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2016
13TH ANNUAL

SPOKANE
INTERCOLLEGIATE
RESEARCH
CONFERENCE

SATURDAY
APRIL 23

www.whitworth.edu/sirc

email: sirc@whitworth.edu

WHITWORTH
UNIVERSITY

Undergraduate students from the greater Spokane area and beyond are invited to present original, faculty-advised research in many disciplines.

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SIRC 2016 Schedule

8:15 a.m. – 9:00 a.m.	Check-in, Coffee and Pastries	Robinson Science Hall (ROB), Lobby
9:00 a.m. – 10:30 a.m.	Early Morning Sessions RS1, RS2, RS3, RS4, RS5, SS1A, SS2, SS3	Weyerhaeuser Hall (WEY), Robinson Science Hall (ROB), and Hixon Union Building (HUB)
10:45 a.m. – 12:15 p.m.	Late Morning Sessions RS6, RS7, RS8, SS1B, SS4, SS5, PS1	Weyerhaeuser Hall (WEY), Robinson Science Hall (ROB), and Graves Gym
12:15 p.m. – 1:15 p.m.	Break for Lunch*	
1:30 p.m. – 3:00 p.m.	Early Afternoon Sessions RS9, RS10, SS6, SS1C, SS7, SS8A, PS2	Weyerhaeuser Hall (WEY), Robinson Science Hall (ROB), and Graves Gym
3:15 p.m. – 4:45 p.m.	Late Afternoon Sessions RS11, RS12, RS13, RS14, RS15, SS8B, SS9	Weyerhaeuser Hall (WEY) and Robinson Science Hall (ROB)

*Several lunch options are within walking distance of campus. Students with Sodexo meal plans may opt to eat in the Hixon Union Building cafeteria. There will also be two food trucks parked in the library parking lot. In case of inclement weather, indoor seating is available in the Robinson Science Hall lobby and Weyerhaeuser 111.

RS = Regular Session SS = Special Session PS = Poster Session

Welcome from the President of Whitworth University



Whitworth University is proud to welcome students from Eastern Washington University, Gonzaga University, Washington State University-Spokane, Community Colleges of Spokane and Whitworth to the 13th Annual Spokane Intercollegiate Research Conference (SIRC). This event provides an opportunity for students to celebrate the research they have completed and to disseminate the results of their work to their peers and the public. In so doing, they join an academic enterprise that for centuries has advanced the frontiers of knowledge and applied that knowledge to solving the world's most complex problems.

The great medieval philosopher and theologian Thomas Aquinas may be considered one of the fathers of the modern university and, in many ways, of SIRC. He recognized reason as one of humankind's greatest gifts, and that the greatest use of human reason was to pursue knowledge and truth wherever they may be found. His careful examination of the natural world (science)

led him to understandings of history, philosophy and theology (humanities) and of economics, politics and psychology (social science) that had tremendous influence on Western thought and that are reflected in the breadth of subjects explored at this conference.

Aquinas also is known for an extraordinary body of writings in which he shared his knowledge with the world. As we make discoveries and gain insights through our research, we bear the responsibility to submit our work to the review of others in our field and to share what we have learned with the broader public. Peer review and public dissemination go hand in hand with the underlying research in expanding the body of knowledge needed to solve the critical problems we face. The students presenting at SIRC take that responsibility seriously, and I thank you.

On behalf of the faculty, staff and students of Whitworth University, I welcome you to our campus and applaud your contributions to the noble and important enterprise of academic scholarship and research.

Sincerely,

A handwritten signature in black ink, appearing to read 'Beck A. Taylor'. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Beck A. Taylor, Ph.D.

President

Whitworth University

Early Morning Sessions

9:00 a.m. – 10:30 a.m.

Session RS1

Room ROB 141

Faculty Moderator: Paul DePalma, Gonzaga University

RS1-a Bethany Bogensberger: “Zipfian Distribution of Words and Word Phrases in American English Speech”

Faculty Sponsor: Paul DePalma, Gonzaga University

RS1-b Christopher Pereyda: “Calculating Stock Fluctuation to Optimize Portfolio Gains using ANNs and CAPM”

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-c Mykaela Hendrix: “Dyslexia and Computer Science”

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-d Bryan Xiong: “Countermeasures of Universal Serial Bus Computer Virus”

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-e Kaitlyn Duarte: “How to Increase the Number of Women Pursuing Computer Science”

Faculty Sponsor: Peter Tucker, Whitworth University

Session RS2

Room ROB 210

Faculty Moderator: Vikas Gumbhir, Gonzaga University

RS2-a Josiah Lara: “The Sex Part Always Gets in the Way? Experiences of Friendship between Men and Women”

Faculty Sponsor: Nicole Willms, Gonzaga University

RS2-b Riana Slyter: “Feeding the Monster of Our Imagination”

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS2-c Madison Garner: “Relational Maximization and Commitment in Romantic Relationships”

Faculty Sponsor: Alan Mikkelson, Whitworth University

RS2-d Joshua Terris: “Family Communication Patterns Shifting among Generations”

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS2-e Alisha Isensee, Abigail Glenn, and Claire Farrington: “Memorable Weight Management Messages”

Faculty Sponsor: Andrea A. McCracken, Gonzaga University

Session RS3**Room ROB 229***Faculty Moderator: Scott D'Amico, Whitworth University*

- RS3-a Zoë Dugdale: "Alaska Grown: Analyzing Alaska Native News Coverage in the Land of the Midnight Sun"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS3-b Morgan Willie: "YouTube Vlogging and Cultural Citizenship"
Faculty Sponsor: Lisa Silvestri, Gonzaga University
- RS3-c Lane Lewis: "Representations of Motherhood in Popular American Magazines"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS3-d Grady Foster: "Columbine vs. Arapahoe: The Power of Media Framing"
Faculty Sponsor: Lisa Silvestri, Gonzaga University
- RS3-e Louis Alessandria: "The Digital Divide: How Information Technology has become the Currency of Opportunity"
Faculty Sponsor: Lisa Silvestri, Gonzaga University

Session RS4**Room WEY 305***Faculty Moderator: Anna Marie Medina, Gonzaga University*

- RS4-a Emily Moline and Horizon Worden: "Resources and Responses to Sexual Assault by Christian Faith Communities"
Faculty Sponsor: Stacy Keogh, Whitworth University
- RS4-b Katelyn Pendley: "Not Our Son, Not Our Town: Media Coverage and the Mass School Shooting Epidemic"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS4-c Chase Deiglmeier: "The Chamber of Secrets: Perceptions of Gun Violence and Concealed Carry of College Youth"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS4-d Allyson Wilson: "Alcohol, Attire, and a Bed: Rape Myths and Perceptions of Sexual Assault on a Private College Campus"
Faculty Sponsor: Vikas Gumbhir and Nicole Willms, Gonzaga University

Session RS5**Room HUB MPR***Faculty Moderator: Karla Parbon, Whitworth University*

- RS5-a Miranda Heckman: "The Dancing Spokane River: Teaching Science through the Language of Dance"
Faculty Sponsor: Suzanne Ostersmith, Gonzaga University
- RS5-b Kaitlyn Anson: "Driving the Pastoral: An Experiment in Blending Passions with Interdisciplinary Thinking"
Faculty Sponsor: Suzanne Ostersmith, Gonzaga University
- RS5-c Diana Fisher: "The Choreographic Design Process in Comparison with the Engineering Design Process"
Faculty Sponsor: Steven Zemke and Suzanne Ostersmith, Gonzaga University

Session SS1A**Room ROB 310***Faculty Moderator: Thomas McKenzie, Gonzaga University*

- SS1A-a Ernie Tsybulnik: "Metapopulation Dynamics Incorporating an Allee Effect"
Faculty Sponsor: Richard Cangelosi, Gonzaga University
- SS1A-b James Winslow: "Consideration of Type III Holling Predation in Harmful Algal Blooms"
Faculty Sponsor: Richard Cangelosi, Gonzaga University
- SS1A-c Joe Stauss: "Perturbing Equilibria of the Three-Body Problem"
Faculty Sponsor: Richard Cangelosi, Gonzaga University

Session SS2**Room WEY 303***Faculty Moderator: Nicole Sheets, Whitworth University*

- SS2-a Denin Koch: "Fractals: Using Math to Understand Depression"
Faculty Sponsor: Nicole Sheets, Whitworth University
- SS2-b Alexa Jose: "Dust to Dust"
Faculty Sponsor: Nicole Sheets, Whitworth University
- SS2-c Molly Rupp: "Decay"
Faculty Sponsor: Nicole Sheets, Whitworth University
- SS2-d Juliana Zajicek: "Rest in Peace"
Faculty Sponsor: Nicole Sheets, Whitworth University

Session SS3

Room WEY 304

Faculty Moderator: Timothy Clancy, Gonzaga University

- SS3-a Katharine Jones: “An Impossible Act: Juggling Evangelism and Social Justice on Missions to Eastern China”
Faculty Sponsor: Timothy Clancy, Gonzaga University
- SS3-b Claire Henson: “The Silent Invasion”
Faculty Sponsor: Timothy Clancy, Gonzaga University
- SS3-c Iris Matulevich: “The Stuff that American Dreams are Made of: Why the Film Noir Genre Emerged in the Midst of Religious Fervor in Postwar America”
Faculty Sponsor: Timothy Clancy, Gonzaga University
- SS3-d Christian Astran: “The Hook-Up Culture and Catholic Universities: Are Catholic Values Still Significant”
Faculty Sponsor: Timothy Clancy, Gonzaga University

Late Morning Sessions

10:45 a.m. – 12:15 p.m.

Session RS6

Room ROB 141

Faculty Moderator: LuElla D'Amico, Whitworth University

- RS6-a Simon Puzankov: "A Play on Gender: Women in Video Games"
Faculty Sponsor: LaToya Brackett, Whitworth University
- RS6-b Christopher Kotson: "The Western District Way: Reconsidering 'The Wire' in a Post-Freddie Gray America"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS6-c Emalise Luzzo: "Good Beer for You, Good Beer for Us: An Analysis of the Subculture of Craft Brewing in Spokane, WA"
Faculty Sponsor: Nicole Willms, Gonzaga University
- RS6-d Sara Jones: "The Ideal Princess, the Perfect Woman"
Faculty Sponsor: Nichole Bogarosh, Whitworth University

Session RS7

Room ROB 210

Faculty Moderator: Matthew Cremeens, Gonzaga University

- RS7-a Catlin Croskrey, Max Hernandez-Brito, and Erik Buren: "Circularly Polarized Helical Antenna Optimization"
Faculty Sponsor: Steve Schennum, Gonzaga University
- RS7-b Bryce Bagley: "A Theoretical Analysis of Ligand-binding Dynamics in NR2E1"
Faculty Sponsor: Kamesh Sankaran, Whitworth University
- RS7-c Lydia Rush: "Potential Non-Statistical Dynamics in Combustion, Atmospheric and Stellar Reactions"
Faculty Sponsor: Matthew Cremeens, Gonzaga University
- RS7-d Alan Lytton, Mollie Freel, and Luke Blanchart: "Investigation of Injection Parameters on Mechanical Properties of Injection Molded ABS"
Faculty Sponsor: J. McCall, Gonzaga University

Session RS8

Room ROB 229

Faculty Moderator: Vesta Coufal, Gonzaga University

- RS8-a Johnnie Duguay: "Awareness and Knowledge of Protected Area Categories in Phnom Kulen National Park, Cambodia"
Faculty Sponsor: Georgina Lloyd, The School for Field Studies
- RS8-b Marissa Dehler, Ruth Tse, Grace Kim, and Jonathan Duyker: "Activism as a Role in Visual Communication"
Faculty Sponsor: Karen Gutowsky-Zimmerman, Seattle Pacific University

RS8-c Zach Oxford-Romeike: "Tainted Blood: Altering the Blood Donation Ban Affecting Non-heterosexual Men"
Faculty Sponsor: Marguerite Marin, Gonzaga University

RS8-d Adam J. Higuete: "Integration of Nuclear Fusion Generators and Water Desalination Facilities to Increase Growth in the Middle East and North Africa"
Faculty Sponsor: Peter Tucker, Whitworth University

Session SS1B

Room ROB 310

Faculty Moderator: Gail Nord, Gonzaga University

SS1B-d Rebecca Mitchell: "A Mathematical Model for the Rise in Pertussis"
Faculty Sponsor: Sergey Lapin, Washington State University

SS1B-e Chauncy Cullitan: "A Parallel Genetic Algorithm for Book Embedding"
Faculty Sponsor: Paul DePalma and Shannon Overbay, Gonzaga University

SS1B-f Ethan Snyder and Eric Rogers: "Infinitesimal-Based Calculus"
Faculty Sponsor: Jeffery Wand, Gonzaga University

SS1B-g Audrey Gomez and Aubrey Ibele: "Dynamical Love"
Faculty Sponsor: Richard Cangelosi, Gonzaga University

Session SS4

Room WEY 303

Faculty Moderator: Rafaela Acevedo-Field, Whitworth University

SS4-a Hannah Tweet, Elizabeth Williams, and Donna Schrock: "Silencios históricos y la identidad nacional: la inmigración china al Perú en siglo XIX"
Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

SS4-b Donna Schrock: "Manuela Saénz: A Look at Simón Bolívar's Mistress"
Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

SS4-c Elizabeth Williams: "Un pueblo mudo es un pueblo muerto": Maya K'iche Poetic Witness
Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

Session SS5

Room WEY 304

Faculty Moderator: Fred Johnson, Whitworth University

SS5-a Audrey Strohm, Dana Comi, and Nick Avery: "Postmodern Destinations: Arriving in Liminal Spaces with DeLillo, Doctorow, and the Portlandia Crew"
Faculty Sponsor: Fred Johnson, Whitworth University

Session PS1**Room Graves Gym**

- PS1-a Daniel Maionchi: "Creating a Drug Sensitive Strain of *Pichia pastoris*"
Faculty Sponsor: Brian Dunn, Gonzaga University
- PS1-b Blake Mansfield: "Primers and PCR to Obtain Aryl Sulfatase B Recombinant"
Faculty Sponsor: Trisha Russell, Whitworth University
- PS1-c Conner Richards: "Producing an Undergraduate Experiment Focusing on HPLC and Fluorimetry Techniques using Alkaloids Ambiently Extracted from Goldenseal Root"
Faculty Sponsor: Trisha Russell, Whitworth University
- PS1-d Erik Domas, Trevor Pereyda, and Bailey Keefe: "The Effects of Creatine Administration on *Danio rerio* Lean Muscle Mass and Oxygen Consumption"
Faculty Sponsor: Michael Sardinia, Whitworth University
- PS1-e Dahyun An, Erin O'Donell, and Marie Nisco: "A Comparison of Effects of Direct Instruction Flashcards and Math Racetracks on Multiplication Facts with High School Special Education Student with Intellectual Disability and ADHD"
Faculty Sponsor: Jennifer Neyman, Gonzaga University
- PS1-f Jessica Moorhouse and Megan Carroll: "The Effects of a Functional Communication Training Intervention on a 4-year-old girl with Autism"
Faculty Sponsor: Jennifer Neyman, Gonzaga University
- PS1-g Daniel Barnhart: "Analysis of Bending Fatigue Stress Using Strain Gage Data and Modeling Software for 2 Different Specimen Designs"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS1-h Rachel Hallett: "The Effects of a Direct Instruction Model, Lead, Test Counting Procedure on Mastery of Rote Counting by a Preschool Student with a Developmental Delay"
Faculty Sponsor: Jennifer Neyman, Gonzaga University
- PS1-i Charlotte Trebilcock: "Calculation of Enthalpy of Desorption for Metal Hydrides used as Candidate Materials for Hydrogen Storage"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS1-j Kevin Brown, Emily Korf, and Candace Ireland: "Quetzal (*Pharomachrus mocinno*) Nesting Preferences in Relation to Running Water Proximity and Ambient Noise"
Faculty Sponsor: Grant Casady, Whitworth University
- PS1-k Cody Kaiser: "Rescue Mutations for an X-Prolyl Dipeptidyl Aminopeptidase (PEPX) W425G Variant"
Faculty Sponsor: Deanna Ojennus, Whitworth University
- PS1-l David Starkovich: "Crystallization of *Lactobacillus helveticus* PEPX"
Faculty Sponsor: Deanna Ojennus, Whitworth University

- PS1-m Alissa Bates, Kelee Lambert, and Rachael Bachler: “Assessments of Abundance in Mollusk Populations in Two Intertidal Habitats in the Gulf of Nicoya, Costa Rica”
Faculty Sponsor: Grant Casady, Whitworth University
- PS1-n Jenna Morris, Asa Arhelger, and Phillip Bax: “Do Leaf Characteristics Influence Foraging Habits in Leaf-cutter Ants (*Atta cephalotes*)?”
Faculty Sponsor: Grant Casady, Whitworth University
- PS1-o Marie Arguinchona: “Expression, Purification and Spectroscopic Analysis of *L. helveticus* PEPX and Triple Mutant”
Faculty Sponsor: Deanna Ojennus, Whitworth University
- PS1-p Anita Weeks: “Crystallization of PEPX from *L. helveticus*”
Faculty Sponsor: Deanna Ojennus, Whitworth University
- PS1-q Jordan Takasugi: “The Influence of Helper Relatedness in Acorn Woodpecker Group Success”
Faculty Sponsor: Joseph Haydock, Gonzaga University
- PS1-r Justin Luppens and Cassandra Hennings: “Geotechnical Analysis of a Martian Soil Simulant JSC MARS-1”
Faculty Sponsor: Richard Orndorff, Eastern Washington University
- PS1-s Austin Cendejas: “Optimizing the Synthesis of Praziquantel Derivatives for Implementation in the Undergraduate Organic Chemistry Laboratory”
Faculty Sponsor: Trisha Russell, Whitworth University
- PS1-t Dominique Armstrong: “Determining the Fraction Unbound of Herbal Product Constituents in Human Liver Microsomes to Improve Herb-Drug Interaction Predictions”
Faculty Sponsor: Mary Paine, Washington State University
- PS1-u Rachel Foster: “Tobacco Cessation in Women's Infants' and Children's Nutrition Program (WIC) - Baby & WE”
Faculty Sponsor: Joann Dotson, Washington State University
- PS1-v Versha Sinha: “Investigating the Role of Fer Kinase in the Early Blood Development of Zebrafish”
Faculty Sponsor: Aaron Putzke, Whitworth University
- PS1-w Jacqueline Barbeau, Cara Nickolaus, and Anthony Verducci: “The Effects of Implementing a Direct Instruction Flashcard Procedure for Grade Leveled Sight Words on Two Twelve-Year-Old Students”
Faculty Sponsor: Jennifer Neyman, Gonzaga University
- PS1-x Alexander Hoffmann, Elisabeth Larson, and Kristen Schoenike: “The Effects of a Mindfulness-based Stress Reduction Meditation Regimen on the Physiological Stress Response of College Students”
Faculty Sponsor: Michael Sardinia, Whitworth University

- PS1-y Hannah Beachwood, Tawnie Rand, and Joel Alexander: "Effects of Caffeine Consumption on Cognitive Function and Mood"
Faculty Sponsor: Michael Sardinia, Whitworth University
- PS1-z Jordan Holmes: "Analysis of the Formation of Sucralose Derivatives using GC-MS"
Faculty Sponsor: Trisha Russell, Whitworth University
- PS1-aa Anthony Lapsansky and Breanna Byrne: "Using Parentage to Study the Reproductive Ecology of the Northern Saw-whet Owl"
Faculty Sponsor: Joseph Haydock, Gonzaga University
- PS1-bb Angela Newman, Kseniya Maroz, Kelland Wolf, and Lakhwinder Bains: "Mutagenesis of a Bordetella Virulence Protein"
Faculty Sponsor: Suzanne Bassett, Spokane Community College
- PS1-cc Molly Steck: "Do Invasive Plants Influence Habitat Selection for Brooding Sage-grouse?"
Faculty Sponsor: Grant Casady, Whitworth University

Early Afternoon Sessions

1:30 p.m. – 3:00 p.m.

