: Investigating the effect of structural changes on optoelectronic properties of benzenoids and their boron nitrogen analogs

Presenters: Benjamin A. Smith, Joshua Thomson

Authors: Benjamin A. Smith, Joshua Thomson, Michelle A. Chicas Aslett, Adam Cluff, Mitchell Asper, Lance Jagerson, Elena N Laricheva

Affiliation: Utah Valley University

Virtual

Title: Preparation of Novel mono-, bis- and tris-ligated PyrOx-Ir complexes

Presenter: Blake Woodward

Authors: Blake Woodward, Seth Smith, Matthew B. Prater

Affiliation: Southern Utah University

Virtual

Title: Direct One-pot Grignard Formation and Addition to Imine Electrophiles

Presenter: Austin Flynn

Authors: Austin Flynn, Matthew B. Prater

Affiliation: Southern Utah University

Social Sciences

In-Person

Title: Is Confession Good for the "Soul"?

Presenter: Sarah Foote

Authors: Sarah Foote, Emily Putnam

Affiliation: Brigham Young University & Salt Lake Community College forensic roles.

Oral Presentations

Arts

Division Chair: Dmitri Peskov

Utah Valley University

SESSION A:

Session Leader: Dmitri Peskov

1:00 p.m.

In-Person

Title: Yankee Doodle Dandy: The Role of Yankee Doodle in the American

Revolution

Presenter: Ethan Walton

Author: Ethan Walton

Affiliation: Brigham Young University

1:20 p.m. In-Person
Title: Novel: Witchstead Chapter 1
Presenter: Kayla Todd
Author: Kayla Todd
Affiliation: Weber State University

1:40 p.m. Virtual
Title: Immigrants and Indigeneity in the Original "West Side Story" Film
Presenter: Thomas Jenson
Author: Thomas Jenson
Affiliation: Brigham Young University, Provo

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

3:00 p.m. Virtual
Title: Haunting Shadows
Presenters: Jenessa Trimble
Author: Jenessa Trimble
Affiliation: Weber State University

3:20 p.m. Questions and Answers

Biological Sciences

Division Chair: Daniel Clark

Weber State University

SESSION A:

Session Leader: Daniel Clark

1:00 p.m. In-Person
Title: Hand Dryers Serve as a Reservoir for Antibiotic-Resistant Bacteria
Presenter: Colette Mortensen
Authors: Ashlynd Greenwood, Colette Mortensen, Michele Culumber, and Craig Oberg
Affiliation: Weber State University

1:15 p.m. In-Person
Title: Amino acid decarboxylation is a potential source of CO₂ production in cheese by *Paucilactibacillus wasatchensis* WDC04.
Presenter: George Barrera
Authors: Kate Sorensen, George Barrera, Michele Culumber, Matthew Domek, Craig Oberg, Taylor Oberg, and Donald McMahon.
Affiliation: Weber State University

1:30 p.m. In-Person
Title: Maintenance and Expression of Redundant Carbapenem- Resistance Mechanisms in the Prolonged Absence of Antibiotic Pressure
Presenter: Taalin Hoj

Authors: Taalin Hoj, Allison Brower, and Richard Robison
Affiliation: Brigham Young University

- 1:45 p.m. Virtual
Title: Exploring Environmental Reservoirs for *Paucilactobacillus wasatchensis*
Presenter: Niharika Mishra
Authors: Niharika Mishra, Michele Culumber, Karen Mann, and Craig Oberg
Affiliation: Weber State University
- 2:00 p.m. Virtual
Title: Physio-chemical basis of high salinity tolerance in an obligate halophyte *Suaeda fruticosa*
Presenter: Abdul Hameed
Authors: Abdul Hameed¹, Bilquees Gull¹, and Brent L. Nielsen²
Affiliation: 1) Dr. Muhammad Ajmal Khan Institute of Sustainable Halophyte Utilization, University of Karachi, Karachi, Pakistan; 2) Department of Microbiology & Molecular Biology, Brigham Young University, Provo, Utah
- 2:15 p.m. In-Person
Title: A Longitudinal Study of Acceptance of Evolution in a University Setting from 2011-2021
Presenter: Sawyer Thomas Baum
Authors: Sawyer T. Baum & T. Heath Ogden
Affiliation: Utah Valley University
- 2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Business

Division Chair: Taowen Le
Weber State University

SESSION A:

Session Leader: Jeff Davis

- 1:00 p.m. Welcome & Introduction
- 1:10 p.m. Virtual
Title: Seasonality of Frequency and Intensity in Consumer Complaints: A Sentiment Analysis Approach
Presenter: Reagan Siggard
Authors: Reagan Siggard, Yong Seog Kim
Affiliation: Utah State University
- 1:30 p.m. Virtual
Title: Graduate School Admission Webpages: Analysis of Marketing Messages for Gendered Marketing Themes
Presenter: Dalton Droubay
Authors: Paige Gardiner, Madison Johnson, Dalton Droubay
Affiliation: Southern Utah University
- 1:50 p.m. Virtual
Title: Business Ethics Education in Utah: A Look at Higher Education

Presenters: Chelsea Dye, Dara Hoffa
Authors: Chelsea Dye, Dara Hoffa, Ron Mano (posthumously)
Affiliation: Westminster College

2:10 p.m. Virtual
Title: Elderly Abuse Fraud--A Forensic Accounting and Legal Case
Presenter: Jeff Davis
Authors: Jeff Davis, Hal Davis
Affiliation: Weber State University, Davis & Sanchez, PLLC

2:30 p.m. Virtual
Title: Data Science and Analytics: A Data Driven Decision Making Approach for Business
Presenter: Amar Sahay
Author: Amar Sahay
Affiliation: Salt Lake Community College

2:50 p.m. Virtual
Title: Bracketed Difference-in-Difference Estimation to Measure the Effect of Medical Marijuana Laws on Violent Crime
Presenter: Anthony Frazier
Authors: Julian Chan, Gavin Roberts, Anthony Frazier
Affiliation: Weber State University

3:10 p.m. Virtual
Title: Academic Success and Comparison of Beginning, Intermediate, Senior, and Graduate Accounting Students: Self-Assessment of Self-Efficacy, Emotional Intelligence, Self Determination and Regulation
Presenter: Jeff Davis
Author: Jeff Davis
Affiliation: Weber State University

SESSION B:

Session Leader: H, Laine Berghout

1:00 p.m. Welcome & Introduction

1:10 p.m. In-Person
Title: Desired Leadership Traits in First Bosses: A Study of Extant Leadership Theories Using Generation Z College Students
Presenter: Jim Brau
Authors: James Brau, Jameson Brau
Affiliation: Brigham Young University, Gonzaga University

1:30 p.m. In-Person
Title: Setting Context and Expectations in Adult Education
Presenter: Todd J. Wentz
Author: Todd J. Wentz
Affiliation: Ensign College

1:50 p.m. In-Person
Title: An Econometric Analysis of Inventory Turnover: Expanding the Gaur, Fisher, and Raman (2005) Three-Factor Model Up and Down the Supply

Chain

Presenter: Peter Christensen

Authors: James Brau, Rebekah Brau, Joe Henry, Peter Christensen

Affiliation: Brigham Young University, Rowan University

- 2:10 p.m. In-Person
Title: An Econometric Analysis of Diversity: Perceptions of College Students towards Corporate Social Responsibility Metrics
Presenter: Jim Brau
Authors: James Brau, Jameson Brau
Affiliation: Brigham Young University, Gonzaga University
- 2:30 p.m. Refreshment Break – Atrium - Ballroom A and B
- 3:00 p.m. In-Person
Title: Global Commercial Civilization
Presenter: Edward G. Engh
Author: Edward G. Engh
Affiliation: Salt Lake Community College
- 3:20 p.m. In-Person
Title: A Framework for Incorporating CFA and CFP Preparation Courses in an Undergraduate Finance Major
Presenter: Peter Marshall
Authors: James Brau, Taft Dorman, Peter Marshall, Stephen Owen
Affiliation: Brigham Young University, Brigham Young University - Idaho, University of North Texas
- 3:40 p.m. In-Person
Title: The (non-existent) Effect of Video Gaming and Social Media on Academic Performance
Presenter: Jim Brau
Authors: Heber Brau, Jim Brau, James Gaskin
Affiliation: Brigham Young University

Education

Division Chair Nicole Gearing

Utah Valley University

SESSION A:

Session Leader: Nicole Gearing

- 1:15 p.m. Welcome
- 1:20 p.m. Virtual
Title: Policies and Practices for Supporting Secondary Multilingual Learners-Teacher Perspectives
Presenter: Marilee Coles-Ritchi and Alondra Miranda
Authors: Marilee Coles-Ritchi and Alondra Miranda
Affiliation: Westminster College
- 1:40 p.m. Virtual
Title: Story in the Stars

Presenter: Belinda 'Ofakihevahanoa Fotu
Author: Belinda 'Ofakihevahanoa Fotu
Affiliation: Utah State University

2:00 p.m. In-Person
Title: An Exploratory Tribal-Crit Analysis of Educators Rising's Role in Teacher Recruitment
Presenter: William J. Davis
Author: William J. Davis
Affiliation: Southern Utah University

2:20 p.m. Q & A Discussion

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Engineering

Division Chair: Ali Siahpush
Southern Utah University

SESSION A:

Session Leader: Ali S. Siahpush

1:00 p.m. Welcome

1:15 p.m. In-Person
Title: Thermodynamics Experiment: Adiabatic Compression of Air
Presenter: Toby McMurray
Authors: Toby McMurray and Ali Syeed Siahpush
Affiliation: Southern Utah University

1:30 p.m. In-Person
Title: Inward Melting in Cylindrical Coordinate System Part 1 – Analytical Solution (Derivations)
Presenter: Jordan Whitlock
Authors: Jordan Whitlock and Ali Syeed Siahpush
Affiliation: Southern Utah University

1:45 p.m. In-Person
Title: Transient and Steady-State Heat Transfer Analysis of Long Aluminum Fin
Presenter: Lee Lorimer, Alicyn Astle
Authors: Lee Lorimer, Alicyn Astle, Ali Syeed Siahpush
Affiliation: Southern Utah University

2:00 p.m. In-Person
Title: Transient and Steady-State and Transient Analysis of a Fin Under Water
Presenter: Mitchell Halverson, Floyd K Kimber, Jathen Chaffin, Cameron Dix
Authors: Mitchell Halverson, Kobe Potter, Floyd K Kimber, Jordan Whitlock, Jathen Chaffin, Cameron Dix, Ali Syeed Siahpush
Affiliation: Southern Utah University

2:15 p.m. In-Person

Title: Cavitation Demonstration Trails

Presenter: Ali Syyed Siahpush

Authors: Owen Telford, Ali Syyed Siahpush

Affiliation: Southern Utah University

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

3:00 p.m. In-Person

Title: Scale Analysis of a Solid/Liquid Phase Change Thermal Energy Storage System

Presenter: Jordan Whitlock

Authors: Jordan Whitlock , Ali Syyed Siahpush

Affiliation: Southern Utah University

SESSION B:

Session Leader: Dr. Mohamed Askar (Southern Utah University)

1:00 p.m. Welcome

1:15 p.m. In-Person

Title: Developing and Implementing Traffic Control Plans for Road Work Zones - Case Study On SR-130; North Cedar To MP 9

Presenter: Tyson Prince

Authors: Tyson Prince, Sean Carr, Tavish Darger, Mohamed Askar, Jared Baker

Affiliation: Southern Utah University

1:30 p.m. In-Person

Title: Developing a Quantitative Quality Control System for Road Construction Case Study On SR-130; North Cedar To MP 9

Presenter: Wade Schmid

Authors: Wade Schmid, Jaden Black, Duo Chen 9

Affiliation: Southern Utah University

checking the quality of the project.

1:45 p.m. In-Person

Title: Application of Value Engineering Technique on Tall Wood Building Structural Design

Presenter: Jacob Rollins

Authors: Jacob Rollins, Tony Olsen, Dr. Mohamed Askar

Affiliation: Southern Utah University

2:00 p.m. Virtual

Title: Comparative Study of Structural Systems for Tall Mass Timber Buildings

Presenter: Khevar McLeod

Authors: Khevar McLeod, Braden Madsen, Dr. Mohamed Askar

Affiliation: Southern Utah University

2:15 p.m. Virtual

Title: Making a Big Impact with a Small Design

Presenter: Taylor Perry

Authors: Taylor Perry, Guelord Mirindi, Alexandra Hutchinson
Affiliation: Southern Utah University

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

3:00 p.m. In-Person
Title: Investigating Bracketed Difference-in-Difference Estimation: A Simulation Study
Presenter: Anthony Frazier
Authors: Anthony Frazier, Dr. Julian Chan
Affiliation: Weber State University

Humanities, Philosophy, & Foreign Language

Division Chair: Craig Bergeson
Weber State University

Session Leader: Craig Bergeson

1:00 p.m. Virtual
Title: Instant Out of Time: Mathew Brady's Photographs of the First and Second Ladies, 1844-1896
Presenter: Thomas C. Terry, Ph.D.
Author: Thomas C. Terry, Ph.D.
Affiliation: Utah State University

1:20 p.m. Virtual
Title: Social justice in the languages
Presenter: Lucia Taylor
Author: Lucia Taylor
Affiliation : Dixie State University

1:40 p.m. Q & A Discussion

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Kinesiology and Health Sciences

Division Chair: Tracy Fawns
Dixie State University

Session Leader: Ryan Boam (Weber State University)

1:15 p.m. Welcome

1:20 p.m. In-Person
Title: Exploring Correlates of Domestic Violence and Homelessness: A Review of the Literature
Presenter: Linnette Wong
Author: Linnette Wong
Affiliation: Weber State University

1:40 p.m. Q & A Discussion

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Language, & Literature

Division Chair: Keith Lawrence
Brigham Young University

Session Leader: Keith Lawrence

- 1:00 p.m. In-Person
Title: “Humor within the Horrors of *The Two Gentlemen of Verona*”
Presenter: Madalynn Belliston
Author: Madalynn Belliston
Affiliation: Southern Utah University
- 1:20 p.m. Virtual
Title: “Ambivalent Villains: Tracing the Binary Perception of Heroism Across Three Narratives”
Presenter: Brandan Ivie
Author: Brandan Ivie
Affiliation: Southern Utah University
- 1:40 p.m. Virtual
Title: “Rhetorics of Advocacy in Disability Accommodation”
Presenters: Rachel Bryson, Peter Call
Authors: Rachel Bryson, Peter Call
Affiliation: Utah State University
- 2:00 p.m. Q & A/Discussion
- 2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Physical Sciences

Division Chair: Chris Monson
Southern Utah University

SESSION A:

Session Leader: Chris Monson

- 1:00 p.m. In-Person
Title: Mercury for dinner? Aqueous Heavy Metal Sequestration.
Presenter: Jacob Kjeldahl Jensen, Christopher F. Monson
Authors: Jacob Kjeldahl Jensen, Christopher F. Monson
Affiliation: Southern Utah University
- 1:20 p.m. In-Person
Title: Investigation of Manganese Nanoparticles with Various Capping Ligands and Their Effects on *Raphanus sativus*
Presenter: Taytum Stratton
Authors: Taytum Stratton, Christopher F. Monson, Elizabeth Pierce
Affiliation: Southern Utah University
- 1:40 p.m. In-Person
Title: A three electrode microfluidic for the quantitation of dissolved oxygen
Presenter: Cameron C. Stokes

Authors: Cameron C. Stokes, K. Brayden Bailey, Christopher H. Abraham,
Mariah Clayson, Madison J. Evans, Christopher F. Monson
Affiliation: Southern Utah University

- 2:00 p.m. In-Person
Title: Incorporating Authentic Research Experiences into an Undergraduate Course in Computational Chemistry
Presenter: Elena N Laricheva
Author: Elena N Laricheva
Affiliation: Utah Valley University
- 2:20 p.m. Q & A Discussion
- 2:30 p.m. Refreshment Break – Atrium - Ballroom A and B
- 3:00 p.m. In-Person
Title: Tunings and Temperaments: Mathematical Circles and Spirals
Presenter: Jonathan Tyler
Authors: Jonathan Tyler, Larry Smith
Affiliation: Snow College
- 3:20 p.m. In-Person
Title: Neutron Star Kick-Off as a Consequences of Asymmetric Neutrino Diffusion
Presenter: Alexander Panin
Author: Alexander Panin
Affiliation: Utah Valley University
- 3:40 p.m. In-Person
Title: Single X-ray Photon Diffraction Experiments
Presenter: Alexander M. Panin
Author: Alexander Panin
Affiliation: Utah Valley University

SESSION B:

Session Leader: Jean-Francois Van Huele

- 1:00 p.m. In-Person
Title: Character Table of Permutation Group in 4-Dimensional Space
Presenter: Chin-yah Yeh
Author: Chin-yah Yeh
Affiliation: Salt Lake Community College
- 1:20 p.m. In-Person
Title: Testing Quantum Mechanics on Quantum Computers
Presenter: M. Thomas Hoffman
Authors: M. Thomas Hoffman, Jean-Francois Van Huele
Affiliation: Brigham Young University
- 1:40 p.m. In-Person
Title: Optimizing Quantum Resources in Short-Distance Teleportation Scenarios

Presenter: Aidan Gillam
Authors: Aidan Gillam, Jean-Francois Van Huele
Affiliation: Brigham Young University

2:00 p.m. In-Person
Title: Finding the Quantum in Novel Self-Gravity Experiments
Presenter: Leif Hagen
Authors: Leif Hagen, Jean-Francois Van Huele
Affiliation: Brigham Young University

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

Social Sciences

Division Chair: Emily Putnam
Salt Lake Community College

SESSION A:

Session Leader: Emily Putnam

1:00 p.m. Welcome

1:15 p.m. Virtual
Title: Belief Stories and the Social Construction of Reality using Religion as a Case Study
Presenter: Matthew Smith-Lahrman
Author: Matthew Smith-Lahrman
Affiliation: Dixie State University

1:30 p.m. In-Person
Title: Tupac Shakur and Kendrick Lamar: A Legacy of Hip Hop Resistance
Presenter: Theresa A. Martinez
Author: Theresa A. Martinez
Affiliation: University of Utah

1:45 p.m. Virtual
Title: Clearance Rate Correlation to Pandemic-Era Increased Homicide Rates in American Cities
Presenter: Dr. John Hill
Author: Dr. John Hill, Emeritus Professor
Affiliation: Salt Lake Community College

2:00 p.m. In-Person
Title: Understanding Us: Undergraduate Research to Support a Community Partner Working on Homelessness
Presenter: Kambry Woodbury, Dan Poole
Authors: Dan Poole, Kambry Woodbury
Affiliation: Salt Lake Community College

2:15 p.m. In-Person
Title: Smoke Season: Exploring the Human Geographies of Transient Wildfire Smoke along the Wasatch Front
Presenter: Jeremy Bryson
Authors: Jeremy Bryson, Jeff Montague

Affiliation: Weber State University

2:30 p.m. Refreshment Break – Atrium - Ballroom A and B

3:00 p.m. In-Person

Title "I Was Answered That I Must Join None of Them": Irreligion Among Former Latter-day Saints in Utah.

Presenter: Rick Phillips

Author: Rick Phillips

Affiliation: University of North Florida

3:15 p.m. Virtual

Title: Geospatial Analysis of Drug Related Crimes in Local Communities in Utah

Presenter: Erin Crump

Authors: Erin Crump, Dr. Yong Seog Kim

Affiliation: Utah State University

3:45 p.m. Q & A Discussion

POSTER ABSTRACTS

Biological Sciences

Title: The Predicted Structure of a Thermophilic Malate Synthase

Authors: Shaelee Nielsen, Jantzen Orton, and Bruce R. Howard

Affiliation: Southern Utah University

Abstract: Our project aims to solve the structure of the crenarchaeal *Sulfolobus acidocaldarius* enzyme malate synthase. Other known malate synthase enzymes have been found to require a magnesium ion in the active site to carry out catalytic activities, but a study reported that *S. acidocaldarius* malate synthase does not require magnesium. This suggests a novel mechanism for this enzyme. Additionally, the mature *S. acidocaldarius* protein is approximately 100 residues larger than any other structurally characterized malate synthase. It has also been reported to form a dimer, while previously solved structures have only displayed monomeric, trimeric, and hexameric arrangements. We plan to use X-ray crystallography to determine the structure experimentally. However, major advances in the accuracy of protein structure prediction were made recently by AlphaFold, an artificial intelligence system developed by DeepMind, which have revolutionized the field, and apparently solved the protein folding problem. A similar AI system, RoseTTAFold, developed by David Baker's lab at the University of Washington, has been made publicly available. Here we report our analysis of the structure of this protein, predicted using the RoseTTAFold algorithm, and of a predicted structural model for the dimeric form of the enzyme using ClusPro. Our results provide strong support for a conserved catalytic mechanism, requiring magnesium, in common with all previously solved malate synthase isoforms. Our results also provide potential insight into evolutionary relationships with these other various isoforms.

Title: Single Sample Survey of Halophilic Host and Phage Pairs

Authors: Preston D. Capener, Joshua R. Mott, Matthew B. Crook, Matthew J Domek

Affiliation: Weber State University

Abstract: Bacteria growing in the Great Salt Lake (GSL) are halophilic in nature due to the high salt concentration and are represented by a large number of diverse species. Previous studies from this laboratory have found phage that infect *Halomonas*, *Idiomarina*, *Salinovibrio*, and *Marinobacter*. The host and the phage were isolated over several years of sampling. In this study

we used three different halophilic media formulations to address the diversity in a single sample of GSL water. The water sample was isolated from Bridger Bay in the GSL. The water sample was plated on the three different media and colonies isolated. Isolates were selected based on colony morphology. A portion of the water sample was centrifuged at 10Kxg for 10 minutes and then filtered through a 0.2-micron filter. The filtered water sample served as the phage source and was mixed with each isolate. The samples were inoculated in a 48-well plate. Growth was measured at 600 nm on a Tecan M200 multimode plate reader at 25 °C for 30 hours. Lysis by phage was detected by an initial increase in absorbance followed by a rapid decrease. Control isolates showed an increase in absorbance followed by a stationary phase. Confirmation of the phage infection was followed up by performing phage spot plates. Phage infections are noted by a zone of clearance. Host and phage identification are ongoing.

Title: In sickness and health: Student perceptions of viruses pre- and post- pandemic

Authors: Kayci K. Younger, Landon K. McKinnon, Jennifer L. Momsen, Lisa B. Wiltbank

Affiliation: Weber State University

Abstract: In 2020, the onset of the COVID-19 pandemic began to affect the way that the general public related to viruses. Suddenly, everyday conversations used terms like anti-virals, pandemic, transmission rates, and vaccines. In 2016 “before COVID-19 was on the scene” we were interested in what the general public knew about viruses and bacteria. To get at this information, we decided to survey students from general education biology classes about their knowledge of microbiology. These students were not biology majors. Half of the students received questions about viruses and half of the students about bacteria. We also distributed the same survey in majors and upper-level classes. By Fall 2020, the COVID-19 pandemic was a prominent topic on news media and at dinner tables. This led us to expand our study to incorporate the students' awareness of microbiology post-pandemic, with the hope that their knowledge improved. We decided to distribute the same survey to students in the same classes that we surveyed in 2016 to see if general knowledge about viruses had increased (n=614 students in 2016; n=379 students in 2020). In this presentation, we will present our findings of students' knowledge of viruses and bacteria pre- and post- COVID-19. Overall, in our efforts to compare 2020 to pre-COVID data, we found little evidence of differences in student knowledge or perceptions of viruses at the two timepoints. Interestingly, roughly half of the students surveyed in 2020 perceived that their knowledge of microbiology had increased from before the pandemic. We will present data summarizing our findings from a few key survey questions.

Title: Selective Media for the Isolation of *Paucilactobacillus wasatchensis*

Authors: Chase Wahlstrom, Matthew Domek, Michele Culumber and Craig Oberg

Affiliation: Weber State University

Abstract: *Paucilactobacillus wasatchensis* causes late gas defects in aging cheese. The ability to quickly and accurately isolate *P. wasatchensis*, especially when present at low concentrations compared to other bacteria in cheese, would benefit the dairy industry since the current protocol is time intensive and lacks sensitivity. The goal of this study was to develop a plating media to detect *P. wasatchensis* within 72 h when as few as 10^3 CFUs per gram are present while inhibiting competing starter lactic acid bacteria (SLAB) and nonstarter lactic acid bacteria (NSLAB). Carbohydrate restricted MRS (CR-MRS) media with varying concentrations of vancomycin and 2-deoxyglucose, a glucose analog that inhibits glycolysis was developed. Utilizing 5 SLAB and NSLAB strains along with the *P. wasatchensis* for each variable, CR-MRS broth containing 1% ribose, 2% Oxyrase and either .01% 2-deoxyglucose or various vancomycin concentrations was screened. Application testing was then conducted using CR-MRS agar plates containing 1% ribose, 5 mg/mL vancomycin, and various concentrations of 2-deoxyglucose (0.01-0.1%) incubated anaerobically for 72 h. Results showed WDC04 growth was not inhibited by the experimental medium, where SLAB and other NSLAB such as *Lactocaseibacillus casei* and *Lactocaseibacillus paracasei* showed limited inhibition and *Lactococcus lactis* was inhibited due to the 2-deoxyglucose and/or the vancomycin. However,

the media can be used to differentiate *L. casei* and *L. paracasei* from WDC04 since they appear as pinpoint colonies. Incorporation of 0.01% 2-deoxyglucose and 5mg/mL vancomycin into CR-MRS+1% ribose agar is a selective plating media for *P. wasatchensis* based on its selective and differential properties. This media could be used to determine the presence of *P. wasatchensis* in cheese when it is found in low concentrations (10^3 CFU per gram) versus the high concentration of SLAB (10^8 CFU per gram) that obscure its detection with current isolation techniques.

Title: Effects of the Flavonoid, Epicatechin, on Mitochondrial Respiration and Glucose-Regulated Glucagon Secretion in the Pancreatic Alpha Cell

Authors: Chad Mourino and Ethan Crawford

Affiliation: Brigham Young University

Abstract: Type 2 diabetic individuals have elevated blood glucose levels. This is caused by an inability of tissues like the muscle, adipose, and liver to sense insulin and remove glucose from circulation. Interestingly, the elevated blood glucose corresponds with increased circulating insulin and glucagon levels. The elevated insulin levels are due to compensation in response to target tissue unresponsiveness. The elevated glucagon induces the liver to undergo gluconeogenesis and continuously increase circulating glucose levels. Many foods contain flavonoids, and we previously showed that the flavonoid epicatechin is sufficient to enhance beta cell glucose-stimulated insulin secretion (GSIS) by enhancing beta cell mitochondrial activity. Increased insulin secretion, early in T2D, is sufficient to maintain normal blood glucose levels. Given that the mechanism for inducing beta cell insulin secretion and blocking alpha cell glucagon secretion are very similar, we hypothesize that epicatechin may be sufficient to keep glucagon levels in check over a wider range of glucose concentrations than normally occurs with glucose alone.

Title: Conserving parasites and their symbiotic microbes, keystone species in Great Basin Desert life zones

Author: Robert L. Bossard

Affiliation: Bossard Consulting

Abstract: Recognition of how pathosystems of parasites and their symbiotes in disease foci are keystone ecological engineers constitutes a revolution in our understanding of ecosystem function. Life zones, biomes, and specialized habitat such as caves are distinct biocenoses of plant and fungal parasites, plus animal ectoparasites, such as ticks, mites, mosquitoes, fleas, lice, and internal parasites such as tapeworms and nematodes, further associated with symbiotic microbiota of protists, bacteria, and the virosphere. Biomes show homeostasis, small-scale but affecting the biosphere in the Gaian "Daisyworld" sense of Locklock, undergoing reoccurring, fairly predictable successions after disturbance resulting in repeated species interactions, notably including those of endemic parasites with their hosts in co-evolved subgroup selection that can result counterintuitively in parasites benefitting their hosts. These indirect and third party interactions facilitate the "prudent parasite" paradox. Mistletoe parasitizing Juniper-Pinyon Woodland feeds birds, aiding seed dispersal of its hosts; woodrat (*Neotoma*) nests, shrews (*Sorex*) in Wetlands, and caves shelter complements of fleas and mites in nest and fur, helminths, trypanosomes, and apicomplexa; Alpine zone (above 3,000') harbors pikas (*Ochotona*) with mites and fleas (*Amphalius runatus*, *Ctenophyllus armatus*, *Megabothris abantis*), and invading rodent pathogens as climate warms. Processes such as predation stabilize population densities along with alternation between fragile dispersers and robust, resistant stages in a metapopulation, especially for insects with complex life cycles. Invasive flea-borne plague transforms landscapes by altering nutrient cycling and food chain length. Ecotones further connect biomes. "Fleas to Trees" hypothesizes that fleas and by implication, other parasites, regulate seed eating deer mice (*Peromyscus*), fostering seedlings, and regenerating forest after fires. In addition to the charismatic megafauna, flora, and pollinators, parasites too, and their symbiotes are critical for

conservation initiatives such as "30x30", 30% area conserved by 2030, and "Half-Earth", 50% of natural terrestrial and marine areas preserved.