Session RS9

Room ROB 141

Faculty Moderator: Bendi Schrambach, Whitworth University

- RS9-a Emily Curran: “College Student Perceptions of Virginity, Sex and Intimate Relationships”
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS9-b Lauren Noonan: “Types of Errors in Upper Division French Students' L2 Writing”
Faculty Sponsor: Bendi Schrambach, Whitworth University
- RS9-c Kate Brittingham: “Participation Points: The Difference Between Male and Female Participation in Classrooms”
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS9-d Hannah Beachwood: “Medical-Based Spanish Study Abroad Opportunities for Science Majors”
Faculty Sponsor: Lindy Scott, Whitworth University
- RS9-e Sarah Martin: “From Combat to Chaos: The Physical, Mental, and Emotional Difficulties Student Service Members/Veterans Face in Higher Education”
Faculty Sponsor: Vikas Gumbhir, Gonzaga University
- RS9-f Amy Hooper: “Addressing the 'Leak' in the STEM Pipeline: Examining Where and Why the United States' Education System is Losing STEM Students”
Faculty Sponsor: Peter Tucker, Whitworth University

Session RS10

Room ROB 210

Faculty Moderator: Nichole Bogarosh, Whitworth University

- RS10-a Emma Laufer: “We are here too: Experiences of Tokenism in Women Majoring in Engineering”
Faculty Sponsor: Nicole Willms, Gonzaga University
- RS10-b Sadie Ridgeway: “Me, Myself, and I-Phone: Fitness apps and body surveillance among college women”
Faculty Sponsor: Nicole Willms, Gonzaga University
- RS10-c Emily Nichols: “Pay (Tuition) or Get Paid: Higher Education and Young Men's Decisions about Life after High School”
Faculty Sponsor: Nicole Willms, Gonzaga University
- RS10-d Sara Brazier: “Gender Inequality: The Overlooked War between Women and America's Military and Police Forces”
Faculty Sponsor: Marguerite Marin, Gonzaga University

RS10-e Luke Batty: "Don't Forget your Full Metal Jacket! Maternal Perspectives on American Gun Violence"
Faculty Sponsor: Lisa Silvestri, Gonzaga University

Session SS6

Room ROB 229

Faculty Moderator: Meredith Shimizu, Whitworth University

SS6-a Anna Short: "Art Ownership and the Process of Restitution Post World War II"
Faculty Sponsor: Amanda Clark, Whitworth University

SS6-b Sophia Du Val: "Art as Cultural Property: Ethical Issues in Art Law"
Faculty Sponsor: Amanda Clark, Whitworth University

SS6-c Sarah Spouse: "Roman Copies: Artistic Emulation and Forgery in the First Century"
Faculty Sponsor: Amanda Clark, Whitworth University

SS1C

Room ROB 310

Faculty Moderator: Kate Kearney, Gonzaga University

SS1C-h Ethan Mahintorabi: "Searching for the Optimal Strategy to a Penny Auction Using Applied Queuing Theory"
Faculty Sponsor: Bonni Dichone, Gonzaga University

SS1C-i Bryan Strub, Hayley Olson, and Ryan Lattanzi: "Klein Links Versus Torus Links"
Faculty Sponsor: Vesta Coufal and Kate Kearney, Gonzaga University

SS1C-j Jenia Rousseva: "Alternating Quantum Walks"
Faculty Sponsor: Frank Lynch, Eastern Washington University

SS7

Room WEY 303

Faculty Moderator: Sarah Arpin, Gonzaga University

SS7-a Katherine Palmer: "Do Moral Intuitions and Situations Vary Across Cultures?"
Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-b Kelsey Bajet: "Cultural Variations in Using Self as a Reference Point When Choosing Souvenirs For Self and Others"
Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-c Carly Ball and Jacqueline Armour: "Examining Sources of Culture-mismatch: Can Marginalizing Situations Cause Behaviors to Deviate from Cultural Norms?"
Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

- SS7-d Emily McMonigle and Emily Handy: "The Role of Relational Mobility has on Persistence of First Impressions Across Cultures"
Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University
- SS7-e Devin Ellis and Amanda McCleary: "Pilot Test on the Causal Relationship between Perceptions of Control, Green Behaviors, and Attitudes Towards Climate Change"
Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

Session SS8A

Room WEY 304

Faculty Moderator: Dana Elder, Eastern Washington University

- SS8A-a Sony De Paula: "The Role of the Youth in America's Democracy"
Faculty Sponsor: Dana Elder, Eastern Washington University
- SS8A-b Chris Grim: "Aristotle on Agon"
Faculty Sponsor: Dana Elder, Eastern Washington University
- SS8A-c Corey Horn: "Aristotle's Politics and the Constitution of Athens: One Solution to Political Unrest for the United States"
Faculty Sponsor: Christopher Kirby, Eastern Washington University
- SS8A-d Mica Pointer: "Aristotle's Polis"
Faculty Sponsor: Christopher Kirby, Eastern Washington University
- SS8A-e Spencer Roberg: "Aristotle and Ethos"
Faculty Sponsor: Christopher Kirby, Eastern Washington University
- SS8A-f Jesse Rinderneck: "A Modern Tyrant"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

Session PS2

Room Graves Gym

Faculty Moderator: TBA

- PS2-a Clarisa Watkins: "Determination of Heavy Metals in Water from the Little Spokane River, WA, USA"
Faculty Sponsor: William Ntow, Whitworth University
- PS2-b Derek Savage and Mary Walker: "Physiochemical Investigations of the Surface Water of Little Spokane River"
Faculty Sponsor: William Ntow, Whitworth University
- PS2-c Samantha Lawson: "Optimization of Tissue Microarray Production for Immunohistochemistry"
Faculty Sponsor: Kerry Breno, Whitworth University

- PS2-d Joie Ikuzwe: "Determination of heavy metals concentration in a wetland on the Little Spokane River"
Faculty Sponsor: William Ntow, Whitworth University
- PS2-e Mateo Ledesma: "Effect of Hydrogen and Vapor Solvent Exposure on the Mechanical Properties of 3D Printed Polylactic Acid"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS2-f Kevin Featherstone: "Correlation of Bending Fatigue Data for Two Different Specimen Designs and at Different Gaseous Hydrogen Exposure Levels for 304 Stainless Steel"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS2-g Matthew Gschiel: "Improving the Efficiency and Accuracy of Molecular Modeling Through the use of Natural Orbitals"
Faculty Sponsor: Gergely Gidofalvi, Gonzaga University
- PS2-h Jessica Moorhouse and Sarah Trapp: "The Effects of a Social Story with a Reward to Decrease Off Task and Disruptive Behaviors on a Sixth Grader with Autism"
Faculty Sponsor: Jennifer Neyman, Gonzaga University
- PS2-i Sydney Hutton and Aubrey Ibele: "How does Huntington's Disease Alter Circadian Rhythm in *Drosophila melanogaster*"
Faculty Sponsor: Helen Smith-Flores, Gonzaga University
- PS2-j Maggie Jones: "Historical Reconstructions of Hg in Puget Sound: Pre-Industrial, Environmental Regulations, and 21st Century"
Faculty Sponsor: Stephen Hayes, Gonzaga University
- PS2-k Harrison Van Til: "Rolling Direction Effects on Tensile Results for 304 Stainless Steel"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS2-l Zachary Oxford-Romeike: "Perfectionism, Perceived Incompetence, and Eating Disorder Symptoms"
Faculty Sponsor: Anna Marie Medina, Gonzaga University
- PS2-m John Tatka: "Strain Rate Effects on Hydrogen Embrittlement Results for 304 Stainless Steel"
Faculty Sponsor: Patrick Ferro, Gonzaga University
- PS2-n Thu Nguyen: "Molybdenum Complex and Hydrogenation of Unsaturated Ketone"
Faculty Sponsor: Kerry Breno, Whitworth University
- PS2-o Shin Ku (James) Kang: "Heavy Metal Content of Sediment in the Little Spokane River"
Faculty Sponsor: William Ntow, Whitworth University
- PS2-p Symara De Melo Silva and Zach Steinberg: "Development of Dual-Modality Liposomes for Image-Guided Drug Delivery Applications"
Faculty Sponsor: Osasere Mary Evbuomwan, Gonzaga University

- PS2-q Drake Martin, Justin Schneider, and Brandon Kautzman: “Influence of Mazama Ash on the Unconfined Compressive Strength of a Soil from a Residential Development in Cheney, WA”
Faculty Sponsor: Richard Orndorff, Eastern Washington University
- PS2-r Cassandra Hennings and Justin Luppens: “Geotechnical Analysis of the Impacts of Mazama Ash (5677 BC) on the California Bearing Ratio (CBR) of Soil from a Residential Construction Site in Cheney, WA”
Faculty Sponsor: Richard Orndorff, Eastern Washington University
- PS2-s Riley Snyder, Kaila Savage, and Lourdes Garcia: “Influence of Mt. Mazama Volcanic Ash on the Optimal Water Content for Compaction of a Soil from a Residential Development in Cheney, WA”
Faculty Sponsor: Richard Orndorff, Eastern Washington University
- PS2-t Sara Oberlander, Stephanie Herrin, Timothy Post, Charles Wilkes, Curtis Anderson, and Jacob Barbarino: “A Student Outcrop Mapping Project”
Faculty Sponsor: Andrew Buddington, Spokane Community College
- PS2-u Mark Bronson: “The High Resolution Infrared Analysis of Allene”
Faculty Sponsor: Anthony Masiello, Eastern Washington University
- PS2-v Jonathan Smith: “Vapor Pressure Determination using Infrared Spectroscopy”
Faculty Sponsor: Anthony Masiello, Eastern Washington University
- PS2-w Kyle Elsasser: “Length Determination using Interferometry”
Faculty Sponsor: Anthony Masiello, Eastern Washington University
- PS2-x Hannah Souers: “Synthesis of Molecules with Potential Biological Activity: A Social Justice Project in Chem 331L: Organic Chemistry II Lab”
Faculty Sponsor: Gemma D’Ambruoso, Gonzaga University
- PS2-y Amanda Martin: “The Effect of Deleting the Gene Rru_A2871 on Rhodoquinone Biosynthesis in *Rhodospirillum rubrum*”
Faculty Sponsor: Jennifer Shepherd, Gonzaga University
- PS2-z Lucas Evert: “Geochemical and Field Identification of a Landslide at Steamboat Rock, Washington using Portable X-ray Fluoresce”
Faculty Sponsor: Chad Pritchard, Eastern Washington University
- PS2-aa Sam Carpenter, Megan Hall, Kelley Stone, and Desirae Marion: “DNA Sequence Analysis of a *Pseudomonas fluorescens* Genomic Library”
Faculty Sponsor: Suzanne Bassett, Spokane Community College
- PS2-bb Bernt Goodson and Austin Armstrong: “Preliminary Mapping and Structural Interpretation of an Aureole in Eastern Washington”
Faculty Sponsor: Chad Pritchard, Eastern Washington University

PS2-cc

Aurora Kraus: "Knockdown of p27 Down Regulates GATA3 Expression in HEI-OC1 and MEF Cell Lines"

Faculty Sponsor: Kevin Measor, Gonzaga University

Late Afternoon Sessions

3:15 p.m. – 4:45 p.m.

Session RS11

Room ROB 141

Faculty Moderator: Julia Stronks, Whitworth University

- RS11-a Phillip Allevato: "The Constitutionality of the Espionage Act"
Faculty Sponsor: Julia Stronks, Whitworth University
- RS11-b Francesca Bisciglia: "The Constitutionality of English Language Development Programs in US Public Schools"
Faculty Sponsor: Julia Stronks, Whitworth University
- RS11-c Jerusha Dressel: "Montgomery v. Louisiana: The United States Supreme Court and Retroactivity in Criminal Law Collateral Review Cases under the Teague Standard"
Faculty Sponsor: Julia Stronks, Whitworth University
- RS11-d McKenzie Legg: "The Constitutionality of Contraceptives"
Faculty Sponsor: Julia Stronks, Whitworth University
- RS11-e Daniel Geiter: "Foster v. Chatman: Injustice in Juries"
Faculty Sponsor: Julia Stronks, Whitworth University
- RS11-f Caleb Mathena: "Friedrichs v. California Teachers Association: Reexamining the Constitutionality of the Agency Shop"
Faculty Sponsor: Julia Stronks, Whitworth University

Session RS12

Room ROB 210

Faculty Moderator: Vikas Gumbhir, Gonzaga University

- RS12-a Emalise Luzzo and Nathan Knox: "Cognitive Performance under Different Environmental Conditions"
Faculty Sponsor: Anna Marie Medina, Gonzaga University
- RS12-b Bryce Bagley: "A Non-gestalt Theory of Objects"
Faculty Sponsor: Nathan King, Whitworth University
- RS12-c Kathryn Hendricks: "A Christian Approach to Deification: What Protestants can learn from Eastern Orthodoxy"
Faculty Sponsor: Karin Heller, Whitworth University
- RS12-d Ellie Probus: "The Effects of a Strengths-Focused Approach on Paternalistic Prejudice in Volunteers"
Faculty Sponsor: Alicia Epps, Whitworth University
- RS12-e Katlyn Lee: "Adventure Based Leadership Education Through Hardiness"
Faculty Sponsor: Adrian Popa, Gonzaga University

RS12-f Neal Jatekar: "Personality and Decision-Making"
Faculty Sponsor: Anna Marie Medina, Gonzaga University

Session RS13

Room ROB 229

Faculty Moderator: Claudia Bucciferro, Gonzaga University

RS13-a Marianne Sfeir: "North American Christianity? Quo Vadis?"
Faculty Sponsor: Karin Heller, Whitworth University

RS13-b Lilly Davis: "Wisdom Psalms: Is the Category Worthwhile?"
Faculty Sponsor: Will Kynes, Whitworth University

RS13-c Brittany Decker: "Self Stratums"
Faculty Sponsor: Jenny Hyde, Eastern Washington University

RS13-d Kieran Abbotts: "Hip Hop Fans Perception of Race in Hip Hop"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS13-e Anna Welch: "A Narrative of Ecocentrism: A White Heron by Sarah Orne Jewett"
Faculty Sponsor: Paul Lindtholdt, Eastern Washington University

RS13-f Bradley Rehwaldt: "Timbuktu: The Malpractice of Losing History"
Faculty Sponsor: LaToya Brackett, Whitworth University

Session RS14

Room ROB 310

Faculty Moderator: Lindy Scott, Whitworth University

RS14-a Paxton Richardson: "From Pictures to Protests: The Social Psychology of Collective Action"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS14-b Levi Detrich: "Black Wall Street: A Thriving Community Destroyed by Hatred"
Faculty Sponsor: LaToya Brackett, Whitworth University

RS14-c Corey Horn: "Aristotle's Constitution of Athens and John Locke's Second Treaties of Government: What John Locke Could Learn from the Ancient Mind"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

RS14-d Cassandra Hiatt: "Healthcare for All!"
Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS14-e Claire Couron: "Inequality in American Higher Education"
Faculty Sponsor: Marguerite Marin, Gonzaga University