Title: Characterization of metformin's repression of chemokine reduction in triple-negative breast cancer cells

Author: B. Drake Alton

Affiliation: Weber State University

Abstract: Numerous studies have demonstrated that the anti-hyperglycemia drug, metformin, exhibits both anti-proliferative and anti-metastatic effects on cancer cells. For patients diagnosed with triple-negative breast cancer, these in vitro effects are associated with life-prolonging outcomes in vivo. Although the anti-metastatic potential of metformin is striking, the mechanism by which the drug exerts this effect is unclear. Generally, the number of tumor-associated macrophages (TAMs) found in solid tumors portends poorer prognoses. TAMs are recruited to solid tumors not only by tumor-infiltrating stromal and inflammatory cells but also by tumor cells themselves. Tumor cell production of monocyte-recruiting chemokines has been well-documented for a number of cancer types, including triple-negative breast cancers. We hypothesized that metformin exerts its anti-metastatic effects, at least in part, by inhibiting tumor cell chemokine production. To test this hypothesis, two triple-negative breast cancer cell lines were treated with varying concentrations of metformin and at varying timepoints. Metformin treatment diminished the production of several key C-C chemokines as measured via real-time PCR.

Physical Science

Title: Particle Detector and Einstein's Theory of Relativity

Author: Sota Nakahama

Affiliation: Southern Utah University

Abstract: Einstein's Theory of Special Relativity was an invaluable contribution to modern science, turning the notion of an immutable time on its head. Einstein's Theory of Special Relativity theorized that as the speed of the object that has mass increases, time dilated. The implications of special relativity have been tested repeatedly and have always shown the theory's accuracy, but more testing does not hurt. In this work, we revisit the cosmic muon experiment that originally showed the accuracy of special relativity, but at higher altitudes, in order to see a corresponding shift in the number of muons detected. These results are then compared to theory to ensure that special relativity is indeed correct. To conduct this experiment, we are going to build a particle detector by using a scintillator and photomultipliers. This device will allow us to detect muons at a given altitude. The measurement given by the device will allow us to experimentally help show Einstein's theory's accuracy.

Title: PDMS Frit Fabrication and Applications

Authors: Kylee Stoddard, Christopher F. Monson

Affiliation: Southern Utah University

Abstract: Frits are filters that can remove micrometer-sized particulates from solution, and are typically fabricated from glass beads. We have developed a method to make frits by mixing magnesium particles and PDMS, a silicone elastomer, followed by magnesium dissolution. Our frits exhibit surprising abilities to remove large molecules from solution, at times showing the ability to exclude medium proteins and possibly smaller molecules. They are also more heat stable than traditional dialysis membranes, and so might offer significant advantages. Additional applications of the PDMS frits are being explored, including vesicle separation and superhydrophobicity.

Title: Investigating the effect of structural changes on optoelectronic properties of benzenoids and their boron nitrogen analogs

Authors: Benjamin A. Smith, Joshua Thomson, Michelle A. Chicas Aslett, Adam Cluff, Mitchell Asper, Lance Jagerson, Elena N Laricheva

Affiliation: Utah Valley University

Abstract: The bandgap is an intrinsic characteristic of a material that determines its electric conductivity and is linked to the optical gap energy. Depending on the magnitude of the bandgap (E_{gap}), all materials are classified as conductors ($E_{\text{gap}} < 3 \text{ eV}$), semiconductors ($3 \text{ eV} < E_{\text{gap}} < 10 \text{ eV}$), and insulators ($E_{\text{gap}} > 10 \text{ eV}$). Tuning the bandgap of 2D materials has long been a subject of great interest for their applications in nanophotonics and nanoelectronics.

Among known 2D structures, graphene and hexagonal boron nitride (h-BN) are especially promising. However, they are also some of the most difficult materials to engineer the bandgap in. Graphene is a zero-gap electrical conductor, while h-BN functions as a wide-gap insulator. Several strategies have been employed to open the bandgap in graphene and reduce the one in h-BN, with limited success. A complete understanding of the factors affecting the electronic structure and the bandgap in materials such as graphene and h-BN is still missing.

In this project, a series of benzenoids and their boron-nitrogen analogs with varying ribbon lengths (1-6 rings) and structural patterns (linear, zigzag, and helical) were investigated computationally. The structures, which serve as the prototypical building blocks of 2D materials such as graphene and h-BN, were optimized at the B3LYP level of theory with the def2-SVP and def2-TZVP basis sets. The calculated HOMO and LUMO energies were used to approximate the bandgap for each structure. Additionally, the UV/Vis spectra were computed using the time-dependent density functional theory (TD-DFT) to find the maximum of absorption (λ_{max}) that corresponds to the optical bandgap. The data analysis showed how changing structural patterns, extending ribbon length, and making atomic substitutions affects optoelectronic properties in graphene and h-BN-like systems.

Title: Preparation of Novel mono-, bis- and tris-ligated PyrOx-Ir complexes

Authors: Blake Woodward, Seth Smith, Matthew B. Prater

Affiliation: Southern Utah University

Abstract: Ir based complexes, particularly tris-bipyridine complexes, have been the subject of much study due to their unique photochemical properties. Such complexes have been used for photoredox chemistry, hydrogenation, and as a chemical sensor for hypochlorite ions. Coordination compounds of this nature are studied in intermediate inorganic chemistry courses. However, the ligand utilized in these experiments is often a symmetric diimine. We proposed the use of an asymmetric diimine ligand to form mono-, bis-, and tris-ligated Ir complexes. Formation of these compounds can be confirmed using analytical techniques such as UV-vis and IR spectroscopy, magnetic susceptibility and X-ray diffraction. Currently, efforts to characterize these complexes is underway.

Title: Direct One-pot Grignard Formation and Addition to Imine Electrophiles

Authors: Austin Flynn, Matthew B. Prater

Affiliation: Southern Utah University

Abstract: Alkylamines represent an important class of organic molecules that include biologically active natural products and pharmaceuticals. They are found in important compounds such as morphine, dopamine, DNA, and all proteins. The formation of alkylamines is crucial for the production of better medicines. The Grignard reaction is a well-known reaction consisting of a Grignard reagent and an electrophile. We plan to use an alternative form of the Grignard reaction to form alkylamines. The proposed reaction could make it easier for chemists to produce alkylamines. In Grignard syntheses, the Grignard reagent contains an alkane with a magnesium-halide bond. The dissociation of the magnesium and halide group allows for the alkane to act as a nucleophile to attack an electrophile. It has been shown that an alkyl halide, in the presence of magnesium, will cause the Grignard reaction to occur. After reviewing the literature, it is apparent that no reports exist of the production of amines by this method. We

propose to carry out the Grignard reaction to form alkylamines without prepared Grignard reagents by using only the alkyl halide and the presence of magnesium in the solution.

Social Sciences

Title: Is Confession Good for the “Soul”?

Authors: Sarah Foote & Emily Putnam

Affiliation: Brigham Young University & Salt Lake Community College

Abstract: This literature review investigates the role and impact of confession on psychological well-being. It investigates and differentiates between confession related to criminal behavior versus non-criminal disclosures that may also be described as confessionals. This literature review also examines the role of “confessions” in religion and the potential impacts on the confessors mental and psychological well-being. We also explore a psychodynamic perspective of the role of “confession” in bringing the unconscious to consciousness. Overall, this review examines the role of confessions in psychological interventions as well as in more forensic roles.

Oral Presentations

Arts

Title: Yankee Doodle Dandy: The Role of Yankee Doodle in the American Revolution

Author: Ethan Walton

Affiliation: Brigham Young University

Abstract: Every kindergartener throughout America is familiar with the with the timeless tune known as "Yankee Doodle." However, most adults do not recognize the significant role this song played before, during, and after the Revolutionary War. A simple children's song was once an anthem of triumph. Although originally written by Richard Schuckburg in the 1750s to mock untrained colonial militiamen, Yankee Doodle converted into a strong political statement against British oppression. The Americans took an insult and turned it into a weapon of morale warfare used against enemy forces. The American soldiers of the Revolutionary War set a valuable precedent regarding the power of music, the influence of attitude, and the vitality of resilience. By the end of the American Revolution, "Yankee Doodle" had converted into a manifestation of American determination. Without "Yankee Doodle" and the pattern it demonstrated, American victory may not have been possible. If a group of untrained, unprofessional militiamen could defeat the world's greatest superpower nation with the appropriate actions and reactions, what are their successors capable of? The proper attitudes and resilience can turn the worst circumstances into the most beneficial scenarios. Perspective is everything.

Title: Novel: Witchstead Chapter 1

Author: Kayla Todd

Affiliation: Weber State University

Abstract: Witchstead is a work of fiction that draws influence from authors such as J. R. R. Tolkien and J. K. Rowling, and it is meant for young adult audiences. The book takes place in a fictitious world and is set in a time period similar to our 1700s. In the first chapter, the main character, who is the daughter of a small town farmer, is summoned to take part the annual Testing along with the rest of her age group. When she unexpectedly passes the Test, she finds herself forcibly separated from her family and everything she knows to attend Witchstead Academy, where she will grow in her newfound abilities.

Title: Immigrants and Indigeneity in the Original "West Side Story" Film

Author: Thomas Jenson

Affiliation: Brigham Young University, Provo

Abstract: The 1961 film version of *West Side Story* at first glance presents a dichotomy between

immigrant Sharks and native Jets, or the two gangs battling for turf on the West Side of Manhattan in the 1950s. The film goes on to unsettle that dichotomy by emphasizing the Sharks' origins in Puerto Rico, a territory of the United States, and by exposing the foreignness of the Jets, whose parents immigrated from Eastern Europe. While most of the critical discussion around *West Side Story* focuses on the film's exoticization of the Sharks, my analysis points out how the systems of power do not endorse the Jets as fully American either. As the Sharks and the Jets grapple with contradictory standards of ethnic citizenship, *West Side Story* unravels what it means to be native to America. Ultimately, I argue that the film makes two moves. First, it establishes a hierarchy of ethnic groups with native Anglo-Americans on top followed by European immigrants and then Puerto-Rican immigrants. The second move is to use that ethnic hierarchy to justify the displacement of foreigners under the banner of urban renewal. While the Sharks and the Jets fight over the streets amongst themselves, bickering over who is more American than the other, a more sinister force lurks behind them in the form of city planners. The rumble between the gangs, which leaves them in pieces, opens the door for an outside force to enter and "clean up" the streets; the death of so many characters suggest the dysfunction of immigrant communities and the necessity of slum clearance.

Title: Haunting Shadows

Author: Jenessa Trimble

Affiliation: Weber State University

Abstract: Ian Holmes, an Army veteran, suffers from PTSD that is mediated by the presence of his psychiatric service dog Sasha. Sasha's skills are tested when Ian, thrown off-balance by a difficult morning, is triggered during a seemingly-simple trip to the mall. A polyphonic short story, "Haunting Shadows" alternates between the perspectives of Ian, his therapist, his friend Kylie, and Sasha.

Biological Sciences Oral Presentations

Title: Hand Dryers Serve as a Reservoir for Antibiotic-Resistant Bacteria

Authors: Ashlynd Greenwood, Colette Mortensen, Michele Culumber, and Craig Oberg

Affiliation: Weber State University

Abstract: Automatic hand dryers at Weber State University were installed in most restrooms to improve convenience, decrease paper waste, and increase hygiene. However, previous research has shown hand dryers act as a reservoir for pathogenic bacteria. The purpose of this experiment was to isolate bacteria from hand dryers, characterize their antibiotic resistance profiles, and then identify these bacteria. Hand dryers from 32 high-traffic restrooms in four buildings were sampled. A 10 cm² area at the bottom of the drying chamber was sampled using a 3M Quickswab. Swabs were used to inoculate MSA, TSA, EMB, and SBA plates, which were incubated at 37°C for 24-48 h with 73 isolates selected. Isolates were transferred to TSB broth and grown at 37°C for 24 h then screened for resistance to five antibiotics; ampicillin, vancomycin, tetracycline, penicillin, and chloramphenicol utilizing the Kirby-Bauer method. Isolates that showed antibiotic resistance were identified using 16S rRNA gene sequence analysis. Forty-four isolates showed resistance to one antibiotic with 42 resistant to at least two antibiotics. The majority of the isolates were resistant to penicillin, but a few were also resistant to vancomycin. The most common isolates among the penicillin-resistant organisms were common human commensal *Staphylococcus sp.* including, *S. warneri*, *S. intermedius*, *S. saprophyticus*, and *S. aureus*. We also found representatives of environmental bacteria including *Bacillus pumilus*, *B. velezensis* and *B. subtilis*. Less common were Gram-negative bacteria including *Enterobacter hormaechei* and *Mixta calida*. All identified species have the potential for opportunistic infections. We have shown that antibiotic-resistant bacteria are present in electric hand dryers and may represent a significant source of community-acquired antibiotic resistant infections. To prevent bacterial contamination and the spread of antibiotic resistance during hand drying, the hand dryers' inner chamber should be thoroughly cleaned with a

disinfectant on a daily basis.

Title: Amino acid decarboxylation is a potential source of CO₂ production in cheese by *Paucilactibacillus wasatchensis* WDC04.

Authors: Kate Sorensen, George Barrera, Michele Culumber, Matthew Domek, Craig Oberg, Taylor Oberg, and Donald McMahon.

Affiliation: Weber State University

Abstract: *Paucilactobacillus wasatchensis* (WDC04) is a non-starter lactic acid bacterium that is linked to unwanted late gas production in cheddar cheese. Recent research has shown that this organism has the capability of utilizing the pentose phosphate pathway, following the removal of CO₂ from a 6-carbon sugar, such as galactose. However, WDC04 has still been known to produce splits and cracks in cheddar cheese in the absence of these sugars. In cheese production trials, more CO₂ is released than can be accounted for by added carbon substrates. One possible source of gas production could be the decarboxylation of free amino acids with the formation of biogenic amines. The ability of lactic acid bacteria to decarboxylate amino acids varies greatly but can be used to generate proton motive force. Putrescine and cadaverine, the decarboxylation products of ornithine and lysine respectively, have been detected in cheese inoculated with WDC04. The purpose of this study was to determine if lysine and ornithine could be utilized for growth by WDC04 and if decarboxylation would lead to gas production. The incomplete *P. wasatchensis* WDC04 genome (GenBank accession number GCF_000876205.1) was analyzed for decarboxylation enzymes. In this research, an ornithine decarboxylase was found, but a lysine decarboxylase was not. Carbohydrate-restricted MRS (CR-MRS) with 100-700 mM of lysine or ornithine was inoculated with *P. wasatchensis* WDC04 in 24-well plates and incubated at 30°C. Oxyrase (2%) was added to create anaerobic conditions. Growth curves were monitored by measuring turbidity over 72 h on a Tecan Infinite M200 plate reader. Without the addition of ribose (1%), neither amino acid supported growth above the media alone. However, amino acid decarboxylation may still be the source of excess CO₂ production without the amino acids being used as a growth substrate. Further culture-based analysis will determine if the amino acids contribute to gas release by *P. wasatchensis* WDC04.

Title: Maintenance and Expression of Redundant Carbapenem- Resistance Mechanisms in the Prolonged Absence of Antibiotic Pressure

Authors: Taalin Hoj, Allison Brower, and Richard Robison

Affiliation: Brigham Young University

Abstract: Constant exposure to antibiotics in a hospital setting creates an environment that encourages bacteria to acquire and maintain antibiotic resistance mechanisms. The most difficult to treat of these resistant bacteria are Carbapenem-Resistant Enterobacteriaceae (CRE), which are resistant to last resort antibiotics such as carbapenems.

Previous studies have indicated that a prolonged absence of antibiotic pressure will reduce antibiotic resistance in resistant strains, as bacteria are extremely efficient at maintaining and expressing only necessary genes. This raises the question as to whether strains with multiple resistance mechanisms will maintain redundant mechanisms in the prolonged absence of antibiotic pressure. We aim to answer if and how quickly strains lose resistance, and the mechanism by which such loss occurs.

Two clinical CRE isolates with multiple resistance mechanisms (Strain 1: NDM, CMY, OXA-2, TEM, ompF; Strain 2: NDM, CTX, CMY, OXA-2, ompF) were grown from April-October 2021 in the absence of antibiotic pressure. During this time, minimum inhibitory concentrations (MICs) to doripenem and aztreonam were performed to measure loss of resistance. PCR was performed to measure either loss or downregulation of resistance mechanisms.

MIC data indicated that both isolates gradually lost resistance over time, but never became fully susceptible to either antibiotic. qPCR data from strain 1 indicated an 8.71-fold drop in the number of CMY DNA copies from April to July 2021, and a 22.69-fold drop from April to August 2021. This presents a possible explanation of the loss of the resistance phenotype, in that

fewer gene copies were present during prolonged absence of antibiotic pressure. PCR data indicated no downregulation or loss of *ompF*, which may explain the incomplete return to a fully susceptible resistance phenotype.

Title: Exploring Environmental Reservoirs for *Paucilactobacillus wasatchensis*

Authors: Niharika Mishra, Michele Culumber, Karen Mann, and Craig Oberg

Affiliation: Weber State University

Abstract: *Paucilactobacillus wasatchensis* is a NSLAB preferentially utilizing ribose sugar, which can liberate carbon dioxide from six carbon sugars such as galactose. This organism is a primary cause of late gas defect in cheese resulting in post processing problems and consumer rejection. *Paucilactobacillus wasatchensis* is a contaminant in the cheese industry but its environmental source is unknown. Previous work showed *P. wasatchensis* does not survive pasteurization and microbial surveys of cheese manufacturing facilities have not detected *P. wasatchensis*, yet closely related organisms have been isolated from silage and compost. We hypothesize that *P. wasatchensis* resides in the environment around the dairy cows and contaminates milk during the milking process. Samples of corn silage, hay silage, pre-compost manure, post-compost manure, and sugar beetroot pulp were collected at the USU Caine Dairy Farm. Samples were homogenized, diluted, and plated on two agar media (MRS + 1% ribose and MRS + 1% ribose + 10 µg/ml vancomycin) and incubated anaerobically at 25°C. Visible colonies were marked on plates after 2 d, and then plates were incubated for 7 d. Unmarked colonies were selected and incubated in gas detection broth (MRS + 0.3% ribose + 0.7% galactose) containing a Durham tube for 72 h to identify gas-producing isolates. The 16S rRNA gene from these isolates was analyzed using BLAST. While *P. wasatchensis* was not found in the samples, isolate PCR2 from pre-compost samples was 94.98% similar. API 50CHL results for PCR2 indicate the organism was a closely related species. Analysis of DNA extracted directly from the same environmental samples using 16S rRNA gene sequencing also showed negative results for *P. wasatchensis*. Our results did not find *P. wasatchensis* in any silage or compost samples, which have been suggested as the source of this organism based on the previous isolation of closely related species (*P. hokkaidonensis* and *P. vaccinostercus*).

Title: Physio-chemical basis of high salinity tolerance in an obligate halophyte *Suaeda fruticosa*

Authors: Abdul Hameed¹, Bilquees Gull¹, and Brent L. Nielsen²

Affiliation: 1) Dr. Muhammad Ajmal Khan Institute of Sustainable Halophyte Utilization, University of Karachi, Karachi, Pakistan; 2) Department of Microbiology & Molecular Biology, Brigham Young University, Provo, Utah

Abstract: A thorough understanding of salinity tolerance mechanisms of halophytes, the natural flora of saline habitats, could benefit efforts to breed salinity-tolerant crops. This is important for crop production in saline soils, and is an uphill task as there are still many unanswered questions about salinity tolerance. We examined growth, water relations, ion homeostasis, photosynthesis, and oxidative-stress mitigation responses of an obligate halophyte *Suaeda fruticosa* to increasing salinity. Most growth parameters increased in moderate salinity (300 mM NaCl) with effective osmotic adjustment and accumulation of Na⁺, which did not accompany nutrient deficiency, damage to photosynthetic machinery, or oxidative damage. In contrast, high salinity (900 mM NaCl) caused some reduction in growth, which coincided with a decline in sap osmotic potential and higher Na⁺ accumulation. However, Na⁺ buildup under high salinity did not cause a decline in relative water content, maximum quantum yield of PSII, or increase in oxidative damage (H₂O₂ and MDA). Hence, it appears that physio-chemical modulations enable *S. fruticosa* to grow optimally under moderate salinity, while growth reduction in high salinity might be the result of increased energetic costs rather than ionic toxicity.

Title: A Longitudinal Study of Acceptance of Evolution in a University Setting from 2011-2021

Authors: Sawyer T. Baum & T. Heath Ogden

Affiliation: Utah Valley University

Abstract: Acceptance of evolution has been increasing among the general population in the United States over the last decade (2010-2020), increasing from 40% to 54%, or even 80%, depending upon the format of the question (Miller et al., 2021; Miller et al., 2006; Pew Research Center, 2019). Many factors influence the acceptance of evolution, including education, role models, religion, age, and the format of the question (Ecklund, 2017; Dagerher & BouJaude, 1997; Holt et al., 2018; Miller, 2008). The objective of this study is to evaluate the long-term trends of evolution acceptance of students in a public open-enrollment university (as an overall representation of the general public). This study used surveys taken from Introductory Biology classes (non-majors) at a large public university in Utah from 2011-2021. Students were asked to fill out the survey prior to the semester's instruction and towards the end of the semester. We found that the proportion of students who accept evolution increased from 25% in 2011 to 44% in 2021 prior to any instruction. Using a forecast model, if current conditions and trends were to remain the same, the positive trend would continue with an estimated 53% of the participants accepting evolution in 2025

Business

Title: Seasonality of Frequency and Intensity in Consumer Complaints: A Sentiment Analysis Approach

Authors: Reagan Siggard, Yong Seog Kim

Affiliation: Utah State University

Abstract: Is there a time of year when consumers are more intense in their complaints regarding financial products and services? Consumer complaints and reviews are pervasive in current competitive digital marketplaces as they provide consumers with valuable information about services and products. Consumers may refrain from purchasing items when they find strong negative reviews more frequently than positive reviews. At the same time, consumer behavior is known to be affected by seasonal changes and events. This temporal imbalance phenomenon of consumer shopping behavior is often expressed in total sales or other key performance indicators. This phenomenon forces many business entities to develop their marketing and operational strategies around shifts in consumers' seasonal needs.

This abstract presentation focuses on detecting the seasonality of frequency and intensity in consumer complaints of financial products and services over multiple years using data obtained from the Consumer Financial Protection Bureau (CFPB). Our research focuses on temporal patterns and their potential relationship with seasonal dynamics by measuring the change in the number of positive and negative complaints and the emotional intensity of the complaint narratives. Our analysis finds that seasonal patterns of frequency of consumer complaints differ from the intensity of the narratives. We also observed twice as many positive narratives as negative ones; however, the overall sentiments of the narratives on temporal checkpoints (e.g., monthly and quarterly) were negative due to many strong negative complaints. Additionally, we identify root causes across all quarterly dimensions that affect the frequency and intensity of complaint narratives.

The purpose of our abstract presentation is to provide an overview of the data collection process used to retrieve and store the 160,490 consumer complaint narratives from the CFPB, demonstrate our text mining and sentiment analysis processes, and provide insight and recommendations into seasonal dynamics and consumer complaints in the financial product sector.

Title: Graduate School Admission Webpages: Analysis of Marketing Messages for Gendered Marketing Themes

Authors: Paige Gardiner, Madison Johnson, Dalton Droubay

Affiliation: Southern Utah University

Abstract: Great strides have been made by American graduate business and law schools to recruit and graduate competitive female students. Increasing marketing messages about program format options, positive career outcomes for women, and programs that bridge the gap between undergraduate programs and graduate programs have persuaded more female students to apply to graduate school. As the number of female students attending graduate business and law schools is reaching parity with male students, will these female-gendered marketing messages continue to be used to recruit female students? Our research aims to understand how business and law schools in the Western United States market to female students through the graduate school admission webpage. To understand gendered marketing messages for business and law graduate students, we provide a review of the literature regarding female graduate school choice model, perceived influence of the graduate website admissions page, and gendered marketing messages. Next, using a qualitative media analysis, we examined 25 business and law schools in the Western United States for frequency and type of gendered college choice marketing messages. As the number of female and male graduate business and law school students reaches parity, we offer conclusions, implications, and ideas for future research that will continue to market and promote prospective female students to apply to graduate business and law school.

Title: Business Ethics Education in Utah: A Look at Higher Education

Authors: Chelsea Dye, Dara Hoffa, Ron Mano (posthumously)

Affiliation: Westminster College

Abstract: Utah suffers from the dubious nickname of “The Fraud Capital of the World” time and again. Utahans have fallen prey to the unethical practices of fake practitioners and suspicious swindlers. In recent years, the State of Utah implemented several different programs to shed that moniker, working mainly from the consumer angle. This paper takes a preventative approach, through the examination of business ethics education in Utah’s colleges and universities. This paper examines the importance of ethics education, the unique situation of higher education in Utah, and provides a detailed breakdown of how ethics are taught in the state, concluding with recommendations on how to move forward.

Title: Elderly Abuse Fraud--A Forensic Accounting and Legal Case

Presenter: Jeff Davis

Authors: Jeff Davis, Hal Davis

Affiliation: Weber State University, Davis & Sanchez, PLLC

Abstract: Fraud is a challenge in the world today. One of the most heinous ways to commit fraud is by elderly abuse. This article explains an actual elderly abuse fraud case of a gentleman who suffered from short-term memory loss likely from some level of dementia. The article tells the actual story of the people (no real names), events, transactions, financial and legal issues, and outcome of the case. The article also discusses the events that led to the investigation. The article provides the investigative processes that were used to obtain forensic evidence in support of the legal facts and issues of the case and that led to the final outcome from a legal standpoint. The article lays out the fraud as related to the fraud triangle, which includes (1) an opportunity or access to assets and or accounting records, (2) a perceived need, and (3) rationalization of the fraudulent actions. Finally, the article presents some suggestions as to how the elderly might be protected from some financial abuse.

Title: Data Science and Analytics: A Data Driven Decision Making Approach for Business

Author: Amar Sahay

Affiliation: Salt Lake Community College

Abstract: Data science - a data driven decision making approach is the most desired field in driving business decisions. Using Data Science, decision makers extract insights and knowledge from structured and unstructured data, develop algorithms and models that help improve processes and make key business decisions. The models are widely used in data-driven decisions, machine learning and predictive analytics to predict future outcomes. This paper

explores the key topics in Data Science & Analytics and provides an overview of: (i) Data Science's scope, its evolution, and its relationship with other disciplines, (ii) an overview of the field of Business Intelligence (BI) that investigates historical data to better understand business performance; thereby, improving performance, and creating new strategic opportunities for growth, (iii) Business analytics (BA) and the three major categories of business analytics, the descriptive, predictive, and prescriptive analytics, along with advanced analytics tools explained using flow diagrams outlining the tools of each of the descriptive, predictive, and prescriptive analytics, (iv) Overview of most widely used Predictive Analytics models including regression, classification, forecasting, data mining and machine learning based models and applications, (v) Business Analytics, Business Intelligence (BI) and their relation to Data Science, (vi) Data Science and Software Tools in Data Science and Analytics, (vii) Data Visualization using Excel and other software, (viii) Statistical Tools in Data Science's Inferential and Probability Concepts, (ix) Overview of Machine Learning and R-statistical Software in Data Science.

The paper is motivated by the booming interest in Data Science and Business Analytics. It explores the key models and applications in both areas.

Title: Bracketed Difference-in-Difference Estimation to Measure the Effect of Medical Marijuana Laws on Violent Crime

Authors: Julian Chan, Gavin Roberts, Anthony Frazier

Affiliation: Weber State University

Abstract: The difference-in-differences (DiD) model is a popular statistical model in economics that can estimate the effect of a policy on an outcome variable. It is often difficult for researchers to assess the validity of the assumptions of the DiD model when using observational data.

Hasegawa et al. introduce a bracketed DiD approach that provides an unbiased interval estimate of the treatment effect in some such cases when the influence of the confounder in certain situations. We implement these DiD approaches to estimate the effect of Medical Marijuana Legislation (MML) on violent crime rates. Recent estimates of the effect of MML on violent crime rates vary significantly.