RS14-f William Corbett: "Food Deserts"
Faculty Sponsor: Marguerite Marin, Gonzaga University

Session RS15

Room WEY 303

Faculty Moderator: Joseph Haydock, Gonzaga University

RS15-a Christian Peterson and Om Neelay: "Antimicrobial Peptide Interactions with Bacterial Membranes"
Faculty Sponsor: Matthew Cremeens, Gonzaga University

RS15-b Rachel Noyes: "Interferon-gamma Antagonizes Type 2 Immune Drive Tuft Cell Hyperplasia"
Faculty Sponsor: Kirk Anders, Gonzaga University

RS15-c Laura Seifert: "DNA Extracted from Eggs Allows Study of Sexual Selection in the Acorn Woodpecker"
Faculty Sponsor: Joseph Haydock, Gonzaga University

RS15-d Chad Hicks: "Growth and Purification of the Pseudomonas putida HMG-CoA Reductase Enzyme"
Faculty Sponsor: Jeff Watson, Gonzaga University

RS15-e Michael Arnold: "Presenting Biological Research Data in a Web-Based Format/ A Key to Open-Source Research"
Faculty Sponsor: Peter Tucker, Whitworth University

Session SS8B

Room WEY 304

Faculty Moderator: Christopher Kirby, Eastern Washington University

SS8B-g Braden Agueros: "Virtue and Democracy"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-h David Collins: "What is Democracy?"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-i Jason Heitzmann: "What Modern Democracies could Learn from Aristotle"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-j Alfred Lapier: "Native Americans and Aristotle's Notion of Patria"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-k Jacob Schmauch: "Aristotle's Aristos: The 'Good Man' and Uncle Sam"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-I Loni Taber: "Hoi Polloi"
Faculty Sponsor: Christopher Kirby, Eastern Washington University

Session SS9

Room WEY 305

Faculty Moderator: Ingrid Ranum, Gonzaga University

SS9-a Margaret Douglas: "Fatherhood in Victorian Era: Critical Analysis of Fatherhood in George Eliot's *Silas Marner*"
Faculty Sponsor: Ingrid Ranum, Gonzaga University

SS9-b Emily Courchaine: "Women Writing Masculinities in the Victorian Era"
Faculty Sponsor: Ingrid Ranum, Gonzaga University

SS9-c Katie Polacheck: "The New Woman and the New Man as Androgynous in *The Story of an African Farm*"
Faculty Sponsor: Ingrid Ranum, Gonzaga University

List of Abstracts

RS1-a Bethany Bogensberger: “Zipfian Distribution of Words and Word Phrases in American English Speech”

Zipf's law states that given some text, the frequency of any word is inversely proportional to its statistical rank. For English if the most common word happens to be “a”, it will appear twice as often as the second most common word and three times more than the third most common word.

Zipf's law has been shown to hold for two and three word sequences in all languages examined. In recent years, linguists have begun to notice that speech is structurally different from writing. Nevertheless, no one, to our knowledge has demonstrated that Zipf's Law describes the distribution of words in speech. To do this, we are building custom software in the Python programming language to investigate the distribution of words in the Buckeye Corpus, a collection of 300,000 plus words of American English speech.

Faculty Sponsor: Paul DePalma, Gonzaga University

RS1-b Christopher Pereyda: “Calculating Stock Fluctuation to Optimize Portfolio Gains using ANNs and CAPM”

The purpose of this research is to show the thought process that goes into creating an AI for stock prediction. It will explain the foundations for the fundamental concepts needed to further investigate this field. For this project I will be using an Automatic Neural Network to analyze previously known data to develop a logical prediction value with 95% certainty. Then using the values obtained by the ANN, I will implement the Capital Asset Pricing Model to determine which stocks should be invested in. This will then lead to a greatly optimized portfolio and improved gains.

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-c Mykaela Hendrix: “Dyslexia and Computer Science”

Being a dyslexic student I find myself always wanting to teach others about my disability, so when they come across another dyslexic student that have a better idea in how to help them succeed. There are so many ways I can go about involving dyslexia into my research for this project, but one idea seems to stand out the most allowing me to form a question to start with. Can providing Computer Science to dyslexic students in high school affect college enrollment? Let us develop a structure for dyslexic students to further the education after high school in high demanding fields. It is time to build the confidence of students who are smart but may have a hard time showing it.

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-d Bryan Xiong: “Countermeasures of Universal Serial Bus Computer Virus”

Little by little computers all around the world are being infected by a simple yet avoidable problem. Due to the increase of technological advancements, Universal Serial Bus (USB) devices are being compromised and transformed into a weapon that causes harm to users and others.

Faculty Sponsor: Peter Tucker, Whitworth University

RS1-e Kaitlyn Duarte: “How to Increase the Number of Women Pursuing Computer Science”

In 2022, over one million jobs will go unfilled in the computer science industry. The overall number of college graduates continues to increase each year, yet the number of graduates attaining a computer science degree has remained stagnant. While accounting for gender, there is a downward trend for women. As of 2015 eighteen percent of undergraduate computer science degrees are held by women.

A question that has plagued researchers and the computer science industry is why women are not studying computer science. To answer this question, researchers focused on high school girls. One theory is that the college gender gap can be reversed if high school girls are encouraged to take AP Computer Science classes. The challenge with using high school girls as the focus group is the gender gap begins prior to high school. To solve the gender gap, the problem at the root. Studies suggest the gender gap begins in middle school. This research will focus on the beginnings and causations of the gender gap. The research will then look at a program that targets middle school students and has shown to decrease the gender gap.

Faculty Sponsor: Peter Tucker, Whitworth University

RS2-a Josiah Lara: “The Sex Part Always Gets in the Way? Experiences of Friendship between Men and Women”

The concept of cross-sex friendships is relatively new, however there has been some research on the topic that has shed some insight on the social construct—mostly in the realms of the challenges faced by the cross-sex friendship. I believe that I will be able to contribute to the research by researching how individuals outside of the friendship view cross-sex relationships and see if the perceptions by those outside the friendship match up with the experiences faced by those within the friendship.

I have conducted several semi-structured, in-depth interviews and a focus group in order to obtain my data. Through these interviews I hope to answer the following questions: What is the experience of a cross-sex friendship? How do others perceive cross-sex friendships? What makes a cross-sex friendship more or less appealing than a same-sex friendship?

Faculty Sponsor: Nicole Willms, Gonzaga University

RS2-b Riana Slyter: “Feeding the Monster of Our Imagination”

Horror movies have been popular for their enticing stimulation of fear. This paper examines how tropes of fear have evolved to account for an audience conscious of the conventions of fear. As we begin to break down fear in popular horror movies, there is something to be learned about contemporary attitudes, values and beliefs. There must be a change in the way we see horror movies in order to keep us entertained and coming back for more. Filmmakers who have developed horror movies have improved their work to keep up with the audience and their ever escalating levels of fear. It seems that today there are a few things that horror movies include that work for the audience. Movies that we find horrifying include ones that are considered to be based off of true stories, playing with expectations of the audience, and are defined as psychological thrillers.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS2-c Madison Garner: “Relational Maximization and Commitment in Romantic Relationships”

Commitment in romantic relationships tends to increase as satisfaction increases, but can a personality trait affect commitment levels of individuals in satisfying relationships? This study examines whether the trait of relational maximization impacts commitment. Relational maximization is the desire to make the best choice in romantic relationships and is comprised of three components: alternative search, high standards, and decision difficulty. This study explores how relational maximization and its components relate to commitment, and potentially moderate the relationship between satisfaction and commitment. Results from 343 participants revealed alternative search and decision difficulty were negatively related to commitment, while holding high standards did not produce a significant correlation. Results also showed that for highly satisfied individuals, relational maximization does weaken the relationship between satisfaction and commitment. One implication of these findings could be that a maximizer might end a highly satisfying relationship due to lower levels of commitment combined with high alternative seeking.

Faculty Sponsor: Alan Mikkelson, Whitworth University

RS2-d Joshua Terris: “Family Communication Patterns Shifting among Generations”

In today's society, we lack the understanding of how to connect with people that are not our age. Communication is a something that is very hard to master and is forever changing. Each generation has advanced in life with their special way of communicating with each other that are like-minded. Throughout this research, I am going to argue, show, and prove that through communication we can better understand each other no matter the age of the person. This research will layout the foundations on how to deal with communicating better with each generations giving advice that will help grow a family relationship that matters the most. We as a society need to realize that when we all work to together we can accomplish anything, especially with the advancement of technology.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS2-e Alisha Isensee, Abigail Glenn, and Claire Farrington: “Memorable Weight Management Messages”

Weight management is a major health challenge and has been linked to medical, psychological, social, and financial difficulties (Sarwer, Foster, & Wadden, 2004; Neumark-Sztainer & Haines, 2004; Carr & Friedman, 2006; Wolf & Colditz, 1998). However, the strategies employed by weight management programs and campaigns toward addressing this challenge have experienced limited success (U.S. Department of Agriculture, 2004). This research proposal employs a survey format to identify memorable weight messages. Memorable messages have two qualities: first, the individual recalls the message for a long period of time, and second, the individual perceives the message as having an important influence on their (Knapp et al., 1981). By asking participants to report about memorable weight messages, we can identify the message source, message content, and the perceived effectiveness of the message for weight management behaviors. Implications for healthcare practitioners, individuals trying to manage their weight, and health scholars will be discussed.

Faculty Sponsor: Andrea A. McCracken, Gonzaga University

RS3-a Zoë Dugdale: “Alaska Grown: Analyzing Alaska Native News Coverage in the Land of the Midnight Sun”

Through the content analysis of three Alaska Native news sources, I examine articles and ads that discuss the many facets of Native life in rural Alaska. Some of the dominant narratives appearing in these newspapers include the discussion of oil and gas, the environment, subsistence hunting and fishing, crime and violence, economic prosperity, land claims, accessibility to services and resources, etc. These rural newspapers are published on a weekly basis, and I examine each issue published in 2015, cover to cover. I engage in both deductive and inductive coding, employing strong qualitative methodology. I pay special attention to how salient certain issues are to distinct regions within the state. In sum, I focus on how rural news sources that manifest from communities housing a Native majority shape a cultural perspective of Native identity within the state of Alaska.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS3-b Morgan Willie: “YouTube Vlogging and Cultural Citizenship”

YouTube serves as a “forum for people to connect, inform, and inspire others across the globe,” and additionally “acts as a distribution platform for original content creators and advertisers large and small” (YouTube “About”). Video blogging, colloquially known as vlogging, is one of the most common and influential practices of YouTube users. The intent of this presentation is to put YouTube, as a space of appearance, (Arendt) in context and conversation with citizenship and civic discourse. I will describe the relationship between the practice of vlogging and cultural citizenship, primarily utilizing what social theorist Michel Foucault calls a dual economy of freedom and constraint to provide insight regarding communication phenomena on YouTube. The presentation will examine citizen media, participatory culture, and democratization. Commentary and observation from YouTube will be juxtaposed with

scholarly examination and theory. I will provide a thorough overview and interpretation of the video blogging collective.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS3-c Lane Lewis: “Representations of Motherhood in Popular American Magazines”

Understanding the importance of mothering ideologies in popular media, this research seeks to examine the mothering ideologies present in three popular women’s magazines and one popular parenting magazine. I perform structured and ethnographic content analysis of four issues of each of the following magazine titles: *Good Housekeeping*, *Family Circle*, *Woman’s Day*, and *Parents*.

I examine the prevalence of the “intensive mothering” ideology—thought to be the hegemonic ideal for modern day mothers—in each issue, and analyze the topic of self-care in the lives of mothers. Each selected issue is examined for assumptions regarding mothering norms, messages which normalize self-care and support systems in the life of a mother, and the presence of care activities being performed by or for mothers.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS3-d Grady Foster: “Columbine vs. Arapahoe: The Power of Media Framing”

In 2015 there were 372 gun-related acts of violence across the nation from Oregon to South Carolina. The shooting at a government-funded agency, which provides services and programs to adults with developmental disabilities, in San Bernardino, California resulted in the loss of 14 lives on December 2, 2015. The frequency of gun violence has made it such that shooting deaths are longer newsworthy to most Americans. The idea that gun violence has become normalized demands a new critical engagement in evaluating the portrayal of gun violence in the media. This paper offers a close textual analysis of print news media coverage of two school shootings 15 years apart to illustrate a shift in news reporting on the subject. The paper identifies a move from emphasis on the individual shooter to a failure in school policy, as the location of blame on the individual is no longer sufficient for the nation.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS3-e Louis Alessandria: “The Digital Divide: How Information Technology has become the Currency of Opportunity”

The goal of this presentation is to examine and analyze the communicative factors that are tied to the concept of the Digital Divide. That is, identifying that there is a gap between those who have access to modern information and communications technology, specifically the internet, and those who do not. Using collected data and expert interviews, this presentation will explore how economic status is contributing to this exponentially growing rift between the digital haves and have-nots, focusing

specifically on how this rift may affect education quality in the U.S. I will assert that the Digital Divide is inherently connected to wealth and we must first understand this, if anything is going to be done to address the issue.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

RS4-a Emily Moline and Horizon Worden: “Resources and Responses to Sexual Assault by Christian Faith Communities”

Churches are seen as places of refuge and safety from emotional turmoil, but are they sought out when people face emotional and physical trauma? We are interested in investigating the relationship between victims of sexual assault and their church communities. We will be researching the experiences had by victims of sexual assault when disclosing to church communities, as well as the resources made available by churches. Church communities can be an institution of support, and increased religiosity can help with recovery from traumatic events. This is important because if we find information leading us to believe that churches are not fulfilling the needs of victims of sexual assault, we can then examine what can be done on the part of the church communities to make their resources more welcoming and helpful to victims. For victims of traumatic events, often times disclosing the event can feel just as traumatic. Because of this sensitivity, respondents will be treated with the utmost sensitivity.

Faculty Sponsor: Stacy Keogh, Whitworth University

RS4-b Katelyn Pendley: “Not Our Son, Not Our Town: Media Coverage and the Mass School Shooting Epidemic”

Marysville, Washington; Red Lake, Minnesota; Jonesboro, Arkansas; Springfield, Oregon; Chardon, Ohio; these racially, geographically, and politically diverse cities all have one thing in common: they are all locations of mass school shootings. When horrendous events like these occur, people often turn to the media to find answers. The media subsequently formulate narratives in order to answer such questions. As a main source of information, these narratives construct reality for much of the American public, and therefore, are important to consider when studying and analyzing school shootings. For this project I used content analysis to examine the themes and concepts, including descriptions of shooters, schools, communities, and culture highlighted by the media in newspaper reports of five mass school shootings. My main research question was: what details, themes, or concepts have become normalized or exceptionalized by the national and state media in their coverage of mass school shootings?

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS4-c Chase Deiglmeier: “The Chamber of Secrets: Perceptions of Gun Violence and Concealed Carry of College Youth”

Currently, eight states in the U.S. have enacted legislation allowing concealed carry on public college campuses. Texas is the most recent state to enact such legislation, going into effect August of 2016,

allowing legal concealed carry permit holders to carry their weapon on campus. But, the majority of states have handed off the power to ban or allow concealed carry on campuses to each individual university and institution. This power being at the disposal of the institutions themselves raises the following question: What are the beliefs and opinions about firearms and concealed carry at a private Catholic university? In order to investigate this further, a set of questions focusing on the opinions and beliefs of students regarding firearms and concealed carry in today's society were administered through The General Gonzaga Survey. A total of 515 students started the survey, and 415 students provided enough data to be included in the final data set, for a completion rate of 80.6%.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS4-d Allyson Wilson: "Alcohol, Attire, and a Bed: Rape Myths and Perceptions of Sexual Assault on a Private College Campus"

Sexual assault and rape are a reoccurring issue on college campuses today. Gonzaga is no exception. Gonzaga students are asking for more attention on these problems and for the university to accept responsibility for the absence of conversation. I am asking Gonzaga students their perceptions about sexual assault on campus and their views of how the university addresses these issues. Do Gonzaga students rely on rape myths to predict their opinions of sexual assault? A random sample of Gonzaga students will be taken to assess perceptions of sexual assault and rape. Questions will include a student's own perception of their safety on and off campus at different parts of the day and if they believe certain rape myths. I anticipate that Gonzaga students do rely on rape myths to predict sexual assault and students do not have an accurate understanding Gonzaga's relationship with sexual assault.

Faculty Sponsor: Vikas Gumbhir and Nicole Willms, Gonzaga University

RS5-a Miranda Heckman: "The Dancing Spokane River: Teaching Science through the Language of Dance"

The Dancing Spokane River is a student-produced, dance-based production touring to K-6 schools in the Inland Northwest. This interactive performance teaches audiences about natural and renewable energy resources, ecosystem dynamics, and our own interactions with the Spokane River through movement and narration. In this presentation I will take the time to share my inspiration for this project, my processes and experience in research and development, and the success of the production thus far. We will also share an excerpt from the thirty-minute, interactive show.

Faculty Sponsor: Suzanne Ostersmith, Gonzaga University

RS5-b Kaitlyn Anson: “Driving the Pastoral: An Experiment in Blending Passions with Interdisciplinary Thinking”

Driving the Pastoral is a project that mixes the disciplines of writing and dance. Inspired by the senior project for a writing major, Driving the Pastoral is words written by the student presenter, set to music and choreographed for a company of four dancers from Gonzaga University. The presentation will take a look at the process and different components of research and communication that were required to take two passions and meld them to create this dance work. The presentation will include the benefits of interdisciplinary work, the ways it exists in places we might not even see it, and a presentation of the dance itself.

Faculty Sponsor: Suzanne Ostersmith, Gonzaga University

RS5-c Diana Fisher: “The Choreographic Design Process in Comparison with the Engineering Design Process”

Dance and engineering are often considered to be disparate areas of study with few overlapping applications. However, this research looks into comparing the engineering design process with the choreographic design process of dance. The intent is to identify the similarities and differences between the two processes with an end goal of further understanding each and how differences may be applied to the so-called opposing process. The engineering design process research is based in literature reviews of various books and journals. The choreographic design process research is based in interviews from a qualitative study of various choreographers and a student choreographer’s reflections. These will be synthesized into a choreographic design process by an engineering and dance student. From the results of the literature review, interviews, and student choreography, many common themes have emerged including iteration, analysis, and teamwork. Results will be presented with objective findings and demonstration of the dance.

Faculty Sponsor: Steven Zemke and Suzanne Ostersmith, Gonzaga University

SS1A-a Ernie Tsybulnik: “Metapopulation Dynamics Incorporating an Allee Effect”

Allee effects are essential in the examination of populations and growth rates. In our examination, we will review the concept of Allee effects and distinguish the difference between what it means for them to be strong vs. weak. The primary analysis will focus on the Levins model for metapopulation dynamics while incorporating an Allee effect and the significance and possible consequences it predicts in the population dynamics.

Faculty Sponsor: Richard Cangelosi, Gonzaga University

SS1A-b James Winslow: “Consideration of Type III Holling Predation in Harmful Algal Blooms”

Algal blooms have become an increasingly regular occurrence in coastal ocean regions. The most important factors in determining if these blooms occur are the seasonal processes of coastal upwelling, river flow, and human fertilizer runoff. The cyclical nature of plankton populations due to nutrient availability results in interesting dynamics within the affected marine ecosystems. Furthermore, some species of phytoplankton have evolved a mechanism for producing toxins that limit predation by predatory zooplankton: a phenomenon that complicates the dynamics further. This particular kind of phytoplankton growth is called a harmful algal bloom (HAB). In 2002, a Holling type II model was proposed by J. Chattopadhyay and R.R. Sarkar to understand HABs in the Bay of Bengal. In this paper, I will consider the dynamics that result from assuming a Holling type III model for predation of phytoplankton by zooplankton instead of a type II model.

Faculty Sponsor: Richard Cangelosi, Gonzaga University

SS1A-c Joe Stauss: “Perturbing Equilibria of the Three-Body Problem”

The Lagrange-Relative Equilibrium and the Figure-8 Equilibrium are the only known periodic solutions of the Three-Body problem in the case of equal masses. These equilibria were analyzed by using a finite-difference method to approximate their perturbation-response for various quantities. The resultant behavior is discussed, explained, and classified.

Faculty Sponsor: Richard Cangelosi, Gonzaga University

SS2-a Denin Koch: “Fractals: Using Math to Understand Depression”

This presentation will feature a reading of Denin Koch's creative non-fiction work *Fractals*. A Q-and-A session with the author will follow. The essay combines research on the mathematical concept of fractals with a personal narrative on depression to create a multi-disciplinary piece of art. The work is structured around five distinct episodes or occurrences, with facts on fractals preceding each section of narrative, creating a meta-layered piece. The presentation will show the value of academic research to the artistic disciplines and how empirical data can have a beautiful relationship with our personal lives.

Faculty Sponsor: Nicole Sheets, Whitworth University

SS2-b Alexa Jose: “Dust to Dust”

Dust to Dust is a Creative Nonfiction piece inspired by dust bunnies. Dust, the often forgotten element of life, coats and clings to every surface in our natural lives. The process of researching the infinitesimal stuff of stars involved a great deal of reading and dust hunting. The archives of the internet and Hannah Holmes' *The Secret Life of Dust* led me down digital dust trails and fed my research. The creation of the piece, however, demanded a more intimate touch, a little life amongst the motes; hence, the

interspersed with personal narration. From the cosmos to the cracked corners of the room, dust is all around us.

Faculty Sponsor: Nicole Sheets, Whitworth University

SS2-c Molly Rupp: “Decay”

This essay explores the emotional, physical, and sometimes deadly effects of sustained loneliness. Sparked by both a podcast exploring the photo series *Possible Relatives* by Tina Enghoff and the New York Times article *The Lonely Death of George Bell*, it weaves a narrative of a specific life with statistics, events, and studies on chronic loneliness. Through the use of a second person narrative, the essay builds a character who follows the process of death and decomposition as a result of prolonged, chronic loneliness, forcing the reader to experience the process in a highly personal way. In looking at loneliness from both pathos and logos perspectives, I hoped to intertwine the two into a narrative that encourages an emotional response supported by factual inquiry.

Faculty Sponsor: Nicole Sheets, Whitworth University

SS2-d Juliana Zajicek: “Rest in Peace”

Rest in Peace reveals the personality of cemeteries and their ability to befriend those that walk their paths. They ask questions about our lives, our relationships, our family history, what we will do with our bodies when we die, and share of themselves as well and of who now resides within their grounds. These questions also have the potential to inspire research, as seen in this essay. We examine the options we have in regards to where we send our bodies when we no longer need them, what affects our seemingly simple choices have, and how humanity is connected through death and burial.

Faculty Sponsor: Nicole Sheets, Whitworth University

SS3-a Katharine Jones: “An Impossible Act: Juggling Evangelism and Social Justice on Missions to Eastern China”

Throughout the last three hundred years, countless American Protestants have traveled abroad to spread the good news of the gospel. Specifically, many have traveled to Eastern China, facing communism and political and social issues with the intent of allowing Chinese citizens religious freedom. These missionaries have voluntarily taken on additional roles in such as doctors, board members, diplomats to promote social justice. Although they were effective social justice workers, it appears very challenging to balance being a religious missionary and promoting social justice. This is reflected by the experiences of Protestants Peter Parker, M.D. and E.C. Bridgman of the 19th century and Nina Braddock of the 21st century. Solving large social issues generally involves unpopular revolutionary work, whereas conversion involves advertising appealing and inclusive ideas. I fear that as long as Protestant Christians

go on missions to eastern China, they will struggle to balance spreading their faith and combating injustice.

Faculty Sponsor: Timothy Clancy, Gonzaga University

SS3-b Claire Henson: “The Silent Invasion”

American in the 1840s through the 1950s is a time period that was filled with demographic change and increased cultural awareness. The steep and fast increase in the immigration of Catholics to the United States perpetuated a widespread fear and hatred that continues to show its remnants today. An examination of “nativistic” propaganda and other fear mongering practices illuminates the reasons for the extreme reaction to the 1928 presidential election, and primary documents can demonstrate the overall mentality of the American people.

Faculty Sponsor: Timothy Clancy, Gonzaga University

SS3-c Iris Matulevich: “The Stuff that American Dreams are Made of: Why the Film Noir Genre Emerged in the Midst of Religious Fervor in Postwar America”

Film noir, a film genre characterized by darkness, femmes fatales, private detectives, and the inversion of traditional values, emerged in America in the 1940s-1950s. At the same time, a religious fervor was building in the United States. Why did a genre defined by dark crime and moral ambiguity hit its stride in the U.S. during a surge of Christianity? I look at three different theories about film noir’s rise in America and analyze them alongside historical evidence in order to prove the simultaneous rise of noir and Christianity was not as odd as it seems. The film noir movement arose because the films were relatable to anxious audiences, a changing political landscape caused a desire for a new definition of morality, and film noir aligned with Protestantism’s search for redemption. The seemingly unlikely pairing of noir and Christianity shows the complicated emotional and political landscape that was post-WWII America.

Faculty Sponsor: Timothy Clancy, Gonzaga University

SS3-d Christian Astran: “The Hook-Up Culture and Catholic Universities: Are Catholic Values Still Significant”

This project involves examining the basic tenants and beliefs of contemporary Catholic sexual teaching and it is applied on university campuses experiencing the hook-up culture. The goal of this project is to propose the conjecture that there is a fundamental difference between the effect of the hook-up culture among private Catholic student bodies and secular public student bodies. This has been done by a thorough examination of Catholic social teaching on sexuality and examining how wide spread the effects of Catholic social teachings are amongst students. Data regarding student opinions and thoughts on sexuality was also examined to develop a clear picture of sexuality on different types of college campuses. This examination revealed that there is a definitive difference between how sexuality and the

hook-up culture is viewed on Catholic and secular campuses. This research highlights the limited but still important effect that Catholic social teaching has on amongst Catholic university students.

Faculty Sponsor: Timothy Clancy, Gonzaga University

RS6-a Simon Puzankov: “A Play on Gender: Women in Video Games”

Over the years of the brief history of video games, a deeply-rooted male-dominance bias has been observed. Recent trends, however, show that more females are now involved in gaming. I explore the question: how has the relationship of women and video games evolved over time?

Faculty Sponsor: LaToya Brackett, Whitworth University

RS6-b Christopher Kotson: “The Western District Way: Reconsidering ‘The Wire’ in a Post-Freddie Gray America”

On April 19, 2015, Freddie Carlos Gray, Jr., died from injuries sustained while in police custody. The following days saw protests, extensive media coverage, deployment of the National Guard, and filing of charges against six Baltimore police officers. This paper analyzes these events through the lens of the HBO series “The Wire”. Using Altheide’s (1987) ethnographic content analysis, I examine all five seasons of the show, paying special attention to scenes, characters, story arcs, and symbolism relevant to Gray’s death. I also employ a structured approach in analyzing media coverage of Gray’s death and subsequent events. In addition to studying reportage, I include editorial and critical pieces in popular print media. My analysis indicates that “The Wire” minimizes and simplifies the violence of policing in Baltimore. However, the show starkly reveals the dehumanization of young black males by the Baltimore police and the corruption of departmental disciplinary processes.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS6-c Emalise Luzzo: “Good Beer for You, Good Beer for Us: An Analysis of the Subculture of Craft Brewing in Spokane, WA”

My research is focused on the rise in craft breweries and how that relates to an aspect of local, community-based products and consumption. Through in-depth interviews, my research examines how the local craft brewers in Spokane have come to understand themselves through the context of their unique beer, their community, and their place in the rising craft beer movement in the United States.

Faculty Sponsor: Nicole Willms, Gonzaga University

RS6-d Sara Jones: “The Ideal Princess, the Perfect Woman”

This paper examines current cultural expressions of the princess character contrasting idealized fictional models from mainstream films and other media to authentic royal ideals. Modern imagery in film and print deemphasize true royal princess models and characteristics versus illusory roles. Characteristics of courage, beauty, grace, purity, intelligence, gentleness, and reserved or youthful behavior are associated with the proper representation consistent with the expectations and roles within fictional Disney princesses or “fairytale” females. Contrasting non-fictional royalty such as Princess Diana Spencer and Kate Middleton against these idealized virtues connected with this categorization of females provides actual factual models, and refutes dominance of these perceptions. This paradigm shift examines personality traits like tenacity, decisiveness, maturity, wisdom, political aptitude and sometimes learned behaviors, often in response to social demands and culture. Additionally, the consistency of these roles and the ideal princess archetype and ideology, both in fictional and true life narratives, are investigated.

Faculty Sponsor: Nicole Bogarosh, Whitworth University

RS7-a Catlin Croskrey, Max Hernandez-Brito, and Erik Buren: “Circularly Polarized Helical Antenna Optimization”

An omnidirectional circularly polarized bifilar helical antenna element was developed. This low-profile radiating antenna is composed of two individual elements providing orthogonal right and left hand circular polarization in an omnidirectional pattern. A parameterized single element model was captured in HFSS. Circular polarization and an omnidirectional pattern were optimized through parametric sweeps of aspect ratio, number of turns, and transitional bend radius. A mathematical model was produced, such that these parameters could be adjusted independently for optimization. Special attention was given to the transitional bend between the helical arm and the straight crossbar to increase the antenna’s performance. The resultant fabricated element operates at 960MHz, exhibits right hand circularly polarized azimuthal gain at 1.4dBi, azimuthal gain variation $\leq 1.43\text{dB}$, $\pm 45^\circ$ vertical beamwidth, and axial ratio $\leq 0.9\text{dB}$. These antennas can be applied in adaptive polarization and MIMO transceiver systems.

Faculty Sponsor: Steve Schenum, Gonzaga University

RS7-b Bryce Bagley: “A Theoretical Analysis of Ligand-binding Dynamics in NR2E1”

TLX is an orphan nuclear hormone receptor involved in maintaining the pluripotency of neural stem cells, angiogenesis in neural tissue and the development of glial cells into astrocytes. Having shown potential as a drug target in a recent study, TLX is of interest in the treatment of glioblastoma. Using the crystal structure of the TLX ligand-binding domain and a set of viable ligands identified by Benod *et al.*, we performed a theoretical investigation of TLX, first by identifying potential binding sites in the crystal structure followed by docking simulations with Benod’s ligands at each site. We determined the best

binding pocket to be a non-canonical binding site and performed molecular dynamics (MD) simulations of this site's binding behavior.

Faculty Sponsor: Kamesh Sankaran, Whitworth University

RS7-c Lydia Rush: “Potential Non-Statistical Dynamics in Combustion, Atmospheric and Stellar Reactions”

Combustion, atmospheric and stellar reactions are gas phase reactions that often have characteristics associated with non-statistical behavior. A vibrational analysis might be used to predict non-statistical reaction dynamics which will allow us to scan thousands of gas phase reactions without using expensive dynamics calculations. Furthermore, using basic science to understand these gas phase reactions could provide further insight into environmental reactions.

Faculty Sponsor: Matthew Cremeens, Gonzaga University

RS7-d Alan Lytton, Mollie Freel, and Luke Blanchart: “Investigation of Injection Parameters on Mechanical Properties of Injection Molded ABS”

Tensile test specimens were injection molded under a range of conditions. The effect of gate location, injection pressure and temperature were studied. The results correlate well with industry expectations. The purpose of the investigation was to determine the ultimate tensile strength of injection molded ABS with varying gate locations.

Faculty Sponsor: J. McCall, Gonzaga University

RS8-a Johnnie Duguay: “Awareness and Knowledge of Protected Area Categories in Phnom Kulen National Park, Cambodia”

This study examines the awareness and perceptions of individuals surrounding Protected Area (PA) categories and governance of a national park in Cambodia. The park is characterized by complicated governance – the area also contains Community Protected Areas and Archaeological Protected Areas within its boundaries. Few studies have researched governance in the park, and none to date have interviewed a wide spectrum of stakeholders to gauge their understanding and opinions of PAs. Data was collected by interviewing individuals from ten stakeholder groups living or working in the park. This study found that respondents are aware of PA categories, but have gaps in knowledge of specific rules and boundaries. Additionally, opinions vary regarding who should be responsible for protecting cultural and natural resource values. Finally, this study analyzes the legal framework surrounding PAs, revealing discrepancy between the practical management and PA law in the national park.

Faculty Sponsor: Georgina Lloyd, The School for Field Studies

RS8-b Marissa Dehler, Ruth Tse, Grace Kim, and Jonathan Duyker: “Activism as a Role in Visual Communication”

Designer as author is now commonplace in the field of Graphic Design. Often design authorship is synonymous with social activism. However, using the origination of authorship is not necessarily activism in that it intentionally seeks out social change. Our project proposes that current methods of design research may not be adequate for the type of interaction that leads to social activism. Designers often use instruction, craft or promotion to incorporate activities of social concern. Our research sought out other disciplines and incorporated these processes and methods of investigation into theories of participatory design. Using the new framework of research and theories from participatory design, students created an interaction that addresses cultural awareness. This presentation is a case study of how designers can use research and participatory design as tools for social activism.

Faculty Sponsor: Karen Gutowsky-Zimmerman, Seattle Pacific University

RS8-c Zach Oxford-Romeike: “Tainted Blood: Altering the Blood Donation Ban Affecting Non-heterosexual Men”

Currently, over 3 million men in America are unable to donate blood due to their status as a non-heterosexual citizen. While legislation has recently passed that makes same-sex acts lead to a one-year deferral from donating blood rather than a lifetime ban, this does not adequately aid the U.S. given its recent blood shortages and the impending blood shortage that may occur in the near future due to the Zika virus. Increasing the eligibility for these individuals to donate blood can lead to a large increase in blood supply without heightened risk of HIV contamination given blood-testing practices that are over a decade old. Nucleic acid testing – already in use by donation blood banks throughout America – is able to detect HIV within twelve days of infection. Based upon this, I propose a two week blood donation deferral for any citizen after an unprotected sexual encounter with a new partner.

Faculty Sponsor: Marguerite Marin, Gonzaga University

RS8-d Adam J. Higuert: “Integration of Nuclear Fusion Generators and Water Desalination Facilities to Increase Growth in the Middle East and North Africa”

Water desalination facilities have the potential to provide for the unmet water needs of Middle Eastern and North African countries but are severely limited due to the amount of energy they require to operate. If nuclear fusion power plants could be integrated with desalination plants, the two technologies would provide for each others needs increase growth in countries in this region. Unfortunately, the technology required for nuclear fusion is still a ways off and the Middle East and North Africa cannot currently afford to invest fully in fusion cogeneration facilities.

Faculty Sponsor: Peter Tucker, Whitworth University

SS1B-d Rebecca Mitchell: “A Mathematical Model for the Rise in Pertussis”

The incidence of whooping cough, caused by the bacterium *Bordetella pertussis*, is currently on the rise. In 2012, the United States saw the highest levels of incidence since 1955. Current research shows that the bacteria may have evolved to evade vaccine-derived immunity. These new strains lack pertactin, a cell-surface protein of the bacteria that is a main component of the vaccine. The lack of pertactin results in a lowered rate of transmission. The evolving bacteria must balance the loss of virulence with an increased ability to evade acquired immunity. Compartmental modelling can be used to determine the evolutionary stable strategy of optimal virulence, where the pathogen can maximize evasion of vaccine-acquired immunity while minimizing loss of infectiveness.