Title: Academic Success and Comparison of Beginning, Intermediate, Senior, and Graduate Accounting Students: Self-Assessment of Self-Efficacy, Emotional Intelligence, Self Determination and Regulation

Author: Jeff Davis

Affiliation: Weber State University

Abstract: A rich history of research in self efficacy (SE), emotional intelligence (EI), self-determination (SD), self-regulated learning (SRL) indicates students have better academic success when they perceive that they have higher levels of SE, EI, SE, and SRL. Some of this research also indicates professionals in the workplace also benefit from having perceived higher levels of these same cognitive constructs. This article explains and analyzes the results of a survey given to accounting students in different class levels (beginning (B), intermediate (I), senior (S), and graduate (G)) as they prepare for a career in accounting and business. The survey questions provide a measure of a respondent's levels for each of these cognitive constructs (Bandura, 1977; Schwarzer and Jerusalem, 1995; Mayer, et. al., 2004; Gagne and Deci, 2005; Pintrich and DeGroot, 1995). As students gain more experience in college, their levels of SE, EI, SD and SRL learning should typically improve as they navigate their college training. The course grades are analyzed in relation to students' measures of SE, EI, SD, and SRL at each class level (B, I, S, G). A 4X4 ANOVA ({SE, EI, SD, SRL} X [B, I, S, G]) is proposed as to predicting course grade. Understanding the relationship of SE, EI, SD and SRL to grades can help instructors suggest ways that students can navigate more successfully their college preparation for a career. More research needs to be done to isolate any confounding variables in relation to improved grades or lack of improved grades as a measure of academic success.

Title: Desired Leadership Traits in First Bosses: A Study of Extant Leadership Theories

Using Generation Z College Students**Authors: James Brau, Jameson Brau****Affiliation: Brigham Young University, Gonzaga University**

Abstract: In this paper we document the extant theories of business leadership and partition them into main threads (e.g., Great Man Theory, Trait Theory, Contingency Theory, etc.) Next, we examine the socio-cognitive literature on Generation Z and formulate hypotheses of desired leadership traits in first bosses. We then conduct a comprehensive survey gathering data from 700+ undergraduate college students, asking them what preferred traits they would like to have in their first boss upon graduating from college. Empirical analyses are then conducted to test the various hypotheses pertaining to the extant leadership theoretical camps.

Title: Setting Context and Expectations in Adult Education**Author: Todd J. Wentz****Affiliation: Ensign College**

Abstract: Malcolm Knowles insights into how adults prefer to be engaged in instructional environments are well known, but some opportunities for application of these insights are missed due to an emphasis on pedagogical techniques in teacher and instructor training programs. While vital, pedagogical approaches may be insufficient to engage the most driven or demanding of adult learners. A simple three question exercise has been demonstrated to open the student to the context of a course of information and to provide a framework of respect and inclusion for all participants regardless of previous educational or professional exposure. This presentation will walk through some real life examples of how this process has benefited educators and students and successfully set the stage for better engagement and learning for university-level students.

Title: An Econometric Analysis of Inventory Turnover: Expanding the Gaur, Fisher, and Raman (2005) Three-Factor Model Up and Down the Supply Chain**Authors: James Brau, Rebekah Brau, Joe Henry, Peter Christensen****Affiliation: Brigham Young University, Rowan University**

Abstract: Gaur, Fisher, and Raman (2005) present a three-factor model to explain inventory turnover within firms. To the three factors of Gross Margin ((sales-COGS / sales), Capital Intensity (GFA / [AvInv+GFA]), and Sales Surprise (sales / expected sales)), we add factors for the inventory turnover of firms above and below each firm in the supply chain. We test two hypotheses, the JIT Displacement Hypothesis, specifically that suppliers and customers have negatively-correlated inventory turns [$\rho(\text{ITC}, \text{ITS}) < 0$] and the JIT Integration Hypothesis, that suppliers and customers have positively-correlated inventory turns [$\rho(\text{ITC}, \text{ITS}) > 0$]. Our empirical evidence provides general support for the JIT Integration Hypothesis, although with some intertemporal nuance.

Title: An Econometric Analysis of Diversity: Perceptions of College Students towards Corporate Social Responsibility Metrics**Authors: James Brau, Jameson Brau****Affiliation: Brigham Young University, Gonzaga University**

Abstract: The focus of this study is to examine college student perceptions of diversity issues in a business setting. We use a sample of 1,149 students and ask questions pertaining to how important diversity is in their ideal first job. The dependent variables are derived from a corporate social responsibility database and focus on diversity issues. We employ a set of econometric tests to find correlations between demographic independent variables and six dependent variables as well as an aggregate Diversity Index dependent variable. The tests show that gender and political affiliation are robustly correlated with the dependent variables.

Title: Global Commercial Civilization**Author: Edward G. Engh****Affiliation: Salt Lake Community College**

Abstract: Earth operates under a single Global Commercial Civilization (GCC) which continually evolves, growing as the roots of a tree weaving around obstacles. Humanity is a social organism sustained by commerce. Traditional national and institutional systems are becoming obstacles to commerce. National, political, social, and ideological institutions struggle to find a useful way to contribute, while some show signs of decay and obsolescence. A de-facto world state exists as a Global Commercial Civilization, not as a traditional nation state or aggregation of states.

Commerce is a global process of attraction within and between communities, drawing them together; whereas War and Ideology tend to repel. Commerce attracts from a distance, while fostering civic-virtue, formation of democratic institutions. War infects with the urge to use violence, and ideology often infects with intolerance and animosity. Commerce fosters democratic and republican forms of political discourse. Trade fosters intellectual commerce of knowledge, technology, civility and liberal education, challenging ideologies and nations who would otherwise resort to war. Commerce becomes a teacher of the world; engendering trust. Commercial Republics and Democracies form new institutions to protect trade, by which the commercial civilization survives. Commerce becomes decadent thru centralization and privatization of interests, when former trading communities are alienated from each other. Communities and institutions struggle to catch up with facts. Global Commercial Civilization (GCC) is a physical and social reality. Commerce may have had greater evolutionary influence than either War or Religion. Physical and social facts of global commerce and civilization are described.

Title: A Framework for Incorporating CFA and CFP Preparation Courses in an Undergraduate Finance Major

Authors: James Brau, Taft Dorman, Peter Marshall, Stephen Owen

Affiliation: Brigham Young University, Brigham Young University - Idaho, University of North Texas

Abstract: Academic research on the Chartered Financial Analyst (CFA) and the Certified Financial Planner (CFP) programs spans from Hamilton and Marshall (1987) through Grieb, Noguera, and Trejo-Pech (2021). In this paper we extend this thread of literature by presenting a framework for providing a CFA prep program and a registered CFP program at the university level without a heavy professor burden. We highlight two programs that exist at a large, US university located in the west. The first program started in 2010 when Dr. Andrew Holmes began a CFA Level 1 prep course as an advanced finance elective. The school pass rates range from 56% to 100% with the national pass rates ranging from 38% to 43%. Annual differences between school pass rates and national pass rates range from 18% to 57%. The university prep program outperforms the national pass rate in every year. The first part of our paper discusses the CFA prep program and how it can be applied at the MBA and/or the undergraduate level.

The second part of the paper discusses the CFP program, which began in January 2021 at the university when Dr. Jim Brau obtained registered status for the CFP curriculum. Unlike the CFA, which can be taken without completing a registered educational program, the CFP requires a CFP Board-approved registered program. The university officially became CFP-registered in December 2020. No student has taken the CFP exam for record, and so we do not have a table of results.

The last section of the paper covers the professional development activities at three separate universities in the context of the CFA and CFP. Activities such as Meet the Advisors Night, NetTreks, Case Competitions, and student-managed funds are discussed. We present student job placement data that results, at least in part, from these professional development activities.

Title: The (non-existent) Effect of Video Gaming and Social Media on Academic Performance

Authors: Heber Brau, Jim Brau, James Gaskin

Affiliation: Brigham Young University

Abstract: Prior research by Brau, et al. (2016, 2017) identifies factors that correlate with university student course grades. We employ the same research structure as the Brau, et al. papers with the innovation of adding dozens of questions that deal with video game and social media usage. Extant research argues that time spent on video gaming and using social media can: 1) hurt student grades, 2) help student grades, or 3) have no impact on student grades. We test the video game and social media impact hypotheses using a survey of over 500 college students in an Introduction to Information Systems course at a large, private, US university. Methodologically, we employ univariate and multivariate testing with course grade as the dependent variable and a set of video game, social media, and control variables as independent variables. Our results indicate that for this sample period (2019-2020), neither video game usage nor social media usage significantly impact course grades.

Education

Title: Policies and Practices for Supporting Secondary Multilingual Learners-Teacher Perspectives

Authors: Marilee Coles-Ritchi and Alondra Miranda

Affiliation: Westminster College

Abstract: This study explores the perspectives of secondary public school teachers whose primary responsibility is supporting multilingual learners (MLs). Approximately 10 percent of all students in the United States are MLs or English Learners (ELs). Despite the need for research there is a gap around the literature focusing on the experiences and issues teachers face when teaching MLs in a secondary school environment. Research that is available points to inequitable policies and practices that result in lower graduation rates and achievement gaps for secondary MLs. To better understand this phenomena, the researchers used qualitative methods to explore the perspectives of English Language development (ELD) teachers within secondary schools based on research of effective practice and policy. Data were collected through in-depth, semi-structured interviews with secondary teachers in a metropolitan area of the western United States. By analyzing the data with the constant comparison method, the following findings arose; 1) content teachers often do not have the background knowledge and/or take the time to learn teaching strategies that support MLs; 2) tension arises when planning programs with courses specifically designed for MLs for fear of separating MLs from mainstream classrooms; 3) requiring standardized testing as the sole instrument for MLs program placement can result in long-term ELD placement and a lack of support. Based on the data collected, the authors suggest specific policies and administrative support for teachers of MLs.

Title: Story in the Stars

Author: Belinda 'Ofakihevahanoa Fotu

Affiliation: Utah State University

Abstract: Past, present, and future stories are important devices for transferring culture and knowledge while connecting communities. Narratives of self are apparent in the types of stories we tell each other as well as the venues in which we tell them. In this autoethnography, I investigate specifically through a Tongan-American lens the community built through stories: ancestors ancient and living as well as those outside of the Tongan-American culture. This is especially relevant for members of the Tongan-diasporic community born into or living within land-locked states. Situated spaces and storytelling play an important role in the success of a Tongan-American storytelling: the diasporic execution and reception of generational stories, parental advice (akonaki), or reciprocal conversations (talanoa). Contexts of audience and venues disrupt those spaces. This disruption is the most true space for Tongan-American learning, as we navigate generational promises and expectations that cross continents, mingling with the immediate demands of westernized systems of knowledge reproduction. Online learning and family separation due to the ongoing Covid-19 pandemic further complicate and redefine these interactions. I develop the concept of vahano as an important liminal destination and throughway

Tongan-Americans constantly navigate using wayfinding techniques that include storytelling over stages, at kitchen counters, across pillows, and through the internet. It is the space Tongan-Americans constantly cross in learning pathways that pay credence to both family and state demands. Implications of this study include the need for educators to adjust learning spaces to better integrate epistemologies and learning strategies that feature strengths of community and genres of literacy-building centered in Polynesian epistemologies of respect, sacrifice, and humility. With the opportunity to create new digital spaces in online learning, educators can restructure curriculums to better include access to storytelling platforms that magnify the literacy strengths of students often marginalized in traditional classrooms.

Title: An Exploratory TribalCrit Analysis of Educators Rising's Role in Teacher Recruitment

Author: William J. Davis

Affiliation: Southern Utah University

Abstract: Utah consistently contends with teacher staffing challenges, which have made teacher recruitment a pressing issue in the state. In recent years, Utah's grow-your-own initiative has been expanded into high schools, through the development of curriculum standards for the state's secondary-level Teaching as a Profession (TAP) courses as well as through the involvement of Educators Rising. A nationwide nongovernmental entity that claims to promote a community-based model of teacher recruitment, Educators Rising partners with state career and technical education offices, marketing itself in Utah as a career and technical organization for TAP students (akin to Future Farmers of America and students interested in agricultural education). Separating TAP from Educators Rising is difficult. TAP teachers must complete Educators Rising New Advisor Training to obtain an endorsement, and the summer TAP conference involves several training modules on establishing chapters and participating in Educators Rising. For indigenous people to enter the teaching profession through Educators Rising is to subject themselves to a (re)colonization into white Euro/Americentric thinking, knowledge, and power structures. In this paper, I analyze Educators Rising through its publicly available documents and web sites using Tribal Critical Race Theory (TribalCrit). TribalCrit includes nine tenets, three of which can easily be illustrated using Educators Rising. By promoting microcredentials' skill certificates awarded in exchange for a review of documents and a fee' Educators Rising uses secondary students by transforming their teacher learning into material gain. The Educators Rising standards and microcredentials require assimilation to Euro/Americentric forms of teaching like the data-driven plan-teach-assess-reflect cycle and anti-bias instruction. Although Educators Rising's standards cast students as change agents, it is difficult to see how paying for credentials and teaching using assessment data will affect change. To pursue teaching the Educators Rising way is to submit to colonization, assimilation, and a sterile view of culture and diversity.

Engineering

Title: Thermodynamics Experiment: Adiabatic Compression of Air

Authors: Toby McMurray and Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: Thermodynamics concepts are complicated and hard to understand. In the undergraduate mechanical engineering lab, we studied and built a thermodynamic cycle of ideal gases. In this study, air was considered as the working fluid. The experiment was conducted by compressing and expanding air in a sealed container (two-liter pop bottle). This process is complicated, but breaking down the ideal gas processes as adiabatic and isometric will simplify it to demonstrate the concept. This simplified model was applied to predict the ratio of specific heats of air (c_p/c_v). The results for the air were very close to the published value of air specific heat ratio.

Title: Inward Melting in Cylindrical Coordinate System Part 1 – Analytical Solution (Derivations)

Authors: Jordan Whitlock and Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: This research is the continuation of last year's undergraduate research concerning the experimental and analytical solution to the inward melting in the cylindrical coordinate system at Southern Utah University (SUU). The phase change material is Eicosane (paraffin, $C_{20}H_{42}$) with a melting point of $36.5^{\circ}C$. Up to this point, the experiment has been performed to collect melting data from $50^{\circ}C$ to $1^{\circ}C$. Previously, we evaluated the performance of eicosane for releasing thermal energy (melting). The scope of this project includes (I) Analytical solution of the inward melting which includes the conservation of mass, momentum, and energy; and (II) apply the scale analysis to validate the experimental results. In part (I), we successfully derived the analytical solution for the conservation equations.