Faculty Sponsor: Sergey Lapin, Washington State University

SS1B-e Chauncy Cullitan: “A Parallel Genetic Algorithm for Book Embedding”

Assuming a circular ordering of a graph's vertices, a book embedding is defined as an assignment of colors to the graph's edges, such that no same-colored edges intersect. The minimum number of colors required to produce a valid book embedding is the graph's book thickness. Computing the book thickness of an arbitrary graph is generally intractable by brute force means, so we use genetic algorithms to find approximate solutions. A genetic algorithm (GA) walks through the search space with a population of candidate solutions, in a manner loosely inspired by biological evolution.

We present a simple GA (written in C++) for approximating the optimum book thickness of a graph with fixed vertex ordering. We also give our preliminary results with a massively parallel GA on the CUDA architecture, which is approximately 3x faster than the single-threaded GA.

Faculty Sponsor: Paul DePalma and Shannon Overbay, Gonzaga University

SS1B-f Ethan Snyder and Eric Rogers: “Infinitesimal-Based Calculus”

When Newton and Leibniz first developed calculus, they did so by using infinitesimals (really really small numbers). Infinitesimals were used until calculus was made more rigorous by Weierstass. The calculus that we are taught today is based on Weierstass's ϵ - δ definition of the limit. However, people have been arguing that we go back to an infinitesimal-based calculus, not only for its historical roots, but because many proofs and concepts seem to be much cleaner when using infinitesimals. Using Keisler's "Elementary Calculus: An Infinitesimal Approach," our group set out to relearn calculus using infinitesimals. First we will define the hyperreal number line (an extension of the real line that contains the infinitesimals). Then we will walk through the familiar ideas and concepts of single variable calculus, such as limits, derivatives, and integrals, reformulated in terms of hyperreals.

Faculty Sponsor: Jeffery Wand, Gonzaga University

SS1B-g Audrey Gomez and Aubrey Ibele: “Dynamical Love”

Dynamical systems both linear and non-linear have the power to describe intricate behavior and provide analysis. In this paper, linear and non-linear models are employed to replicate the interaction between individuals with varying romantic styles. Using traditional analysis methods the goal was to examine the models laid out in Sprott of the dynamic phenomena of love. The graphical outputs and implications between the simple linear and two-dimensional non-linear models were compared; despite identical initial conditions, results varied. This showcases the impact that a variation of parameters has on the system. The non-linear model had an additional logistic function, which made the system more realistic by adding the possibility for emotional reactions. Predictions suggest that with the addition of more parameters, the dynamical system will diverge to chaos.

Faculty Sponsor: Richard Cangelosi, Gonzaga University

SS4-a Hannah Tweet, Elizabeth Williams, and Donna Schrock: “Silencios históricos y la identidad nacional: la inmigración china al Perú en siglo XIX”

This paper explores Chinese immigration to Peru in the nineteenth century through the mediums of literature and photography with an emphasis on gender. While Chinese Peruvians were an important part of the development of Peru’s national identity, their contribution was largely silenced. However, this silence is a form of history. Using Ricardo Palma’s *Tradiciones peruanas*, a contemporary text that was influential in defining Peruvian national identity, this paper addresses the role that literature plays in creating these silences as it relates to those who do not fit neatly into literature’s often binary structure. It also utilizes photographs as a mediator between history and literature, and argues that photographs can serve as a type of text that can discuss what literature often silences. The silent spaces that Chinese Peruvians occupied require creative exploration and a willingness to move outside of and across the boundaries set by past historical texts.

Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

SS4-b Donna Schrock: “Manuela Saénz: A Look at Simón Bolívar’s Mistress”

Manuela Saenz is best known as the mistress of Latin American independence leader Simon Bolivar, but she also played a large role in the independence movements. The daughter of a Spanish aristocrat, her life was spent rebelling against both societal expectations and governmental institutions. In my presentation I will look specifically at how her relationship with Bolivar affected the way that Saenz’s role in the independence has been portrayed. In looking at the work of historians in both Saenz’s time and today, we can see how her gender and its role have been depicted. By considering Saenz simply as a mistress her role has been largely downplayed and her contributions ignored. Her involvement in the independence movements caused Saenz to bend many gender norms of her time, resulting in a confused identity that continues today. I hope to combat the stereotype that she has been given with this presentation.

Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

SS4-c Elizabeth Williams: “Un pueblo mudo es un pueblo muerto”: Maya K’iche Poetic Witness

A critical reading of poems by Humberto Ak’abal will be augmented by historical formation and creation of Maya K’iche identity from the turn of the twentieth century through the civil war. Three interrelated aspects of identity are highlighted: nature as testimony and language, individual versus collective identity, and the elevation of feminized domestic spaces. Greg Grandin’s work concerning K’iche elite at the turn of the century forms a basis for analyzing later shifts in identity representation and formation. Ak’abal’s poetry, both technically and thematically, is analyzed as a key contemporary literary voice of witness. Close-reading of five poems reveals the simultaneous honoring and re-imagining of historically understood Maya K’iche identity. This in turn makes a case for Ak’abal as a necessary poetic voice whose work offers alternative understandings of indigenous and Guatemalan identity in our current moment.

Faculty Sponsor: Rafaela Acevedo-Field and Katherine Karr-Cornejo, Whitworth University

SS5-a Audrey Strohm, Dana Comi, and Nick Avery: “Postmodern Destinations: Arriving in Liminal Spaces with DeLillo, Doctorow, and the Portlandia Crew”

This panel reviews postmodernism as a literary and cultural phenomenon, addressing trends in fiction and popular culture as it relates to the rejection of pre-World War II positivism. Emphasis is placed on post-structural thought with regards to the formation of communal and individual narratives and identity. The three presentations will investigate postmodernism and its literary, aesthetic, and philosophical tendencies, stressing major theorists while beginning to characterize our contemporary moment in light of such theory.

Faculty Sponsor: Fred Johnson, Whitworth University

PS1-a Daniel Maionchi: “Creating a Drug Sensitive Strain of *Pichia pastoris*”

Cystic Fibrosis is an autosomal recessive condition that is caused by a mutation in the CFTR gene. This mutation results in the misfolding and dysfunction of the CFTR protein. The most common of these is the $\Delta F508$ mutation. Our collaborator Dr. Stephen Aller, an X-ray Crystallographer at the University of Alabama plans to use drugs to extract and isolate the CFTR protein and the $\Delta F508$ mutation. In order to do this, the organisms used must be drug sensitive. The main purpose of this research was to create a drug sensitive strain of *Pichia pastoris* to use as the model organism to look at CFTR and $\Delta F508$ CFTR. In order to do this, our approach includes the deletion of key transcription factor sequences in *Pichia pastoris*, these were determined by blast results comparing *Pichia pastoris*’ genome to that of *Saccharomyces cerevisiae*, and identifying the similar sequences for transcription factors.

Faculty Sponsor: Brian Dunn, Gonzaga University

PS1-b Blake Mansfield: “Primers and PCR to Obtain Aryl Sulfatase B Recombinant”

Arylsulfatase B (ASB) is an important protein for the breakdown of glycosaminoglycans. The absence or misfolding of ASB is known to lead to the clinical disorder mucopolysaccharidoses (MPS VI). To study possible treatments for MPS VI, a source of ASB is important. Therefore, a HEK293 cell line in a Bovine liver was created to over express ASB. This ASB was then targeted through HEK cell screening where the RNA sequence could be assayed to cDNA. Primers were assessed using Primer-BLAST in order to isolate the correct sequence from the cDNA strand of ASB. Once the forward primer and reverse primer codon was assessed proper PCR conditions could be evaluated. ASB was then isolated and created in the PCR product to find the cause of the mutant ARSB.

Faculty Sponsor: Trisha Russell, Whitworth University

PS1-c Conner Richards: “Producing an Undergraduate Experiment Focusing on HPLC and Fluorimetry Techniques using Alkaloids Ambiently Extracted from Goldenseal Root”

Goldenseal root is a common herbal supplement that contains alkaloids such as berberine, palmatine, and hydrastinine. Therefore it can be used to design an organic chemistry lab to quantitatively analyze the concentration of these alkaloids that are contained in different goldenseal root pills from different manufactures and the variations within the herbal supplements as well as practice using organic techniques such as running TLC plates and preparing HPLC samples. Berberine, palmatine, and hydrastinine were extracted from the goldenseal root samples using an ultrasonic bath at ambient temperature. The suspension was centrifuged and the supernatant was diluted with methanol and syringe filtered before being analyzed using HPLC techniques. In addition, samples were spotted on a TLC plate and analyzed by fluorimetry. Levels of berberine were established varied between the samples from different manufacturers and were found to be between 2.24 mg and 3.91 mg. In addition, differences in the brands of goldenseal root were evident in the TLC plates of the samples. Sample B (SOLARAY) showed to have the largest amount of the alkaloid berberine than the other two samples which was supported by the numerical values found from the HPLC experiment.

Faculty Sponsor: Trisha Russell, Whitworth University

PS1-d Erik Domas, Trevor Pereyda, and Bailey Keefe: “The Effects of Creatine Administration on *Danio rerio* Lean Muscle Mass and Oxygen Consumption”

Over the past decade, creatine has been speculated to have both beneficial and negative effects on human performance and training regimens. Known as an ergogenic aid, increasing creatine consumption within a diet has been understood to increase the total creatine and phosphocreatine levels of concentration found in muscles in humans. This supply of phosphocreatine and creatine allows for increased energy metabolism and increased exercise performance. Genetically similar to humans, zebrafish (*Danio rerio*) were separated into two groups: a control group that was fed a normal diet of fish food and an experimental group that was given the same fish food with an addition of creatine to supplement muscle growth. Over the course of the experiment, analyses showed no significant difference in oxygen consumption. However, statistically significant differences in lean body mass

percentages were found between the creatine and control fish groups, supporting our hypothesis of creatine loading in zebrafish.

Faculty Sponsor: Michael Sardinia, Whitworth University

PS1-e Dahyun An, Erin O’Donell, and Marie Nisco: “A Comparison of Effects of Direct Instruction Flashcards and Math Racetracks on Multiplication Facts with High School Special Education Student with Intellectual Disability and ADHD”

This study’s purpose was to compare the effectiveness between Direct Instruction (DI) flashcards and Math Racetracks on the number of correct multiplication facts for a fourteen-year-old boy with a learning disability and attention deficit hyperactivity disorder (ADHD). The setting was a library conference room in a High School. The target skill was the correct number of multiplication facts. A frequency count data collection system within an alternating treatment design compared which intervention would be more successful. Reliability was 100%. DI flashcard system presented individual flashcards with multiplication facts written on it. If an error was made the researchers performed a model-lead-test-re-test correction strategy. The intervention deck was repeated until few or no errors were made. Math Racetracks used a graphic racetrack with 19 spaces for multiplication facts with repeated trials. If an error occurred, a model-lead-test-re-test correction was employed. Overall, DI Flashcards was more successful than Math Racetracks.

Faculty Sponsor: Jennifer Neyman, Gonzaga University

PS1-f Jessica Moorhouse and Megan Carroll: “The Effects of a Functional Communication Training Intervention on a 4-year-old girl with Autism”

This study’s purpose evaluated the effectiveness of Functional Communication Training (FCT) using a Picture Exchange Communication System (PECS) to decrease inappropriate behaviors and increase verbal communication for a four-year-old girl with autism in a special education preschool setting. Event recording in a reversal design assessed the participant’s number of inappropriate behaviors, such as tantrums, and appropriate communication comments. FCT consisted of the researcher fading prompts to teach the participant how to replace her inappropriate behaviors with her appropriately taking a “breathe” as means to ask for a break. PECS involved the participant handing the “breathe” picture to the researcher to communicate a break. During baseline the participant showed high numbers of inappropriate behaviors that disrupted the learning environment and no communication. Once implemented, FCT using PECS showed a decrease in inappropriate behaviors and an increase in verbal communication. The intervention was highly effective and could be generalized across multiple settings.

Faculty Sponsor: Jennifer Neyman, Gonzaga University

PS1-g Daniel Barnhart: “Analysis of Bending Fatigue Stress Using Strain Gage Data and Modeling Software for 2 Different Specimen Designs”

Specimens of 304 stainless are failed in bending after a range of different gaseous hydrogen exposures. Two different specimen geometries have been tested. In order to determine the stresses on each specimen type, strain gage data and modeling software were used to estimate maximum bending stresses. The results are analyzed and used to construct stress amplitude (S) as a function of log₁₀ Nf curves. The data in S-log Nf form may be used by future designers who predict allowable stresses for components which are subjected to fatigue loading in hydrogen environments.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS1-h Rachel Hallett: “The Effects of a Direct Instruction Model, Lead, Test Counting Procedure on Mastery of Rote Counting by a Preschool Student with a Developmental Delay”

This study’s purpose evaluated the effects of the Model-Lead-Test teaching procedure on mastery of rote counting by a preschool student with a developmental delay in a Special Education Integrated preschool classroom. The participant was a four-year-old boy. Event recording within a changing criterion design was used to measure the effects of the Model-Lead-Test teaching procedure on the accuracy and speed of rote counting. The target behavior was correctly saying the numbers while rote counting one through ten within thirty seconds. The intervention consisted of the researcher first modeling and leading the participant through a number’s sequence. Then the participant counted independently and finally a correction procedure was implemented as needed. At the end of the study, the participant made clear improvement from 4 to 20 due to the successful results of a Model-Lead-Test intervention procedure.

Faculty Sponsor: Jennifer Neyman, Gonzaga University

PS1-i Charlotte Trebilcock: “Calculation of Enthalpy of Desorption for Metal Hydrides used as Candidate Materials for Hydrogen Storage”

Metal hydrides are used in hydrogen storage applications when volumetric efficiency is critical. For example, such as that necessary in the development of hydrogen fuel cell vehicles, where volumetric efficiency in storage is desirable. One of the critical material properties that affects the performance of metal hydride alloys is the enthalpy of desorption (ΔH). If this value is too high, a metal hydride is not a likely choice when hydrogen storage reversibility is critical. If ΔH is too low, such as that found with sorption materials including carbon nanotubes, hydrogen storage is not easily reversible because the hydrogen cannot stay reliably charged.

To measure the enthalpy of desorption for the candidate materials studied, equilibrium pressure measurements were made at two different temperatures for a portable hydrogen storage canister. By graphing the natural log equilibrium pressure data as a function of reciprocal temperature and multiplying the slope by the universal gas constant, the enthalpy of desorption for the candidate

material was estimated. The calculated value was compared with published literature data to allow for a 'reverse engineered' estimate of the alloy chemistry.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS1-j Kevin Brown, Emily Korf, and Candace Ireland: "Quetzal (*Pharomachrus mocinno*) Nesting Preferences in Relation to Running Water Proximity and Ambient Noise"

Quetzals are an important species both ecologically and economically, as many eco tourists travel to Costa Rica in search of the bird. The purpose of this research is to determine whether the quetzal (*Pharomachrus mocinno*) prefers to nest near running water because of the sound. According to local guides, quetzals prefer to nest within earshot of running water. In order to test this anecdotal knowledge, used and unused quetzal nesting sites in the area of the Rio Savegre were analyzed based on their distance from running water and their ambient sound levels using an independent sampled t-test. Our data indicate that the distance from the stream did not influence the quetzals nesting selection among the snags we surveyed ($p = 0.204$) and that quetzal select nesting cavities where the ambient sound associated with running water is louder ($p = 0.016$).

Faculty Sponsor: Grant Casady, Whitworth University

PS1-k Cody Kaiser: "Rescue Mutations for an X-Prolyl Dipeptidyl Aminopeptidase (PEPX) W425G Variant"

Celiac disease is an autoimmune disease that is caused by an allergic response to the gluten ingested in food. Modern treatment mainly consists of avoidance of dietary gluten but potentially oral treatment using enzyme therapy could be developed. One such enzyme is PEPX from *Lactobacillus helveticus*. Initial studies using a W425G PEPX variant from *L. helveticus*, designed for pepsin resistance, exhibited instability. Three rescue mutations were made to stabilize the PEPX variant and hopefully retain activity. Mutations L424A, F230A, and I433A were successfully made by site-directed mutagenesis to help rescue the W425G. However activity assays showed that the rescue mutations did not provide the stability needed to retain activity. Further testing is needed to conclusively determine the mechanism of activity loss.

Faculty Sponsor: Deanna Ojennus, Whitworth University

PS1-l David Starkovich: "Crystallization of *Lactobacillus helveticus* PEPX"

X-Prolyl amino dipeptidase (PEPX), an enzyme involved in the removal of N-terminal amino acids that are adjacent to a penultimate proline residue, was isolated from *Lactobacillus helveticus*, lactic acid producing bacterium. PEPX protein suitable for crystallization was expressed using an *E. coli* pET expression system followed by cell lysis, ammonium sulfate precipitation, and purification by affinity and ion exchange HPLC. PEPX protein crystals were obtained with 7.4 mg/ml protein and 6-8% PEG stock and

75-100 mM Kpi pH 6.0 buffer solution. The enzyme was successfully crystallized by hanging drop crystallization methods. Solving the three-dimensional structure of a protein will allow for better understanding of its mechanism and function.

Faculty Sponsor: Deanna Ojennus, Whitworth University

PS1-m Alissa Bates, Kelee Lambert, and Rachael Bachler: “Assessments of Abundance in Mollusk Populations in Two Intertidal Habitats in the Gulf of Nicoya, Costa Rica”

After years of over-exploitation of the Gulf of Nicoya, the Marine Area of Responsible Artisanal Fishing of Tárcoles (MARAFT) and the fishing cooperative Coope Tárcoles were established to improve sustainability efforts and increase local involvement in preserving the health of the region’s marine populations. The objectives of this study were to assess the intertidal abundance of gastropods at Caletillas and bivalves at Playa Azul. Using belt-transect samples, average density of the gastropods was determined to be 13,416 snails/ha. Using belt transects and clam guns, two families of bivalves were extracted as in a previous study done in 2014; there was a marked decline in abundance of *Tellinidae* clams from 2014 to 2016 but no significant difference in density of *Donacidae* clams over the same period. However, there was a significant difference ($p < 0.001$) in the average valve length of *Donacidae* clams collected in 2014 and 2016.

Faculty Sponsor: Grant Casady, Whitworth University

PS1-n Jenna Morris, Asa Arhelger, and Phillip Bax: “Do Leaf Characteristics Influence Foraging Habits in Leaf-cutter Ants (*Atta cephalotes*)?”

Human activity has fragmented habitat areas and has sparked the creation of new leaf-cutter ant colonies, which are a hindrance to the ongoing reforestation efforts in the rainforest areas in which they are present. We looked at the foraging preferences of leaf-cutter ants on the Bijagual Ecological Reserve in La Virgen, Costa Rica, measuring leaf thickness, toughness, water content, and saponin presence in hopes of informing future reforestation management decisions on ant-resistant tree species selection. We sampled nine defoliated and nine untouched trees, and used descriptive statistics, two-sample t-tests, and Chi-squared analysis to characterize differences between the two tree groups. Likely due to the small sample size, no significant trends were determined. However, our data suggested that the ants may prefer leaves which are thicker, tougher, and contain less water and saponin.

Faculty Sponsor: Grant Casady, Whitworth University

PS1-o Marie Arguinchona: “Expression, Purification and Spectroscopic Analysis of *L. helveticus* PEPX and Triple Mutant”

An x-prolyl dipeptidase (PEPX) is an enzyme that is capable of hydrolyzing gluten fragments at proline residues. Gluten causes a T-cell mediated response in the lining of the small intestine of Celiac Disease

(CD) patients. Therefore, CD patients must adhere to a gluten free diet. The presence of PEPX supplemental enzymes in the digestive tract of a CD patient may allow for digestion of gluten. However, PEPX enzymes must be pepsin resistant in order to maintain activity in the small intestine. A modified PEPX (PEPX 3M) contains three mutations designed to remove high frequency pepsin cut sites (F133W, W161Q, L684H) and is a potential candidate for an oral therapeutic. However, these mutations were found to decrease pepsin resistance when compared to w.t. PEPX. Stability of the 3M mutant was considered as a possible explanation for its lack of pepsin resistance. The PEPX 3M was expressed in *E. coli* and purified via affinity and ion exchange chromatography. Temperature denaturation analysis via circular dichroism spectropolarimetry showed a lack of thermal stability in the PEPX 3M enzyme when compared to the w.t. PEPX.

Faculty Sponsor: Deanna Ojennus, Whitworth University

PS1-p Anita Weeks: “Crystallization of PEPX from *L. helveticus*”

Celiac disease is an autoimmune response triggered by ingestion of gliadin, a glycoprotein present in wheat and barley, which damages the gastrointestinal tract. Enzymatic oral therapy could potentially supplement digestive enzymes so that celiac disease patients could digest gluten without initiating an autoimmune response and damaging their GI tracts. Peptidases of the bacterium *Lactobacillus helveticus* (*L. helveticus*) are, theoretically, able to degrade the proline-containing peptides in gluten. The 3D structure of prolyl aminopeptidase (PEPX) from *L. helveticus* is unknown, therefore characterizing the structure would be beneficial in attempts to design PEPX enzymes with better properties for oral therapy. PEPX was expressed in *E. Coli* using a pET expression system and purified using nickel affinity chromatography and anion exchange chromatography. Parameters for crystallization of the *L. helveticus* protein were determined by varying concentrations of PEG and NaCl in phosphate buffer of either pH 5.7 or 6.0.

Faculty Sponsor: Deanna Ojennus, Whitworth University

PS1-q Jordan Takasugi: “The Influence of Helper Relatedness in Acorn Woodpecker Group Success”

The acorn woodpecker (*Melanerpes formicivorus*) is a cooperative breeding bird in which the helpers can increase reproductive success within the group. These helpers do not participate in breeding activities, but instead may assist in the provisioning and protecting young produced in a group. A breeding group can have between one to ten helpers, but reproductive success within a social group only increases with the presence of up to three helpers; after which additional helpers have a diminishing effect on the group’s reproductive success. While this pattern is well established for acorn woodpeckers, we have not tested whether helpers are able to adjust their reproductive effort based on their actual relatedness to the nestlings. Here we used detailed knowledge of parentage to determine whether or not helpers modulate their provisioning behavior based on their relatedness to the nestlings, and whether this is dependent on the number of helpers.

Faculty Sponsor: Joseph Haydock, Gonzaga University

PS1-r Justin Luppens and Cassandra Hennings: “Geotechnical Analysis of a Martian Soil Simulant JSC MARS-1”

We tested a Martian soil simulant (MSS) for geotechnical properties. Both NASA and Mars One plan manned missions to Mars in coming decades. This necessitates an understanding of soil characteristics for construction as well as stability of transported habitats. MSS is classified as a non-plastic silt by the Unified Soil Classification System. The California Bearing Ratio (ASTM D1883-14) test reveals the suitability of soil for use in roads, runways, and landing pads. The CBR test gave a result of 5.6% at optimal water content and 8.4% when dry. Unconfined compressive strength (ASTM D2166-85) testing allows identification of yield strength and ultimate strength of soil for supporting a structural load. The ultimate strength of MSS near optimal water content is 3000 psf and 2300 psf when dry. Understanding the impacts of reduced water and gravity on soil behavior is an important part of Mars mission planning.

Faculty Sponsor: Richard Orndorff, Eastern Washington University

PS1-s Austin Cendejas: “Optimizing the Synthesis of Praziquantel Derivatives for Implementation in the Undergraduate Organic Chemistry Laboratory”

An important aspect of scientific education should be to promote independent research ability amongst students. Organic chemistry laboratories can aid in accomplishing this goal by teaching useful techniques and the introduction to analysis of chemical literature. Herein, a simple synthesis and characterization of praziquantel derivatives for use in a second-year undergraduate organic laboratory is described. The nucleophilic acyl substitution presents a well-established reaction connected to the synthesis of praziquantel derivatives, which have been studied as treatments for parasitic worms. This experiment is discovery-based in that it uses multiple acid chlorides requiring the students to identify products unknown to them. Multiple skills are reinforced including acid-base extraction, reaction monitoring by TLC, and characterization of product by IR and NMR spectroscopy.

Faculty Sponsor: Trisha Russell, Whitworth University

PS1-t Dominique Armstrong: “Determining the Fraction Unbound of Herbal Product Constituents in Human Liver Microsomes to Improve Herb-Drug Interaction Predictions”

Inhibition of drug metabolizing enzymes by herbal constituents is a common mechanism underlying adverse herb-drug interactions. Inhibition constants (K_i s) for isolated constituents of the herbal product, milk thistle, towards multiple drug metabolizing enzymes were previously assessed. The fraction unbound (f_u) for each constituent was determined in this work to calculate ‘true’ K_i to improve interaction prediction accuracy. Mixtures containing human liver microsomes and milk thistle constituent or binding control were added to the donor side of semipermeable membranes in an equilibrium dialysis device; buffer was added to the receiver. At equilibrium, aliquots were collected and analyzed by LC-MS/MS. f_u was calculated by dividing the peak area ratio (analyte/internal standard) of the receiver to that of the donor side. High and low binding control f_u was 0.60 ± 0.09 and 1.02 ± 0.17 , respectively. Constituent f_u was high (0.99 ± 0.07 to 1.21 ± 0.09), indicating negligible impact on true K_i .

Faculty Sponsor: Mary Paine, Washington State University

PS1-u Rachel Foster: “Tobacco Cessation in Women's Infants' and Children's Nutrition Program (WIC) - Baby & WE”

Background: Tobacco use in pregnant women is largely associated with low birth weight and premature births, accounting for 20-40% of infant mortality in the U.S. annually.

Aims: to examine the effect of a behavioral tobacco cessation education program, which targets pregnant and postpartum women in WIC and their spouse/partners to help them both quit smoking and/or maintain abstinence for at least three months postpartum.

Hypothesis: Targeted tobacco cessation education, biochemical monitoring and incentives during the postpartum period will improve abstinence from tobacco use among pregnant and parenting women and their spouse/partners.

Methods: An experimental design was used. The control group received standard WIC education; the intervention group received prenatal and postpartum tobacco cessation counseling by trained staff. Dyad participants receive \$10 gift cards (per participant within dyads) each time tobacco use is assessed. There are 13 couples currently enrolled and recruitment is ongoing until August 2016. Data analysis and preliminary analysis begins in April 2016.

Faculty Sponsor: Joann Dotson, Washington State University

PS1-v Versha Sinha: “Investigating the Role of Fer Kinase in the Early Blood Development of Zebrafish”

Fer kinase, a protein involved in the regulation of cell-cell adhesion and proliferation, has been shown to be required during invertebrate development and implicated in leukemia, gastric cancer, and liver cancer. However, *in vivo* roles for Fer during vertebrate development have remained elusive. This study, bridges the gap between the invertebrate and vertebrate realms by showing that Fer kinase is required during zebrafish embryogenesis for normal hematopoiesis and vascular organization with distinct kinase dependent and independent functions. Our data suggest a model in which separate kinase dependent and independent functions of Fer facilitate Notch activity in a divergent manner for hematopoietic proliferation and vascular tissue organization. Our data suggests a role for Fer kinase during zebrafish embryogenesis for proper differentiation of the hemangioblast lineage which gives rise to hematopoietic and vascular cells. Additionally, Fer kinase activity appears to be required for hematopoietic proliferation but not vascular organization.

Faculty Sponsor: Aaron Putzke, Whitworth University

PS1-w Jacqueline Barbeau, Cara Nickolaus, and Anthony Verducci: “The Effects of Implementing a Direct Instruction Flashcard Procedure for Grade Leveled Sight Words on Two Twelve-Year-Old Students”

This study's purpose determined the effectiveness of a Direct Instruction (DI) flashcard procedure to teach accuracy and fluency to two twelve-year-old students in a resource room. The male student performed at a 1st grade level and the female student performed at a kindergarten level. Event recording within a multiple baseline design (across sets of words) assessed the number of correctly read

sight words. The DI flashcard system consisted of a combination of mastered and unmastered words and presented individual word trials. If an error occurred the researcher provided systematic review of that word by providing a Model-Lead-Test correction procedure and representing the missed word multiple times to ensure correct repeated readings. For both participants across all word sets, mastery was reached and maintained for a minimum of three sessions. The DI flashcard system was an extremely quick and effective teaching procedure for each participant.

Faculty Sponsor: Jennifer Neyman, Gonzaga University

PS1-x Alexander Hoffmann, Elisabeth Larson, and Kristen Schoenike: “The Effects of a Mindfulness-based Stress Reduction Meditation Regimen on the Physiological Stress Response of College Students”

Mindfulness-based stress reduction (MBSR), a form of meditation, has been shown to decrease the physiological acute stress response. We hypothesized that a seven day modified practice of MBSR would decrease the physiological stress response of college students. Stress response was measured in terms of heart rate, systolic and diastolic blood pressure, salivary cortisol concentration, and positive and negative affect scores, a measure of the subjects’ subjective experience of stress. Data collected in this study was not found to be statistically significant, but several interesting trends were noted. Results were mixed, suggesting that increases in systolic blood pressure, diastolic blood pressure and negative affect may be buffered by meditation, while meditation appears to inhibit a decrease in heart rate following exposure to a stressor. Finally, meditation may cause an increase in positive affect and a decrease in salivary cortisol concentration after experiencing a stressful event. The lack of statistical significance in this study may be due to sampling error and the abridged version of MBSR administered.

Faculty Sponsor: Michael Sardinia, Whitworth University

PS1-y Hannah Beachwood, Tawnie Rand, and Joel Alexander: “Effects of Caffeine Consumption on Cognitive Function and Mood”

Caffeine is found naturally in a variety of foods and beverages including coffee, tea, and chocolate and is the most widely consumed food/drug in the world. It is almost completely (99%) absorbed from the gastrointestinal tract into the blood stream and easily crosses the blood brain barrier. Caffeine is commonly known to cause alertness. It is believed to combat tiredness and replace it with mental awareness. Several studies have tested the effects of caffeine on mood in conjunction with cognitive performance, finding that while the latter may not have been significantly affected, the former was improved based on self-evaluation. For our study, we observed the effects of caffeine on cognitive performance and mood. A 0 mg, 200 mg, and 400 mg dose of caffeine significantly improved performance on addition testing, short term memory, and mood tests but not sequence completion or reaction time.

Faculty Sponsor: Michael Sardinia, Whitworth University

PS1-z Jordan Holmes: “Analysis of the Formation of Sucralose Derivatives using GC-MS”

Splenda contains sucralose (1,6-dichloro-1,6-dideoxy-β-D-fructofuranosyl-4-chloro-4-deoxy-α-D-galactopyran-oxide) and is a common substitute sweetener for sucrose. Many studies have been completed testing sucralose for possible hazards and its biological importance because of its zero calorie and high-level sweetness. While generally regarded as safe, the chemistry of sucralose under basic conditions has not been established. This study monitored the reaction of sucralose in basic water under reflux. When sucralose is treated with a weak base and water, sucralose undergoes two cyclizations on the fructose ring. The goal was to evaluate which cyclization of the fructose occurred first. The reaction was monitored by collecting samples over time, converting them into volatile trimethylsilyl (TMS) ether derivatives, and analyzing the samples by GC-MS. As the reaction progressed the monocyclized derivative increased and then decreased, and the amount of the dicyclized derivative increased. The reaction proceeded to form the 1,4:3,6-dianhydro-β-D-fructofuranosyl-4-chloro-4-deoxy-α-D-galacopyranoside (dicyclized product). The monocyclized product (3,6-anhydro-1-chloro-1-deoxy-β-D-fructofuranosyl-4-chloro-4-deoxy-α-D-galacopyranoside) was identified as the intermediate in the reaction.

Faculty Sponsor: Trisha Russell, Whitworth University

PS1-aa Anthony Lapsansky and Breanna Byrne: “Using Parentage to Study the Reproductive Ecology of the Northern Saw-whet Owl”

Aegolius acadicus, commonly known as the Northern Saw-whet owl, inhabits forested regions across much of North America (Godfrey 1986). Despite its widespread and abundant population, much remains unknown about the species due to its low nest site fidelity, small size, cryptic coloration, and nocturnality (Cannings 2008). From past studies, it has been hypothesized that the breeding biology of the Northern Saw-whet owl is dependent on prey and nest site abundance – with pairs mating monogamously when both conditions are low, and polygynously when both are high (Cannings 1993). This may be due to a lowered pressure for consistent biparental care in times of high resource availability. We wish to test this hypothesis by assigning parentage to all members of a population and connecting this data to documented abiotic and biotic conditions. To do so, we are in the process of screening microsatellite loci that were developed for other avian species to find a set that amplify reliably and are sufficiently polymorphic to assign genetic parentage.

Faculty Sponsor: Joseph Haydock, Gonzaga University

PS1-bb Angela Newman, Kseniya Maroz, Kelland Wolf, and Lakhwinder Bains: “Mutagenesis of a Bordetella Virulence Protein”

Pertussis is a highly contagious human respiratory illness caused by the bacterial pathogen *Bordetella pertussis*. In animals, *Bordetella bronchiseptica* causes kennel cough, a similar respiratory illness. *B. bronchiseptica* is routinely used as a model system in pertussis research because it is easier to culture and does not typically cause illness in humans. *Bordetella* Type III Secretion System Effector A (BteA) is a virulence protein produced by members of the genus *Bordetella*. The BteA protein rapidly kills a wide

range of mammalian cells, and appears to be important in the pathogenesis, yet the mechanism of cytotoxicity is presently unknown. The objective of this project is to perform mutagenesis of the gene to determine which regions of the *bteA* gene are responsible for cell killing. *Bordetella bronchiseptica* isolates expressing mutagenized *bteA* will be screened for the non-cytotoxic phenotype. An enhanced understanding of BteA may lead to more effective therapies and vaccines.

Faculty Sponsor: Suzanne Bassett, Spokane Community College

PS1-cc Molly Steck: “Do Invasive Plants Influence Habitat Selection for Brooding Sage-grouse?”

Brooding sage-grouse utilize locations with an abundance of flowering plants. The plants play a key role in these locations because the young grouse will feed off of them for the first few weeks of their lives. The question that came into play was, do the grouse prefer native to invasive species of plants? Or is there no preference? The plant types from brooding and non-brooding sites were recorded and later analyzed to see the differences, or similarities, between native or invasive species.

Faculty Sponsor: Grant Casady, Whitworth University

RS9-a Emily Curran: “College Student Perceptions of Virginity, Sex and Intimate Relationships”

My research question is what social and cultural influences have the greatest impact on undergraduates perceptions of sexual behavior.

I have been conducting in-depth interviews as my method of research. I have conducted about 28 interviews and am in the process of transcribing and analyzing them right now. I am analyzing what patterns emerge based on language to see what is common when it comes to Gonzaga students and concepts of virginity.