Title: Transient and Steady-State Heat Transfer Analysis of Long Aluminum Fin

Authors: Lee Lorimer, Alicyn Astle, Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: There are several important concepts in heat transfer, including conduction, convection, and radiation. Most heat transfer analysis is assumed one dimensional, steady-state, and uniform, if possible. These simplifications make solving complicated problems easier. Convection heat transfer is enhanced by enlarging the surface area and exposing it to the surrounding fluid, air. This can be done by adding fins. Fins are often used to cool down or heat devices over a broad range of industries. Fins are highly conductive and made from various materials like aluminum. The purpose of this experiment is to analyze the heat transfer throughout a fin, an aluminum rod suspended in air, assumed to be infinitely long (the end of the rod is at room temperature). This is done by using experimental data and known transient and steady-state heat transfer equations for a fin, to predict the temperature profiles. Then to get an accurate heat transfer coefficient the value can be found by changing the value until the temperature curves match. The value found for the natural convection heat transfer coefficient was 10 (W/(m.K)) . The temperature profiles between the theoretical and measured steady-state were compared and the average difference between them was 1.34. The transient state was also compared and the average difference between all the nodes was 0.2912. The difference values between both the steady and transient states are extremely small and show that the data gathered was correct.

Title: Transient and Steady-State and Transient Analysis of a Fin Under Water

Authors: Mitchell Halverson, Kobe Potter, Floyd K Kimber, Jordan Whitlock, Jathen Chaffin, Cameron Dix, Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: This paper describes an analysis that was performed on a fin underwater to better understand the convective coefficient of heat transfer, h , while giving experience into real-life engineering projects. The experiment was set up by making an aluminum fin using an aluminum plate and rod, where the rod is submerged in a plastic tub filled with water and the plate is heated via a heating pad outside of the tub of water. The plate and heat pad are insulated, so that heat from the heat pad is not lost to the environment. Thermocouples attached at specified distances from the heat source measured the temperature throughout the rod. To analyze the heat transfer through the rod, steady-state and transient conditions were considered, with models created on MATLAB to predict how the rod would lose heat and compare it to the data collected through experimentation. To collect the data, two 8-channel thermocouple data loggers were used. There also exists a general solution for finding the temperature and heat flux throughout the fin. This solution proves useful under conditions where the fin is assumed to be very long.

Title: Cavitation Demonstration Trails

Authors: Owen Telford, Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: In this paper, multiple experiments were conducted on various types of pumps. Pumps vary in size and function to explore a suitable cavitation demonstration for a fluid mechanics lab. It was intended to compare experimental results with analytical methods and discuss discrepancies. Four different pumps were tested: a submersible pump, a circulation pump, a diaphragm pump, and a centrifugal pump. Based on its classification, each pump was used differently to generate cavitation and each pump gave various results. Each pump was discussed along with recommendations for how to create a proper system that can be used for students to learn and experience cavitation in a fluid mechanics lab.

Title: Scale Analysis of a Solid/Liquid Phase Change Thermal Energy Storage System

Authors: Jordan Whitlock , Ali Syyed Siahpush

Affiliation: Southern Utah University

Abstract: A detailed scale analysis study has been carried out to evaluate the heat transfer performance of a solid/liquid phase change thermal energy storage system. The phase change material (PCM), 99% pure eicosane with a melting temperature of 36.5°C, was contained in a vertically oriented test cylinder that was heated at its outside boundary, resulting in radially inward melting. Detailed quantitative time dependent temperature distributions and melt front motion and shape data were obtained in previous research. A heat transfer scale analysis was used to help interpret the data and development of heat transfer correlations. In this scale analysis, conduction and natural convection heat transfer were considered. Comparison of experimental data with scale analysis predictions of the solid liquid interface position and temperature distribution was performed. The analytical scale heat transfer results demonstrated good agreement with the experimental results, and confirmed the existence of four melting regions.

Title: Developing and Implementing Traffic Control Plans for Road Work Zones - Case Study On SR-130; North Cedar To MP 9

Authors: Tyson Prince, Sean Carr, Tavish Darger, Mohamed Askar, Jared Baker

Affiliation: Southern Utah University

Abstract: Any construction project has its share of challenges. However, when it comes to road construction, there are various things to consider and address that are unique to road work. During the planning and construction phase of a roundabout project, a temporary traffic control system must be designed and implemented to provide an acceptable margin of safety to personnel within the work zone and keep the natural flow of traffic to the minimum extent possible during the construction phase. Due to the limited but growing incorporation of roundabouts in the US, an inadequate amount of information is available for definitive guidance on the design and operation of such temporary traffic control systems. This paper seeks to understand what rules and considerations could have been utilized to manage such traffic better in the project case study - N. Minersville Hwy. and E Midvalley Rd as the I-15 offramp, exit 62. When looking at traffic control, the intent is to provide a traffic control plan that would include materials, equipment, labor, flagging, pilot car, variable message boards, temporary pavement, markings, and all quality required. In addition to these considerations, UDOT standards should be maintained as necessary, as located in section 00555M of the Special Provisions. Regarding the considerations placed on exit 62 offramp, all work being done on the offramps must allow for the interchange ramps to remain open at all times. The research concluded a traffic control plan with more detail as the job gets closer to the start date, with all traffic plans to be approved fourteen days prior to start.

Title: Developing a Quantitative Quality Control System for Road Construction Case Study On SR-130; North Cedar To MP 9

Authors: Wade Schmid, Jaden Black, Duo Chen 9

Affiliation: Southern Utah University

Abstract: Construction is a significant contributor to the USA economy. The industry has more than 680,000 employers with over 7 million employees and creates nearly \$1.3 trillion worth of structures each year. Unfortunately, the outbreak of COVID-19 has changed some of that, disrupting the construction industry's pace. Construction laborers are required to work while maintaining social distance, resulting in reduced productivity and poor quality.

This research's primary goal is to develop a quantitative quality control system to improve the quality of construction projects. A secondary objective is to focus on the regular monitoring of the construction site conditions of a heavy civil construction project, SR-130; North Cedar To MP 9, and effectively solve the quality problems of the main work items, such as materials, subbase, base, concrete, pavement, and testing. The methodology of this research is to outline the best practices for using application software and quality checklists to discover, raise, and solve problems of the construction process. A quality dashboard and statistical analyses were developed to measure the quality of the construction work items and the general quality index. The developed model will be used for monitoring each problem and scheduling solutions. More complete checklists and management methods have been considered, ensuring that the project meets a certain quality level with practical strategies, solutions and safe communication methods. The research concluded several ideas to identify, resolve and report project quality issues in a timely manner to protect workers' safety and ensure project quality, such as improving the quality checklists, online monitoring and spot-checking the quality of the project.

Title: Application of Value Engineering Technique on Tall Wood Building Structural Design

Authors: Jacob Rollins, Tony Olsen, Dr. Mohamed Askar

Affiliation: Southern Utah University

Abstract: Value engineering is a combination of technical and economic subjects. It is committed to the lowest life cycle cost and reliable completion of the functions required by the client. Value Engineering is an intensive, interdisciplinary problem-solving technique that focuses on improving the value of the required functions to accomplish the goals. It is essentially a process that uses function analysis, teamwork and creativity to enhance value.

The International Code Council (ICC) has approved 17 changes to the 2021 editions of the International Building Code (IBC) and International Fire Code, allowing mass timber buildings up to 18 stories. With the addition of three new mass timber construction types (Type IV-A, IV-B, and IV-C). These new types are based on the previous Heavy Timber construction type (renamed Type IV-HT) but with additional fire-resistance ratings. This is the first time in the modern building code history that significantly new construction types have been added (AWC, 2021).

This undergraduate research's main objective is to develop a structural design and analysis of an 18-story timber building considering a rational performance-based design approach such as sustainability, environmentally friendly, economy, fire and safety testing, and constructability. The structural systems of the study building are composed of Cross Laminated Timber (CLT) shear walls, CLT floors, glulam columns, and reinforced-concrete link cores. Numerical simulations, such as 3-D finite element model development and non-linear time history analysis, have been used in the design analysis. The application of value engineering to structural design in various design phases has been applied. Further, an analysis of these performance indicators and suggestions of design alternatives have been considered during the value engineering workshops. Finally, the workshop results will be taken into consideration in the design.

Title: Comparative Study of Structural Systems for Tall Mass Timber Buildings

Authors: Khevar McLeod, Braden Madsen, Dr. Mohamed Askar

Affiliation: Southern Utah University

Abstract: A comparative study has been carried out to examine the most common structural systems that are used for tall mass timber buildings. These systems include Rigid Frame, Shear Wall, Core System, and Braced Frame. This comparative analysis has been aimed to select the optimal structural system for an 18 story mass timber building. The structural efficiency is measured by the Time Frame, Fire Resistance Factor, Ease of Design, Sustainability, Maintainability, and Constructability. Relative weight is created for each selection criteria. A quantitative measurement method/formula is designed to measure the score of each criterion. The recommendations for each structural system are based upon reducing the timeframe of the design and construction, minimizing the cost of the construction, simplifying the design process, eliminating the negative environmental impacts, allowing safe, quick and easy replacement of the component parts, and using of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives. Combinations of systems were also considered for comparison, such as the shear wall lateral system seems to have excellent acoustic and fire insulators between rooms in a high rise and appeared to be more cost-effective for high-rise buildings in areas of seismic zones II & III. The conclusion of the study shows that the core system structural method and the combination between the core system and shear walls have the highest values.

Title: Making a Big Impact with a Small Design

Authors: Taylor Perry, Guelord Mirindi, Alexandra Hutchinson

Affiliation: Southern Utah University

Abstract: Cities and counties across the United States are restricting new construction due to the limited nature of life-sustaining resources (i.e water, electricity). What we are proposing with this project is a solution that goes against tradition to provide the safety and security of homeownership, while implementing eco-friendly technology to meet the needs of a growing population. This design challenges the square footage of a traditional single-family home by reducing it to less than 200 square feet. Along with the benefits of a small footprint, this design utilizes advanced solar technology, high-efficiency appliances, and purposeful architecture. With the rising cost of homes, and high-density dwellings taking over residential zones, tiny homes provide an alternative opportunity for homeownership. Furthermore, this design would help conserve life-sustaining resources in growing communities. This proposal expands beyond the suburban environment as we explore the potential of placing eco-friendly tiny homes in areas that historically have not had access to traditional housing. Specifically, we will be looking at the process of building these eco-friendly tiny homes in the Democratic Republic of the Congo.

Title: Investigating Bracketed Difference-in-Difference Estimation: A Simulation Study

Authors: Anthony Frazier, Dr. Julian Chan

Affiliation: Weber State University

Abstract: Difference-in-Difference (DiD) estimation is a commonly used & widely known statistical method of estimating causal effects of a particular treatment over time. Unfortunately, regular DiD estimation often neglects unmeasured confounding variables that bias the treatment effect (TE) estimate. To adjust for possible confounders, Hasegawa et.al proposed Bracketed DiD estimation, which provides an interval of possible DiD estimates. In this paper, we simulate a multitude of scenarios to test the effectiveness of Bracketed DiD estimation. We also propose and investigate several DiD estimators that utilize Bracketed DiD estimates. First, we find the interval generated by Bracketed DiD estimation correctly captures the true TE at varying rates, depending on violations of DiD assumptions or other changes in data characteristics. Second, we find the DiD estimator that adjusts for variances in control groups generally predicts the true TE most accurately. We conclude by discussing in what circumstances Bracketed DiD estimation is most effective and comparing the accuracy of different DiD estimators.

Title: Instant Out of Time: Mathew Brady's Photographs of the First and Second Ladies, 1844-1896

Author: Thomas C. Terry, Ph.D.

Affiliation: Utah State University

Abstract: Mathew Brady is the most famous photographer in American history. People who do not know the name of any other photographer know Brady. His career stretched from 1844-1896 and over that period Brady photographed 18 of the 45 presidents – 40 percent – from the 6th to the 25th (counting Cleveland only once). Only the 9th president, William Henry Harrison, escaped Brady's lens by dying within a month of his March 1841 inauguration. He also photographed 17 of the 49 vice presidents – roughly 35 percent – from the 7th through the 23rd, only Richard Mentor Johnson (1780-1850), the 9th vice president from 1837-1841, never sat for Brady. However, there are only five Brady photographs of First Ladies, out of a possible 13 during his career and just two Second Ladies of a potential 10. They are: First and Second Lady Abigail Powers Fillmore (1798-1853), wife of Millard Fillmore; First Lady Mary Todd Lincoln (1818-1882), wife of Abraham Lincoln; Second Lady Ellen Maria Wade Colfax (1836-1911), wife of Schuyler Colfax; First Lady Julia Dent Grant (1826-1902), wife of Ulysses Grant; First Lady Lucy Webb Hayes (1831-1889), wife of Rutherford Hayes; and First Lady Lucretia Rudolph Garfield (1826-1902), wife of James Garfield. The mortality of the wives of presidents and vice presidents during Brady's career was shocking, undoubtedly at least partly attributable to death during pregnancy and childbirth and the general state of women's healthcare in the early to mid-19th Century. The wives of vice presidents Richard M. Johnson, William A. Weaver, Martin Van Buren (also a president), Chester A. Arthur (also a president), and Henry Wilson died before their husbands took office. Vice President William R. King was unmarried. The purpose of this study is to assemble all the First and Second Ladies photographs taken by Brady and never collected together before.

1:20 p.m. Virtual

Title: Social justice in the languages

Author: Lucia Taylor

Affiliation : Dixie State University

Abstract: "Languages, ethnics and races have been part of the discussion of identities for a long time. When looking into languages with gender differentiations, the new non-binary status has entered the classroom. What do we do when a non-binary student is learning gendered language? Beyond these issues, society is changing moving into looking at social Justice from all perspectives in academia.

In this presentation, I will discuss my own experience as a Spanish teacher. I will dive into myths in languages, language in the media, and the importance of linguistic diversity in global justice. Attendees will reflect on their own biases and their own constructs of what language and identity is for each of them. "

Kinesiology and Health Sciences

Title: Exploring Correlates of Domestic Violence and Homelessness: A Review of the Literature

Author: Linnette Wong

Affiliation: Weber State University

Abstract: Domestic violence is a traumatic event and the aftermath can be devastating. Victims of domestic violence may experience multiple issues while trying to recover from this trauma, such as homelessness. Whether the victim is trying to escape an abusive situation, homelessness has been observed as a trend among those impacted. The purpose of this literature review was to provide an extensive summary of the impact that domestic violence had on an individual's life. This literature review analyzed the available literature using keywords to help identify important

articles that were pertinent to the topic. The outcome of the literature review revealed a total of eight relevant articles relating to the keywords. The results suggested positive correlates of domestic violence and homelessness. The findings have important implications for the design of health and social programs targeting homelessness.