The types of questions I have asked have been open ended questions about the individual’s background, including religion, their media consumption, their familial values, political affiliation and thoughts about hook-up culture. My transcriptions will be complete within a few weeks and I have been coding the language as I’ve been transcribing. I look forward to sharing all my findings at the conference.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS9-b Lauren Noonan: “Types of Errors in Upper Division French Students' L2 Writing”

This study attempts to determine what types of grammatical errors upper-division undergraduate French students make the most often in their writing. Grammatical errors are measured in two categories: form-based errors and meaning-based errors. Form-based errors are defined as errors in grammatical principals, such as conjugating a verb incorrectly. Meaning-based errors are defined as errors in appropriate word use to convey meaning, such as using an unnecessary word. Students were

provided a brief writing prompt once a week and were given five minutes to answer it. Errors in these writing samples were marked using the Error Correction Symbols developed by Harmer. By recording errors over the course of the semester, the researcher found what type of error occurred the most in these writing samples, and sought potential pedagogical answers as to why that type of error is so common.

Faculty Sponsor: Bendi Schrambach, Whitworth University

RS9-c Kate Brittingham: “Participation Points: The Difference Between Male and Female Participation in Classrooms”

Studies have shown that young undergraduate males are likely to overestimate the intelligence and ability of their male peers, and underestimate that of their female peers. This study aims to look deeper into how this affects classroom dynamics in the undergraduate collegiate setting; in particular, how much and in what ways students contribute in class. Through participant observation, I will collect data on which students participate and in what ways. The results aim to give a demonstration of how gender affects the likelihood and quality of student participation in undergraduate classes.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS9-d Hannah Beachwood: “Medical-Based Spanish Study Abroad Opportunities for Science Majors”

Cultural competence has been an increasing focus for medical schools, as the U.S. foreign-born population is projected to increase by 85 percent over the next 50 years. Premedical students are encouraged to study abroad to gain cultural experience, however often they don't believe they can afford an entire semester abroad due to academic schedules, as the majority are science majors. Whitworth University offers a Costa Rica Jan Term trip combining medicine and Spanish that includes an internship, class, and homestay. This study aimed to analyze the current program through surveying past trip attendees and offering a proposal to allow students to get the most out of their shortened trip. Results primarily revealed that the class taken during the trip, though beneficial, took away from time spent exploring the country. Therefore, it's proposed to implement a mandatory class the semester before the trip to allow more time for cultural experience during.

Faculty Sponsor: Lindy Scott, Whitworth University

RS9-e Sarah Martin: “From Combat to Chaos: The Physical, Mental, and Emotional Difficulties Student Service Members/Veterans Face in Higher Education”

According to a report by the American Council on Education (2008), nearly two million military veterans will seek higher education using their government educational benefits by 2020. Many studies have been conducted to understand veteran college students—alcohol and drug abuse, their post-deployment effects, and the challenges these veteran students face. Very few if any focus directly on

the emotional, mental, and physical obstacles veterans experience in higher education. By studying these obstacles, veterans will have more resources available, as well as faculty, staff, and student body that can better understand the veteran student population.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS9-f Amy Hooper: “Addressing the 'Leak' in the STEM Pipeline: Examining Where and Why the United States' Education System is Losing STEM Students”

There is a clear need throughout the United States for more workers in science, technology, engineering, and mathematics (STEM) fields. In addition, employers from a growing pool of industries are searching for people who possess many STEM skills, regardless of whether their particular industry lies directly within one of these fields. The nation’s economic growth and global competitiveness are also directly affected by the presence and success of STEM industries. Despite an abundance of funding, incentives and creative programs, the number of STEM graduates in the U.S. has not sufficiently increased to fill projected job openings in the near future. This research paper examines where the U.S. is losing students along the STEM pipeline and why. Research indicates that STEM support for students must extend well beyond high school in order to increase the number of STEM-degree graduates this country produces. This paper concludes with suggestions for expanded student support.

Faculty Sponsor: Peter Tucker, Whitworth University

RS10-a Emma Laufer: “We are here too: Experiences of Tokenism in Women Majoring in Engineering”

This sociological study looks at the experience of women engineer majors at Gonzaga University. The questions that guide this research are focused on Kanter’s theory on how token women experience visibility, polarization, and assimilation. To answer these research questions, in-depth interviews from women engineer majors were conducted and transcribed and coded for themes. Data collection will be completed over the following couple weeks. One preliminary finding is in group projects the women typically take an organizing role due to the assumption by other students and the women themselves that they are supposed to be better at note taking and planning. The male students also tend to be condescending towards women students especially when stuck working with one in a lab. However, others baby the women and prevent her from actually doing anything. These findings reflect only the beginning to the complex discoveries from the research.

Faculty Sponsor: Nicole Willms, Gonzaga University

RS10-b Sadie Ridgeway: “Me, Myself, and I-Phone: Fitness apps and body surveillance among college women”

My research question is how college women are using and experiencing mobile fitness applications and wearable fitness technology, and how women’s use of these applications effects their conceptions of their self and bodies.

I am using semi-structured, in-depth interviews to gather my data. I am asking questions relating to the use of mobile fitness applications, conceptualization of the body and self, and the participant’s experiences in relation to these topics. I am using volunteer and snowball sampling methods to recruit my participants. I am interviewing approximately twenty college-aged women who use or have used a mobile fitness application in the past year.

Following the interviews, I will analyze the data by thematically coding it to reveal the reoccurring trends. I have almost completed my data collection and am currently beginning analysis.

Faculty Sponsor: Nicole Willms, Gonzaga University

RS10-c Emily Nichols: “Pay (Tuition) or Get Paid: Higher Education and Young Men's Decisions about Life after High School”

Only 40% of college students today are men, and this number is continuously decreasing. There are many factors that may be contributing to the decrease in men choosing college over alternative post-high school decisions. There is evidence that the increase in tuition has a larger effect on men’s decisions to attend college than it has for women. Masculinity also plays a large role in men’s decision to attend college as well as their experience in high school in the home and in the classroom. My research will expand on the current literature because I will be interviewing men on how they rationalized their decision to attend college or to not attend college. I am interviewing men using the snowball method. I’m finding men in the Spokane area that are not attending college and interviewing men attending Gonzaga University.

Faculty Sponsor: Nicole Willms, Gonzaga University

RS10-d Sara Brazier: “Gender Inequality: The Overlooked War between Women and America's Military and Police Forces”

Regardless of the progress that this country has made, gender inequalities are still very prevalent today. This is especially true with regards to our main tactical careers, law enforcement and military services. Because of these inequalities, women must work harder in order to be seen on the same level as their male counterparts. This study looks at the collective works of Karl Marx, Max Weber, Simone De Beauvoir, and more in an attempt to explain why women are treated in such a way. Data are used to detail the debates around the issue, viewpoints of men and other women in these services, and court cases and legislation that define tactical female professionals. In summary, this study suggests a variety

of policy recommendations that should be implemented to local, state, and federal governments in order to address these gender inequalities and help women to achieve their dreams.

Faculty Sponsor: Marguerite Marin, Gonzaga University

RS10-e Luke Batty: “Don't Forget your Full Metal Jacket! Maternal Perspectives on American Gun Violence”

According to Celinska (2007) and Moore (1994) the gun-control debate is namely a contention over individualist versus collectivist values. Two separate cultures have emerged in the discussion of gun legislation: pro-gun individualists and pro-legislation. However, the cultural norms and views of these two sides are not mutually exclusive. Through critical discourse analysis, both collectivist and individualist persuasive materials have relied on the *ethos* of mothers and the maternal responsibility to protect and nurture. However, individualists advocate education for gun safety and personal responsibility; collectivists support the use societal structure through laws to maintain safety. Though the methods differ, both cultures share a common desired end. Therefore, Heifetz’s theory of leadership as the facilitation of loss (2004), to recognize each cultures’ views, and Burns’ theory of adaptive leadership (1979), to establish new cultural norms, could possibly assist repair sequences and navigate towards a compromise in the debate on gun control.

Faculty Sponsor: Lisa Silvestri, Gonzaga University

SS6-a Anna Short: “Art Ownership and the Process of Restitution Post World War II”

For centuries, the desire to own art has driven many to commission, sell, and even steal the works of great masters. This happened increasingly during World War II as Hitler attempted to amass the largest collection of artworks in Europe. By result he displaced one fifth of the total number of artworks located in Europe at the time, often taking items from Jews as he persecuted them in the Holocaust. What followed the end of World War II was one of the largest and long-lasting attempts at art restitution. This paper will examine how the looting of art during World War II and the subsequent restitution processes shaped contemporary ideas of art ownership and law while considering the emotional impact of returning valued artworks to their original owners.

Faculty Sponsor: Amanda Clark, Whitworth University

SS6-b Sophia Du Val: “Art as Cultural Property: Ethical Issues in Art Law”

This presentation will explore the idea of “art as cultural property” by examining pertinent issues in the growing field of art law. Issues regarding the repatriation of art to its country of origin, art consignment fraud, and the ethics of artifact sales as they pertain to private and public collections of art will be further untangled. Sources such as scholarly articles as well as law cases will be consulted in this inquiry

into the intersection of art and law. As cultural icons, artworks that have been repatriated will be considered through the lens of power, nationalism, and cultural symbol.

Faculty Sponsor: Amanda Clark, Whitworth University

SS6-c Sarah Spouse: “Roman Copies: Artistic Emulation and Forgery in the First Century”

Forgeries are an inextricable part of the art world. Some scholars attest that the first instances of art forgery can be traced to the Classical Roman period due to the presence of a growing art market and the veneration of Roman copies. Despite their obvious imitation of Hellenic works, Roman copies of earlier artworks have established themselves as legitimate pieces of art with inherent monetary and historical value. In the contemporary art world, imitations are regarded as intellectually cheap, and deserving of no particular attention. Good art is original art; originality being valued as much as technical skill. However, does the same thought process hold true in the context of the Roman culture in the first century BC? Romans do not seem to have attached a special value to the name of the artist when acquiring a work. Nor is there an implied favor for originals over copies. What role did Roman copies play in society and in the establishment of artistic practice? Was art forgery a common occurrence in ancient Rome? This session will use Roman copies in order to examine the role of artistic emulation and forgery in the art world.

Faculty Sponsor: Amanda Clark, Whitworth University

SS1C-h Ethan Mahintorabi: “Searching for the Optimal Strategy to a Penny Auction Using Applied Queuing Theory”

Is there an optimal strategy to use in penny auction? With their meteoric rise in popularity in recent years it could be financially beneficial to find one. Using data collected from a popular penny auction site. I created two models to suggest the best time to enter an auction; one based on elementary statistics, and the other based on queuing theory. Both models were subjected to tests on new data to suggest their effectiveness.

Faculty Sponsor: Bonni Dichone, Gonzaga University

SS1C-i Bryan Strub, Hayley Olson, and Ryan Lattanzi: “Klein Links Versus Torus Links”

We will examine the relationship between Klein links and Torus links, using both diagrammatic techniques and link invariants. We begin with definitions of these links. Next, we determine the types of components in a Klein link. Finally, we look at which Klein links are torus links and which are not.

Faculty Sponsor: Vesta Coufal and Kate Kearney, Gonzaga University

SS1C-j Jenia Rousseva: “Alternating Quantum Walks”

Quantum walks are a powerful tool for developing efficient algorithms in quantum computing. This research explores two discrete-time one-dimensional quantum walks where the coin operator varies along even and odd positions on the line. We find closed-form expressions for the coefficients of the wave function for both walks and also arrive at a formula for the probability distribution for one of the walks. A significant discovery is a way to model the well-known Hadamard walk using two alternating coins.

Faculty Sponsor: Frank Lynch, Eastern Washington University

SS7-a Katherine Palmer: “Do Moral Intuitions and Situations Vary Across Cultures?”

Culture can regulate a person’s moral intuition, as well as what situations constitute moral violations. The nature of moral intuitions can be categorized as Ethic of Autonomy (rights and justice), Ethic of Community (social role and duty) or Ethic of Divinity (divine-natural-order). Although all three categories exist in all cultures, the degree to which they are emotionally salient varies. Furthermore, the same action can violate different ethics, depending on the culture. Employing the situation sampling method, behaviors that violate each moral category were generated by American and Japanese participants. A second group of participants then categorized each situation and rated the severity of its violation. We predict that Americans will find violations of ethic of autonomy to be more egregious and evoke stronger reactions than ethic of community violations while this pattern will be reversed for Japanese. Cultural differences in the nature of actual situations will be discussed.

Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-b Kelsey Bajet: “Cultural Variations in Using Self as a Reference Point When Choosing Souvenirs For Self and Others”

We conducted an experiment to test how culturally shaped self-concepts affect decision making processes when making choices for self-versus others. Individualistic cultures foster distinct self-concepts while collectivistic cultures foster permeable self-concepts. 73 American undergraduates and 32 Japanese undergraduate were recruited. American undergraduates were hypothesized to spend more time looking at items they selected for themselves even when choosing for other people than Japanese undergraduates. Participants looked at souvenirs in macrovariety (variations in categories of souvenirs) and microvariety (variety in one type of souvenir) conditions and were asked to choose a souvenir either for themselves, their friends, their family, or their classmates. Results from an eye-tracking device suggested the hypothesis on the cultural variations in the self as a reference point when making judgments for others was partially supported. Broader implications for how culturally shaped self-concepts affect decision-making processes for self-versus various others are discussed.

Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-c Carly Ball and Jacqueline Armour: “Examining Sources of Culture-mismatch: Can Marginalizing Situations Cause Behaviors to Deviate from Cultural Norms?”

The culture-match hypothesis states that those whose personalities and values match the norms of their immediate and broader environment are likely to be mentally healthier than those whose values do not match (Fulmer et al., 2010). In terms of the psychological consequences of being in a cultural environment that is mismatched with one's personality, we propose two questions: Is culture-mismatch associated with the risk of becoming marginalized? If so, can marginalizing situations cause a cultural mismatch in values and behaviors? Previous studies have responded to the first question by measuring the risk of marginalization based on individual dispositions. This study addresses the second question by randomly assigning participants to imagining themselves in a marginalizing situation or a secure situation, followed by some of the measures of values and behaviors from the above studies. We hypothesize that the marginalized mindset will cause culturally deviant values and behaviors.

Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-d Emily McMonigle and Emily Handy: “The Role of Relational Mobility has on Persistence of First Impressions Across Cultures”

We are testing to see what role *relational mobility*, a socioenvironmental variable that determines how easy it is to form new relationships and exit old ones, plays in explaining how persistent first impressions are across cultures. Participants in the US and Japan were exposed to either positive or negative narratives to form an initial impression of a character named John. Then half the participants were presented with additional narratives that contradict the initial impression before completing impression formation measure, followed by a test that measures perceived relational mobility. Greater relational mobility may suggest greater significance of first impressions. Therefore, we hypothesized first impressions, despite later contradictions, will continue to persist in high relationally mobile environments (i.e., US) relative to low relationally mobile environment (i.e., Japan) and that this difference will be mediated by cultural variations in relational mobility scores.

Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS7-e Devin Ellis and Amanda McCleary: “Pilot Test on the Causal Relationship between Perceptions of Control, Green Behaviors, and Attitudes Towards Climate Change”

Our research's purpose is to examine the relationship between eco-friendly behavior, attitude towards climate change, and perceived control. Kitayama et al. (2002) found that there are two distinct human motives, influencing the world and adjusting to the world. These perceptions of control are called primary and secondary locus of control, respectively. Our pilot test's priming technique involves student pairs who are randomly assigned to be a leader (primary) or a follower (secondary). The follower and leader undergo a matching task that requires the leader to order 12 tangram cards and the follower to replicate the leader's order by verbal direction. Participants then complete surveys that address influencing and adjusting situations to climate change. We hypothesize that the students primed with a

secondary locus of control mindset will be more oriented towards eco-friendly behaviors and receptive to climate change science relative to those primed with a primary control mindset.

Faculty Sponsor: Vinai Norasakkunkit, Gonzaga University

SS8A-a Sony De Paula: “The Role of the Youth in America’s Democracy”

There are many young people in America who feel they don't fit into the concept of democracy. Many feel their voices won't be heard. As Aristotle says in the *Rhetoric*, And for the most part [the young] live in hope; for hope is of the future and remembrance of the past, and for the young the future is long and the past short. Here Aristotle shows the contrast between the young and the old and how life plays differently in each one's experience. Not recognizing the youth as wise based on a lack of life-experience because they are the ones mentioned in connection with a nation's future. I am going to propose a discussion on how the youth's knowhow can contribute to a democratic society.

Faculty Sponsor: Dana Elder, Eastern Washington University

SS8A-b Chris Grim: “Aristotle on Agon”

The Oxford English Dictionary defines the ancient Greek definition as, a gathering or assembly, especially for the public games, contest for a prize at the games, any contest or struggle, battle, action at law, mental struggle, anxiety, in Hellenistic Greek also speech delivered in court or before an assembly. Agon, as a form of public debate, included law and politics, but was restricted to open forum debate and typically seen as sport. Agon is also where we get the words protagonist (first sufferer), and antagonist (one who causes suffering). In Book 3 chapter 12 of the *Rhetoric*, Aristotle suggests a difference between the lexis of written rhetoric and rhetoric in the form of oratory debate. It is of common knowledge that within modern politics the act of a formal debate is more of a performance of cliché lines. My theory is that each modern candidate has confused their lexis of agonistic rhetoric for that of a written one.