Language, & Literature

Title: “Humor within the Horrors of *The Two Gentlemen of Verona*”

Author: Madalynn Belliston

Affiliation: Southern Utah University

Abstract: Readers and theorists often contemplate how William Shakespeare came to understand classical comedy as inherently humorous. More importantly, they wonder how he came to define humor itself. As a woman, I question why so much of Shakespeare’s humor seems to be founded on female gender degradation.

In my paper today, I explore how women are depicted in Shakespeare’s first comedy, *The Two Gentlemen of Verona*. I will apply principles of social feminism and humor theory to argue that the play’s humor derives primarily from the social oppression and degradation of its female characters, creating a disturbing comedic paradox where Shakespeare seems to imagine that the potential horrors of maltreatment and abuse are softened and made comic through the play’s ignorant, irrational characters.

Title: “Ambivalent Villains: Tracing the Binary Perception of Heroism Across Three Narratives”

Author: Brandan Ivie

Affiliation: Southern Utah University

Abstract: Heroism cannot exist without opposing villainy; no hero can rise without the conflict caused by the villain. Traditional hero narratives are centered on struggles between good and evil; they present a clear dichotomy between hero and villain. Morally ambiguous heroes or villains are nevertheless common in literature and culture, and they challenge this binary. My paper explores three morally ambiguous villains—Satan from John Milton’s *Paradise Lost*, Frankenstein’s monster from Mary Shelley’s *Frankenstein*, and Killmonger from the Marvel film *Black Panther* (2018)—to show how, despite embodying certain heroic impulses, each character is confined to a villain’s status by plot-based and structural conventions that dictate audience perceptions.

Title: “Rhetorics of Advocacy in Disability Accommodation”

Authors: Rachel Bryson and Peter Call

Affiliation: Utah State University

Abstract: For both students and faculty in higher education, the disability accommodation process can be fraught with uncertainty. Institutional documentation processes may inadvertently create separation between students and faculty, leaving those involved unsure about how to begin conversations about accommodations and accessibility, especially when disabilities may be defined as less-apparent.

Our presentation will show how accommodation documents can become a starting point for collaboration and advocacy from both student and faculty perspectives. Using a disability studies methodology developed by Margaret Price (2012), we will consider the institutional accommodation process as framed by access, activism, identification, and representation to argue that institutional accommodation and documentation processes can become sites of advocacy and self-advocacy for both faculty and students with disabilities.

Physical Sciences

Title: Mercury for dinner? Aqueous Heavy Metal Sequestration.

Authors: Jacob Kjeldahl Jensen, Christopher F. Monson

Affiliation: Southern Utah University

Abstract: Heavy metals threaten aquatic life and are a danger to human health. Multiple sites are reporting an increase in heavy metal concentration. It is possible to responsibly remove the toxic metals through a three-step process - pumping, separation, and removal/sequestration. A pumping device will provide a microfluidic separation device with a continuous solution flow. The separation device will utilize electric field-flow-fractionation to produce a concentrated metal ion solution. The metal ions will reduce onto a charged gold mesh(electroplating) which can be removed and disposed of in an environmentally responsible manner. The efficiency of the setup will be evaluated using various analytical techniques, including cyclic voltammetry and UV-visual spectroscopy.

Title: Investigation of Manganese Nanoparticles with Various Capping Ligands and Their Effects on *Raphanus sativus*

Authors: Taytum Stratton, Christopher F. Monson, Elizabeth Pierce

Affiliation: Southern Utah University

Abstract: Nanoparticles have recently been studied in agriculture to mitigate abiotic stress in crops because of their small size and unique characteristics. We investigated the use of manganese nanoparticles to increase stress tolerance in *Raphanus sativus*. Few studies have been conducted on the synthesis and uses of manganese nanoparticles. We were among the first to synthesize manganese nanoparticles using a microfluidic device. Manganese acetate was used as an ion source, sodium dithionite was the reducing agent, and oleic acid was the capping ligand. Fluorescence spectroscopy and scanning electron microscopy were used to confirm that the particles synthesized were in the nanoscale size range. When foliarly applied to *Raphanus sativus* that had been exposed to stress, the nanoparticles significantly increased both chlorophyll content and growth rate, indicating an increase in stress tolerance. In addition, several other capping ligands were used for the manganese nanoparticles. We expressed and purified a red fluorescent protein in *Escherichia coli*. This protein, along with a Texas-Red labeled BSA protein were successfully used as capping ligands for the manganese nanoparticles. The nanoparticles capped with the proteins were foliarly applied to *Raphanus sativus*. It was investigated to see if the protein could successfully travel through the plant cell membrane without being denatured by looking at a change in red fluorescence in the leaves of the plants. If the proteins can successfully make it into the plant cell without denaturing, it could be a possibility that manganese nanoparticles could be used as a delivery method for proteins involved in gene editing technologies in plants, and future studies will investigate this.

Title: A three electrode microfluidic for the quantitation of dissolved oxygen

Authors: Cameron C. Stokes, K. Brayden Bailey, Christopher H. Abraham, Mariah Clayson, Madison J. Evans, Christopher F. Monson

Affiliation: Southern Utah University

Abstract: The concentration of dissolved oxygen in aqueous environments is relevant in both biological and chemical processes. Variations in oxygen levels may critically change metabolic and other chemical pathways. We previously developed a microfluidic device modeled after the STOX electrode to measure dissolved oxygen. The STOX electrode is the most sensitive electrochemical device currently available for the quantitation of dissolved oxygen. However, it is fragile and expensive whereas our device is constructed from PDMS and is thus more rugged and inexpensive to produce. We have further developed our device to make it simpler and require three electrodes instead of eight. We also used a 3D printed capsule to simplify device construction and a new microfluidic oxygen exchange segment. This device will allow oxygen measurements to be made more sensitively, quickly, and cheaply than is currently possible.

Title: Incorporating Authentic Research Experiences into an Undergraduate Course in

Computational Chemistry

Author: Elena N Laricheva

Affiliation: Utah Valley University

Abstract: Computational methods have become ubiquitous in chemical and biological research- from aiding the prediction of protein structures to assisting the development of new materials and the design of new drugs. Therefore, exposing undergraduate students to such methods early in their careers is critical for ensuring they can tackle computationally intensive research tasks after they graduate. Framing the teaching of computational methods in the context of an authentic research experience increases the relevance of the techniques taught.

This talk will describe incorporating authentic research experiences into an undergraduate course in computational chemistry. Initially designed to illustrate the main principles of molecular mechanics and classical molecular dynamics simulations, the course has recently been expanded to include electronic structure calculations. As a part of their research experience in the course, students have explored the effect of single-point mutations on binding between the two cell surface receptors involved in the mammalian fertilization process. In another project, they have investigated the effect of structural changes on the optoelectronic properties of graphene and hexagonal boron nitride-like systems.

Title: Tunings and Temperaments: Mathematical Circles and Spirals

Authors: Jonathan Tyler and Larry Smith

Affiliation: Snow College

Abstract: Musicians do not need to be expert mathematicians in order to produce beautiful music, but music is based on mathematical principles that require some choices on the part of musicians, so an understanding of the mathematical underpinnings of music theory is useful. Connections between the math of circular pitch class space and spiral pitch space and the musical concepts of tunings and temperaments are shown.

Title: Neutron Star Kick-Off as a Consequence of Asymmetric Neutrino Diffusion

Author: Alexander Panin

Affiliation: Utah Valley University

Abstract: It is known that some neutron stars move with velocities in 500-2000 km/sec range which is well in excess of Milky Way galactic orbital speeds (200-300 km/sec). The origin of such strong kick-off is still debated. Stars are known to have strong and often asymmetric magnetic fields. Combined with star rotation, it is unrealistically to expect spherically symmetric collapse of a star or of its core. We estimate analytically what kick-off could result from asymmetric collapse of star core and subsequent asymmetric diffusion of neutrino radiation in rapidly cooling neutron star. It turns out that high opacity of dense forming neutron matter to neutrino radiation may result in development of a "hot side" of neutron star (to which diffusion wave reaches first) - which radiates "hot" neutrinos first - vs opposite side radiating later and thus radiating colder neutrinos. Difference in momenta of radiated neutrinos of different energies can indeed accelerate neutron star to the observed high kick-off velocities.

Title: Single X-Ray Photon Diffraction Experiments

Author: Alexander M. Panin

Affiliation: Utah Valley University

Abstract: "It is very difficult to demonstrate single photon diffraction in visible range as it requires very low intensity sources and very sensitive detectors. In contrast, in x-ray range of electromagnetic spectrum these conditions are much more relaxed due to higher probability of spontaneous emission and much higher energy of photons. Experiments with single photon diffraction can be relatively easy arranged with ordinary x-ray sources (like x-ray tube) and ordinary detectors (like Geiger counter, CCD array, etc). We have performed such experiments both in single photon mode and multi-photon modes. Results of our experiments, as well as analytical comparison of single photon diffraction of x-rays with diffraction in visible light are presented in the talk.

Title: Character Table of Permutation Group in 4-Dimensional Space**Author: Chin-yah Yeh****Affiliation: Salt Lake Community College**

Abstract: Permutation of points reflects the symmetry of a space. Here we shall focus on the permutation between individual points in a space and hope to shed light on the structure of spaces. 1-D spaces have even and odd symmetries. 2-D spaces have three kinds of basic symmetries. 3-D spaces have a symmetry corresponding to that of the regular and chiral octahedron, O . The group O is isomorphic to the 4-point permutation group. With interest in the properties of 4-D spaces, we shall build the character table of the 5-point permutation by starting with 4-point permutation, S_4 . The octahedral symmetry group O or the 4-point permutation group S_4 consists of 24 elements. The elements are divided into five classes, each characterized by a cycle notation. These classes are also described by Young Tableaus shown in the second row. The character table contains five irreducible representations, IR_0 to IR_4 . The 5-point permutation S_5 group has the same size as the icosahedral group but is more symmetrical. We use S_4 as a scaffolding to build the S_5 group table. IR_0 corresponds to a total symmetry. IR_1 is an antisymmetry reflecting the parity of space. The next irreducible representation IR_2 is not extended from that of S_4 group but has a dimension 4. IR_2 is obtained from IR_0 and IR_3 in Table 1 together: The set of characters become $\{4, 2, 0, 1, 0\}$ and correspond to the five classes in S_4 padded with a 1. The rest of the seven classes are (32) and (5) , which have -1 as their characters. IR_3 is a counter part of IR_2 , with the characters of the classes, (2111) , (32) , and (41) negated. IR_6 is easily guessed by its orthogonality to the rest of the IRs.

Title: Testing Quantum Mechanics on Quantum Computers**Authors: M. Thomas Hoffman, Jean-Francois Van Huele****Affiliation: Brigham Young University**

Abstract: Quantum computers have proven to be a valuable resource for complex calculations, but they also provide a new tool to probe quantum theory. One basic tenet of quantum mechanics (QM) is that the probabilities for measurement outcomes are given by the moduli squares of the quantum amplitudes. Sorkin [Mod. Phys. Lett. A9,3119 (1994)] has designed a test based on the use of multi-slit interference to investigate this fact. Sadana et al. [arxiv.org/abs/2111.02136 (2021)] applied the Sorkin test to a quantum computer. In this talk, I will analyze this interpretation and study the Sorkin test to see to what extent quantum computers can tell us about the fundamental laws of QM.

Title: Optimizing Quantum Resources in Short-Distance Teleportation Scenarios**Authors: Aidan Gillam, Jean-Francois Van Huele****Affiliation: Brigham Young University**

Abstract: Quantum teleportation is a powerful example of current quantum technology that allows an unknown quantum state to be communicated from one location to another without physically transporting the particle to which the state is attached. I discuss ideal quantum teleportation involving the sharing of a maximally entangled pair of qubits and the sending of two bits of classical information. I show how teleportation is expressed in the language of quantum circuitry. I then discuss the possible minimization of quantum resources in short-distance teleportation scenarios. I explain its potential application in quantum computers and quantum chips.

Title: Finding the Quantum in Novel Self-Gravity Experiments**Authors: Leif Hagen, Jean-Francois Van Huele****Affiliation: Brigham Young University**

Abstract: Gravity, by far the weakest fundamental force, has proven extremely difficult to experimentally access at small scales. This has contributed to our inability to reconcile our best theories of gravity with those of quantum mechanics. Two “tabletop” experiments have recently

been proposed which could measure the gravitational interaction between two simple quantum systems and confirm the need to quantize gravity. Each of these experiments uses gravity to entangle particles across a pair of interferometers. They differ in the type of interferometers used (Humpty-Dumpty vs. Mach-Zehnder). I compare these two methods and argue, alongside Hatifi and Durt (arXiv:2006.07420), that they can be further simplified by exploiting self-gravity rather than ignoring it.

Social Sciences

Title: Belief Stories and the Social Construction of Reality using Religion as a Case Study

Author: Matthew Smith-Lahrman

Affiliation: Dixie State University

Abstract: A basic sociological question asks "Why do people act?" The short answer is that people act based on perceived realities. If one believes it to be real, one acts as if it is real. In order to answer the first question, then, we must answer another, "What do people perceive to be real?" I suggest that people's actions are "belief stories," presentations of what they believe to be real. Through language, especially, people let others know what they think is going on, who they think they are, and who they think others are. People act because they believe in particular realities and they let others know about those realities through their actions.

In this talk I define and develop the idea of belief stories using empirical data gathered from fourteen months of observations of religious services in Southern Utah. I first discuss the sociological theoretical tradition known as the social construction of reality, then describe the setting and methods I used to gather data, and finally present a few empirical examples of belief stories from my fieldwork.

The bulk of my talk comes from the pages of a book I wrote on the subject.

Title: Tupac Shakur and Kendrick Lamar: A Legacy of Hip Hop Resistance

Author: Theresa A. Martinez

Affiliation: University of Utah

Abstract: From its very beginnings in the 1970s, rap music has reflected the profound disenfranchisement of African Americans living in the nation's neglected and abandoned inner-cities. Rap was only one aspect of hip hop that emerged in the South Bronx in that time period--along with graffiti and breakdancing, among others. Rap could be playful, catchy, sexy, and humorous, but it also intoned a forceful cultural critique of on-going and horrendous disparities facing Black communities, including police violence, systemic inequity in the criminal justice system, housing discrimination, and educational disparity. This paper examines two hip hop artists--one legendary artist from the 1990s and one contemporary hip hop artist who is already making a sizable mark on the genre--as they reflect on and unpack the sociohistorical contexts of their times. The paper unpacks the lyrics of our two hip hop artists through a theoretical lens that evokes oppositional cultures or cultures of resistance within distinct social locations or cultural formations--a nuanced response to appalling structural disparity then and now.

Title: Clearance Rate Correlation to Pandemic-Era Increased Homicide Rates in American Cities

Author: Dr. John Hill, Emeritus Professor

Affiliation: Salt Lake Community College

Abstract: During the Pandemic Era (2020-21), over a dozen American cities have seen record rates of homicide. Clearance rates for these crimes has declined, concurrently. This research analyzes correlation and antecedents for same.

Title: Understanding Us: Undergraduate Research to Support a Community Partner Working on Homelessness

Authors: Dan Poole, Kambry Woodbury

Affiliation: Salt Lake Community College

Abstract: Understanding Us is a non-profit organization that provides several programs focusing on individuals experiencing homelessness in Salt Lake City. Currently, they are running a Tai Chi program at the downtown library four days a week. In 2018, a group of Salt Lake Community College students, working with Professor Poole, collected preliminary demographic survey data to help the organization better understand the population they are serving in order to best meet the needs of participants. We have updated the survey by adding new questions and rewording some of the past questions to make them more clear. In addition to the demographic survey data that was collected, we have added anecdotal examples and insight from participants in the Tai Chi Program to our presentation.

Title: Smoke Season: Exploring the Human Geographies of Transient Wildfire Smoke along the Wasatch Front

Authors: Jeremy Bryson, Jeff Montague

Affiliation: Weber State University

Abstract: Wildfire seasons around the American West have been intensifying as the effects of climate change are reshaping the region. Smoke seasons in Utah are also intensifying so that when places like California and Oregon experience massive wildfires, the smoke from those fires can descend on the Wasatch Front for weeks during the late summer. This transient smoke from cross border wildfires can cause the air quality in Utah's dominant urban region to become among the worst in the world. How are urban places along the urbanized Wasatch Front experiencing transient wildfire smoke? What efforts are state leaders making to alleviate the negative impacts of the smoke? Which residents are most impacted? What specific challenges do the smoke incursions create for the Wasatch Front's human, environmental, and economic health? How is the smoke changing the way we live in the places we live? In this paper, we use an urban political ecology approach to explore the contested human geographies of transient wildfire smoke along the urban corridor of the Wasatch Front.

Title "I Was Answered That I Must Join None of Them": Irreligion Among Former Latter-day Saints in Utah.

Author: Rick Phillips

Affiliation: University of North Florida

Abstract: Within the United States religious switching is common. However, when members of The Church of Jesus Christ of Latter-day Saints change their denominational status, they tend to abandon organized religion altogether. This pattern has been observed for almost 40 years. However, the number of Latter-day Saints leaving religion has accelerated in the 21st century, particularly in Utah. Using ethnographic data collected along the Wasatch Front, this paper presents a sociological framework for studying religious disaffiliation in Utah, and examines why Latter-day Saints are less likely than others to switch to a new denomination when they leave their religion. I provide cultural, demographic, and political reasons for this phenomenon.

Title: Geospatial Analysis of Drug Related Crimes in Local Communities in Utah

Authors: Erin Crump, Dr. Yong Seog Kim

Affiliation: Utah State University

Abstract: According to the 2021 World Drug Report released by the United Nations Office on Drugs and Crime (UNODC), over 36 million people among 275 million people who used drugs worldwide suffered from drug use disorders in 2020 alone. In addition, the number of people who use drugs is estimated to increase by 11 per cent globally by 2030. Therefore, there exists a strong need to further understand drug usage and drug-related crimes to address prevention and intervention policies. In particular, the identification of geographical locations with frequent drug-related crimes is very critical for law enforcement agencies and state/federal governments

to establish strategies to curve such crime activities. At the same time, it is also important for publics in general to be aware of and avoid such dangerous areas for safety reasons.

To this end, we collect, analyze, and visualize crime data sets collected through incident-based reporting (IBR) by local police and sheriff's offices from 2011 through 2019 to explore geospatial and temporal characteristics of drug and alcohol-related crimes in several local communities in Utah. We find natural grouping of the geographic locations via a density-based clustering algorithm (DBSCAN), which finds 10 clusters in addition to outliers automatically. As we expected, many cities in Utah are distinguished by various level of incidents of drug and alcohol-related crimes over years. However, we find across all cities that both the overall crime incidents and the number of drug-related incidents increase significantly during the winter season (October through April). Most of all, we find several geospatial locations of such crimes close to public parks, residential areas, or school districts, which may inform proactive policing in these communities.

Brigham Young University Conference Center

730 E University Pkwy, Provo, UT 84604

Directions

BYU Harman Conference Center, Provo Utah. The easiest, most direct way to get there is to take the University Parkway exit off I-15 (either north- or southbound) and head east. University Parkway dead-ends at 900 E in Provo. The last building on your right before you come to 900 E is the Harman Building.


Take the exit, stay on University Parkway eastbound, and after you pass the Marriott Center and its parking lot, turn right into the large parking lot west of the Harman, parking as close to the building as you can.

Parking


ALL parking at BYU is free on weekends (except designated 24-7 spots for service vehicles or police/emergency vehicles or individual-stall reserved parking slots). Handicapped parking is monitored seven days a week; either a designated handicap license plate or rearview mirror dangler is required to use handicapped parking slots.

Most of the parking immediately west of the Harman Conference Center is A-zone parking (faculty and staff), and all A-slots (and other zoned slots) are open and free-of-charge on weekends.


Google Directions coming from the North

 Take the **University Parkway/UT-265** exit, **EXIT 269**.


----- Then **0.67 miles** -----

 Keep **left** to take the ramp toward **BRIGHAM YOUNG UNIV/UTAH VALLEY ST COLLEGE**.

----- Then **0.10 miles** -----


 Turn **slight left** onto **W University Pkwy/UT-265**.
Continue to follow **W University Pkwy**.

----- Then **4.62 miles** -----


 **BYU Conference Center, 770 E UNIVERSITY PKWY** is on the **right**.

Your destination is 0.1 miles past N 650 E.
If you reach N 900 E you've gone about 0.1 miles too far.


Google Directions coming from the South

 Take the **University Ave/US-189 N** exit, **EXIT 263**.


----- Then **0.27 miles** -----

 Stay **straight** to go onto **S University Ave/US-189 N**.

----- Then **3.29 miles** -----

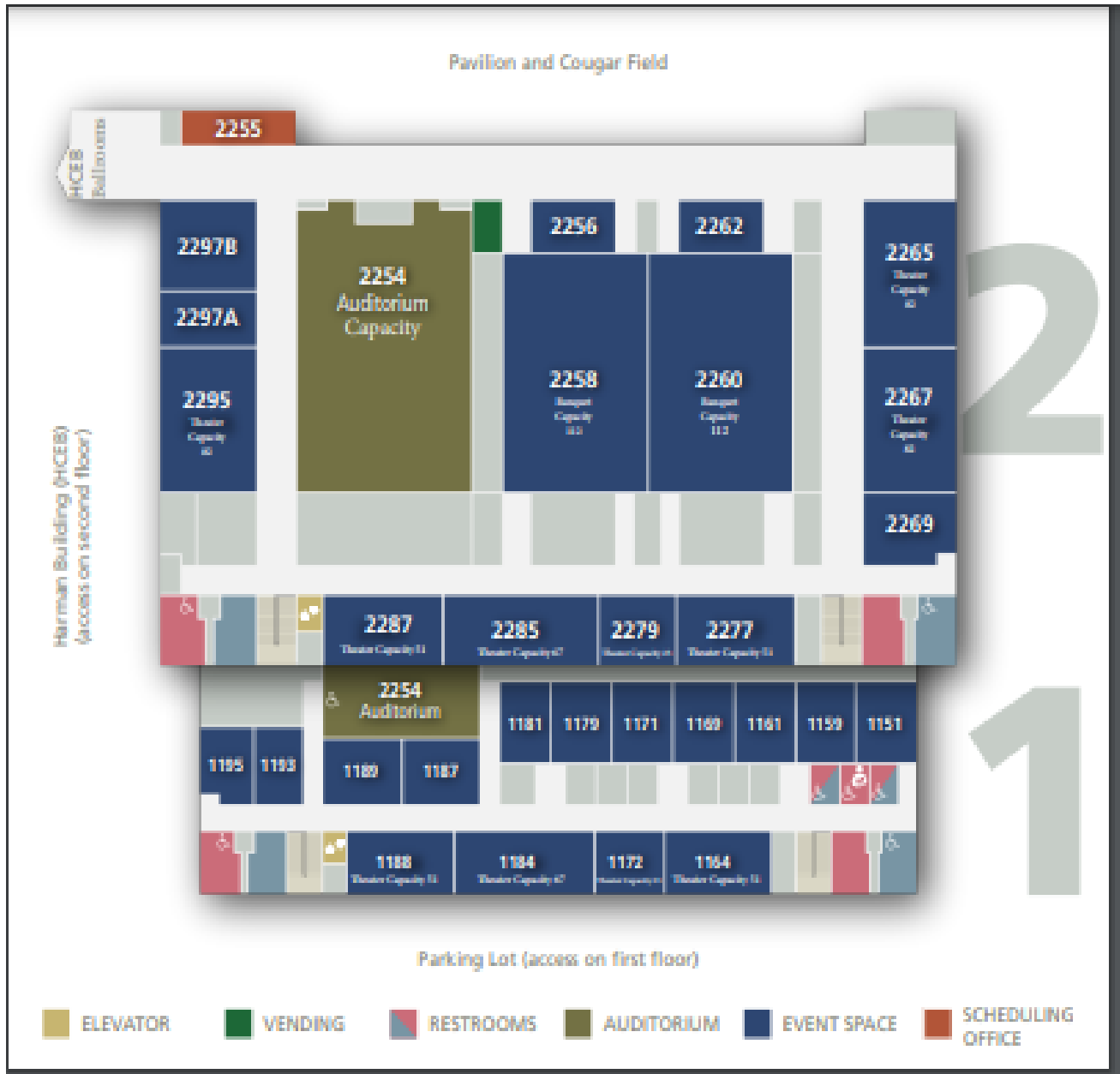
 Turn **right** onto **E University Pkwy**.
E University Pkwy is 0.1 miles past W 1450 N.
If you reach E 1990 N you've gone about 0.3 miles too far.

----- Then **0.70 miles** -----

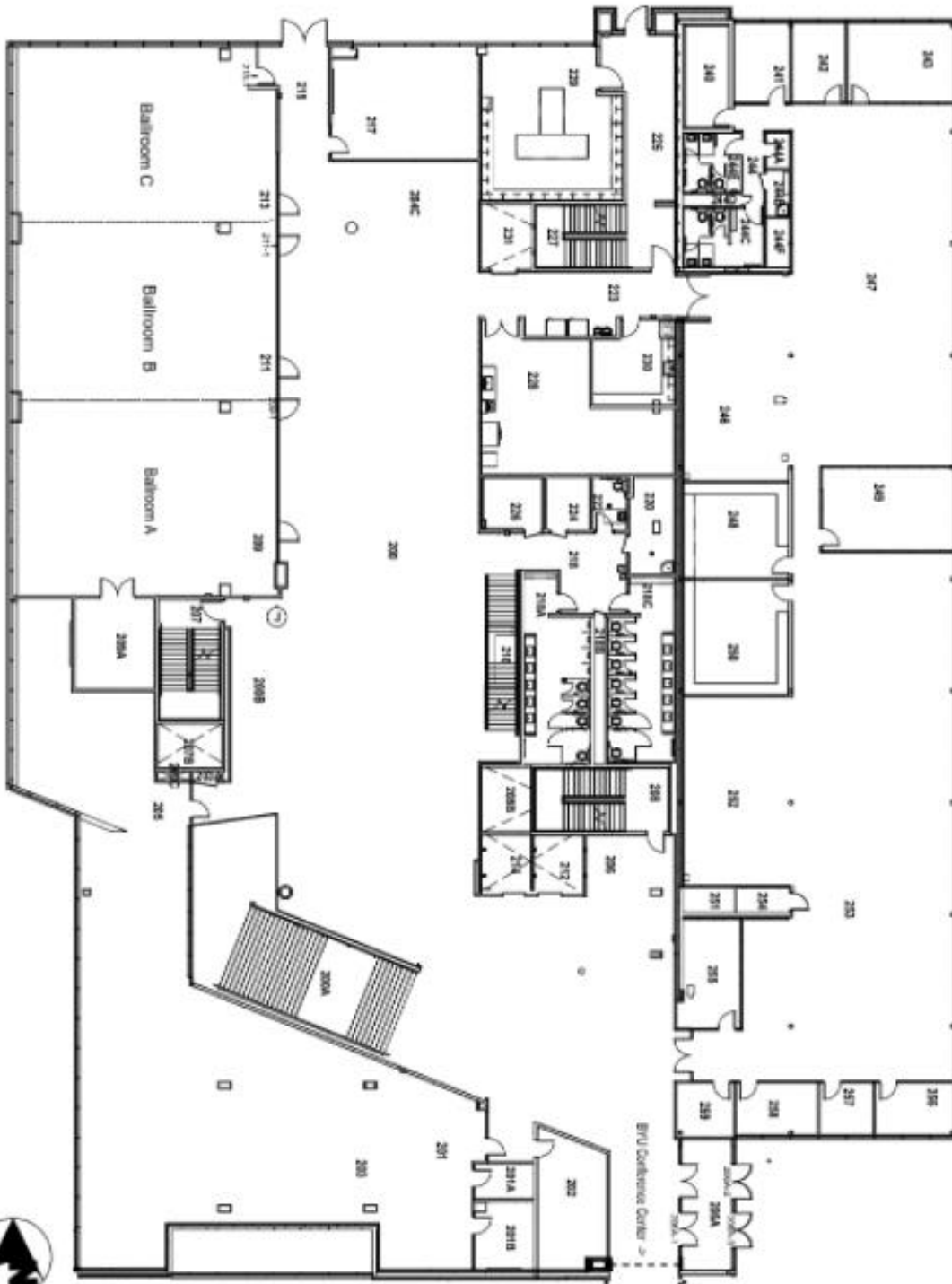
 **BYU Conference Center, 770 E UNIVERSITY PKWY** is on the **right**.

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Conference Center Room Map



- ★ Posters Atrium
- ★ Humanities, Philosophy, Foreign Language 202
- ★ Arts Ballroom C
- ★ Kinesiology and Health 2287
- ★ Biological 2265
- ★ Language Literature 2287
- ★ Business Session A: 2295 Session B: 217
- ★ Physical Sciences Session A: 2277
Session B: 2279
- ★ Education 2267
- ★ Social Science 2285
- ★ Engineering Session A: 2258 Session B: 2260



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