Faculty Sponsor: Dana Elder, Eastern Washington University

SS8A-c Corey Horn: “Aristotle's Politics and the Constitution of Athens: One Solution to Political Unrest for the United States”

The United States is regarded as the gold standard of democracy; however, the American political system is actually a sick perversion of how a democracy should look. Aristotle today would look at the United States “democracy” as a sick organism in need of political change. In Aristotle’s “Politics”, he calls our attention to the Constitution of Athens written by Solon the lawgiver. He commends Solon for his brilliant work and holds this constitution as a great example on how to order your government. Strengthening the middle class and holding the rich accountable for their actions are just some of the changes that could improve the United States political situation. Using Solon’s Athenian Constitution

and Aristotle's comments on politics as well as his ordering of the family, there seems to be a cure to the United States terrible sickness.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8A-d Mica Pointer: "Aristotle's Polis"

As the world becomes increasingly globalized and focus is given to national or international political activity, it is difficult to concentrate on the basic unit at which Aristotle's political ideals were intended to operate under; namely, the *Polis*. It would appear that the political playing field of the American presidency, dealing with a population of approximately 3.2 million people, has vastly outgrown the governing body of 3rd century BCE Athens that included a comparatively scant 40,000 eligible voters. Looking closer at how the *Polis* is referred to in Aristotle's *Politics*, it appears that the *Polis* Aristotle had in mind was less a geographical distinction of a particular city or a numerical representation of particular demographics, but a sense of identity made up of people that shared in a common community and actively participated in that community through political involvement. To strengthen national political activity, perhaps it is necessary to re-think our ideas of the *Polis* by strengthening our sense of community identity and engage more people to participate at a local level by making political activity personal rather than a mere matter of statistics.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8A-e Spencer Roberg: "Aristotle and Ethos"

Aristotle's ethos, or "character" (also art of living) has never ceased to be an important factor when discussing the character of our elected officials, but current world politics seems to be lacking the microscope through which we once examined the ethos of our modern day politicians.

More and more we're seeing a polarization of political beliefs, and more often than not those polarized parties elect individuals who are themselves polarized. I believe we need to re-examine our understanding of ethos through Aristotle's microscope before we can advance our expectations of politics.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8A-f Jesse Rinderneck: "A Modern Tyrant"

This paper will be about taking Aristotle's concept of tyranny and applying it in two different ways to the current political system in the United States. By analyzing Aristotle's various definitions of tyranny in the *Politics*, the American electorate could learn a lot about how to better their system to ensure that nothing tyrannical arises in the United States. The first application will be taking three definitions of tyranny that Aristotle gives and exploring their plausibility to arise in the U.S. Those definitions will be

the definition he gives to what tyranny in democracy is, what tyranny is in an oligarchy, and what an individual tyrant is. The second application of these definitions is to see what the American electorate can learn from them. Once I explore which instances of tyranny could plausibly occur in the U.S. I will explore what this can teach us to ensure that nothing resembling tyranny can come about.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

PS2-a Clarisa Watkins: “Determination of Heavy Metals in Water from the Little Spokane River, WA, USA”

The metal concentration of the surface water from the Little Spokane River at the Verbrugge Environmental Center, near Newport, WA, USA, was measured as part of a general effort to obtain baseline data for the water quality of the river. Water samples obtained in January 2016 were concentrated and analyzed directly by Flame Atomic Absorption Spectrophotometry. The concentrations determined for arsenic, lead, iron, cadmium, and zinc were 0.51 ± 0.11 mg/L ($n = 3$), < 0.05 mg/L ($n = 3$), 0.13 ± 0.08 mg/L ($n = 3$), < 0.002 mg/L ($n = 3$), and 0.010 ± 0.008 mg/L ($n = 3$), respectively. The concentrations of metals reported for the Little Spokane River at the Verbrugge Environmental Center did not reflect water contamination. Further monitoring studies are needed in an attempt to eliminate or reduce potential sources of contamination and to provide information for sustainable management of the wetland’s resources.

Faculty Sponsor: William Ntow, Whitworth University

PS2-b Derek Savage and Mary Walker: “Physiochemical Investigations of the Surface Water of Little Spokane River”

The physiochemical characteristics of the surface water in the Little Spokane River at the Verbrugge Environmental Center (VEC) near Newport, Washington were assessed in two different seasons. Because the VEC is located near the source of the Little Spokane River, surface water quality data at this site can show the background concentrations for nutrients like nitrogen and phosphorus before significant contamination is likely to occur. UV-vis spectrophotometry was used to obtain absorbance data that were used to determine the concentrations of selected nutrients. Soluble phosphorus concentrations were measured using the molybdenum blue-ascorbic acid method and showed low and often undetectable values (< 0.15 mg P/L). Soluble nitrogen concentrations were measured using the cadmium reduction method and were found to be in a range from 0.4 mg N/L to the detection limit of < 0.05 mg N/L. Total nitrogen and phosphorus values were obtained from persulfate digested samples. Total nitrogen was found in a range of 1.0 mg N/L to 0.1 mg N/L. Total phosphorus was found to be below the detection limit in the winter but had an average value of 7.7 mg P/L in the summer. The data indicated normal conditions for an oligotrophic ecosystem according to the Washington State Department of Ecology standards for total nitrogen.

Faculty Sponsor: William Ntow, Whitworth University

PS2-c Samantha Lawson: “Optimization of Tissue Microarray Production for Immunohistochemistry”

In immunohistochemistry, high capacity screening of tissues is necessary for time and cost effective research. Tissue microarrays, the compilation of pertinent tissues into a single paraffin block, can greatly increase the efficiency of staining and analyzing tissue samples. Tissue microarrays were created through a variety of modifications to the annealing stage of production. The microarray competency was established after treatment with various stains, most prominently hematoxylin and eosin staining. The creation of the tissue microarrays proved to be successful and the implementation of this method provided a more efficient process to observe tissues.

Faculty Sponsor: Kerry Breno, Whitworth University

PS2-d Joie Ikuzwe: “Determination of heavy metals concentration in a wetland on the Little Spokane River”

Studying wetlands’ surface water and sediment quality provides scientific baseline data for environmental management to conserve natural resources, restore, and sustain the habitation of thousands of organisms. Concentrations of lead, copper, arsenic, iron and calcium in the sediments of a cattails-dominated wetland on the Little Spokane River, near Newport, WA were measured and compared to typical metal concentrations for sediments. Ground dry sediment samples were sieved and subjected to a closed vessel acid digestion followed by flame or graphite furnace Atomic Absorption Spectrophotometric analysis. Copper, calcium, and iron were determined by flame AAS and had mean concentrations of < 0.006 mg/L ($n = 3$), 11 ± 5 mg/L ($n = 3$), and 39.9 ± 0.6 mg/L ($n = 3$) respectively. Lead and arsenic had mean concentrations of 40 ± 20 mg/L ($n = 3$) and 9 ± 2 mg/L ($n = 3$) respectively, and were determined by graphite furnace AAS. The levels detected for the metals were sufficiently low reflecting natural levels in uncontaminated sediment, a possible indication that the wetland sediment has not been contaminated by anthropogenic sources.

Faculty Sponsor: William Ntow, Whitworth University

PS2-e Mateo Ledesma: “Effect of Hydrogen and Vapor Solvent Exposure on the Mechanical Properties of 3D Printed Polylactic Acid”

Polylactic acid (PLA) test specimens were printed at two different infill percentages and for two different infill hatch geometries. Specimens were exposed to gaseous hydrogen and tested in tension and in relaxation. The objective of the work is to determine the effects of infill geometry on the mechanical properties of 3D printed PLA as a surrogate for rapid prototyped organs. Speed to print is affected by infill geometry and percentage, so optimizing printed organ life is a function of each of these parameters. Further investigation will replicate the tests following exposure to vapor solvents including that from exposure to methanol.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS2-f Kevin Featherstone: “Correlation of Bending Fatigue Data for Two Different Specimen Designs and at Different Gaseous Hydrogen Exposure Levels for 304 Stainless Steel”

Bending fatigue specimens of 304 stainless are subjected to gaseous hydrogen exposure to study possible embrittlement effects from the hydrogen exposure. The specimens are subjected to hydrogen at pressures up to 138 MPa at 300°C for up to three weeks. Two different specimen geometries have been used in the experimentation. The current work seeks to correlate the data for each of the two different specimen geometries. Additional work includes measuring the maximum stress on specimens during bending fatigue. To measure the stress, strain gages are attached to specimens. The measured stresses are compared with modeling results.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS2-g Matthew Gschiel: “Improving the Efficiency and Accuracy of Molecular Modeling Through the use of Natural Orbitals”

The governing principles of quantum chemistry are contained in the Schrodinger equation, and its solution, the wave function, allows the computation of all physical and chemical properties of molecules. The computational cost for solving the Schrodinger equation scales *at least* as n^4 , where n corresponds to the number of orbitals. Thus, *doubling* the number of orbitals increases the time to solution at least *sixteen-fold*. Previous research in our group has explored the possibility of reducing the computational cost by eliminating orbitals that are deemed insignificant according to some selection criteria. Our results indicate that such truncation schemes work best with natural orbitals (instead of regular molecular orbitals) for which the importance is governed by the average number of electrons in the orbital (instead of the orbital energy), known as the occupation number. Thus, natural orbitals with low occupation numbers are expected to contribute less to the electronic structure of the molecule and may be eliminated from the computation. Although these truncated calculations require a significantly shorter time to solution, discarding some orbitals results in an energy increase called the truncation error. In this work we present our latest efforts to account for the truncation error. In particular, we discuss and compare the relative merits of using methods based on extrapolation and composite approaches.

Faculty Sponsor: Gergely Gidofalvi, Gonzaga University

PS2-h Jessica Moorhouse and Sarah Trapp: “The Effects of a Social Story with a Reward to Decrease Off Task and Disruptive Behaviors on a Sixth Grader with Autism”

This study’s purpose evaluated the effects of a social story and reward system on the inappropriate behaviors of a sixth grade student with autism in a resource room. A partial-interval system in a reversal design assessed the levels of off-task and disruptive behaviors across three classroom activities (computer, seatwork, and small group). The intervention consisted of a social story presented in an “if, then” format. The researcher explained to the participant if she performed appropriate behaviors and earned enough good points then she would receive a reward. During the 8 minute session, the researcher approached the participant every 30-seconds and provided her with a point in a correlating column for appropriate or inappropriate behavior. The points were added and the participant received

her chosen reward if she reached the necessary number of appropriate behavior points. Across all classroom activities, the number of inappropriate behaviors greatly decreased to near-zero levels.

Faculty Sponsor: Jennifer Neyman, Gonzaga University

PS2-i Sydney Hutton and Aubrey Ibele: “How does Huntington's Disease Alter Circadian Rhythm in *Drosophila melanogaster*”

This research lab is interested in several questions related to the study of Huntington’s Disease (HD); specially how this neurodegenerative disease affects circadian rhythm genes and alters the sleep-wake cycle and motor function in *Drosophila melanogaster*. To test these questions we used a locomotion assay and circadian rhythm assay to analyze the progression of the HD phenotypes. We first tested our control line, the UAS-hHtt16Q stock, which are transgenic flies with the non-disease causing form of the protein. After identifying the behavioral phenotypes, we attempted to identify base-line expression of the circadian rhythm gene, *period*. Additionally, we have treated these flies with a histone deacetylase inhibitor to test the effect of global changes in gene expression on our phenotypes. The next phase of this research is to replicate this testing with the disease causing form of hHtt and if HDAC inhibitors will rescue these phenotypes.

Faculty Sponsor: Helen Smith-Flores, Gonzaga University

PS2-j Maggie Jones: “Historical Reconstructions of Hg in Puget Sound: Pre-Industrial, Environmental Regulations, and 21st Century”

Mercury (Hg) is a pollutant of concern due to its tendency to bioaccumulate and cause harm to animals and humans. The Washington State sediment quality standards were established to identify the concentrations of Hg in sediment above which there is a potential for harm to humans or ecological species. The concentration of Hg can be historically reconstructed by spatial-temporal records in sediment. In order to determine if the urbanization of the Seattle/Tacoma region resulted in the transport of Hg to rural basins of Puget Sound, WA, the rural sub-basin of Carr Inlet was selected as the study site. Comparatively, urban areas typically demonstrate higher concentrations of Hg (Schuster et al, 2002). The objective of this research was to determine if the pre-industrial through 21st Century sediment concentrations of Hg in Carr Inlet exceed the sediment quality standards through time. The Carr Inlet never exceeded these standards.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS2-k Harrison Van Til: “Rolling Direction Effects on Tensile Results for 304 Stainless Steel”

Dogbone specimens of two different geometries were plasma cut from sheets of 304 stainless steel. The specimens (for each of the two different geometries) were plasma cut from parallel to and perpendicular to the sheet rolling direction. The work seeks to identify the effect of rolling direction on mechanical properties of 304 stainless as part of a larger effort to study the effect of gaseous hydrogen

exposure on mechanical properties of materials that are suggested for future hydrogen designs. The specimens were exposed to one atmosphere hydrogen for one week, or were unexposed, prior to tensile testing. The specimens were pulled to failure at different strain rates ranging between 0.016 in/min and 0.15 in/min. Continued experimentation will correlate the tensile results with bending fatigue data for specimens that are plasma cut from each of the different orthogonalities.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS2-l Zachary Oxford-Romeike: “Perfectionism, Perceived Incompetence, and Eating Disorder Symptoms”

Despite concerns over the prevalence of eating disorder symptoms on college campuses, little research has examined whether perceived academic ineffectiveness and perfectionism contribute to increased risk of eating disorder symptoms in college students. We hypothesized that perceptions of ineffectiveness in one’s college major, as well as perfectionism, would each be associated with eating disorder symptoms. To test this, we administered three inventories tapping in to mistake concern, eating disorder symptoms, and perceived ineffectiveness in major. Our results have shed light on some of the predictors of eating disorders in a non-clinical, yet at-increased-risk-for-eating-disorders population. In addition to observing that Concern over Mistakes is positively linked with eating disorder symptoms, we detected a positive association between a construct specific to college students (perceived ineffectiveness in major) and eating disorder symptoms.

Faculty Sponsor: Anna Marie Medina, Gonzaga University

PS2-m John Tatka: “Strain Rate Effects on Hydrogen Embrittlement Results for 304 Stainless Steel”

Three different strain rates were used to tensile test 304 stainless dogbone test specimens. Previous work by other researchers, at Gonzaga and other institutions, have shown that exposure to gaseous hydrogen affects the strain rate dependence of tensile strength. Exposure to one atmosphere of gaseous hydrogen for a one-week duration may decrease the tensile strength at low strain rates (e.g. 0.016in/min). The current work is based on performing tensile tests at the low strain rate as well as at strain rates one order of magnitude above (e.g. 0.15 in/min) and below (e.g. 0.002 in/min). For the low strain rate both exposed and unexposed samples are tested while the lowest and highest strain rates only use unexposed specimens. The new data will be compared to previous research results.

Faculty Sponsor: Patrick Ferro, Gonzaga University

PS2-n Thu Nguyen: “Molybdenum Complex and Hydrogenation of Unsaturated Ketone”

Transition metal complexes have been commonly used in transfer hydrogenation, an important reaction in both laboratory and industry. Molybdenum complexes, proven in previous research to be configurationally stable, can be effective catalysts for transferring hydrogen. In our research, we look at the efficiency of a water soluble molybdenum catalyst $\text{Mo}(\text{CO})_3(4,7\text{-dihydroxyl-1,10-}$

phenanthroline)(allyl)OTFA for unsaturated ketone reduction. A sacrificial alcohol of isopropyl alcohol with $\text{Mo}(\text{CO})_3(4,7\text{-dihydroxyl-1,10-phenanthroline})(\text{allyl})\text{OTFA}$ was expected to reduce 2-cyclohexen-1-one. However, reactivity studies indicate base catalyzed condensations occur preferentially to reduction.

Faculty Sponsor: Kerry Breno, Whitworth University

PS2-o Shin Ku (James) Kang: “Heavy Metal Content of Sediment in the Little Spokane River”

The Little Spokane River is one of the major tributaries of the Spokane River, which is primarily sourced by Lake Coeur d’Alene. The concentrations of lead, arsenic, cadmium, zinc, and iron in January sediment samples of the Little Spokane River were assessed in this study to provide baseline data. Sediment samples from three different cross-sections of the river were dried, homogenized, acid-digested, and analyzed using flame atomic absorption spectrometry (flame AAS). There were no measurable concentrations of lead and cadmium found in the sediment samples, while concentrations of arsenic ($n = 8.81 \pm 0.48 \text{ mg/L}$), iron ($n = 44.12 \pm 0.29 \text{ mg/L}$), and zinc ($n = 0.38 \pm 0.02 \text{ mg/L}$) were present. The analyzed concentrations of heavy metals in the samples were all under the Washington Administrative Code’s sediment management standards.

Faculty Sponsor: William Ntow, Whitworth University

PS2-p Symara De Melo Silva and Zach Steinberg: “Development of Dual-Modality Liposomes for Image-Guided Drug Delivery Applications”

Lanthanide complexes have been widely studied as magnetic resonance imaging (MRI) contrast agents. Several of these complexes have been incorporated into liposomes for MRI-guided drug delivery applications. Although these approaches have taken advantage of the paramagnetic properties of lanthanides, they do not capitalize on their optical properties. The aim of this project is to develop dual-modality liposomes for optical and MRI-guided drug delivery. These liposomes consist of a mixture of organic chromophores and lanthanide complexes that are either core-encapsulated or embedded in the lipid bilayer. We hypothesize that the complexes will give an MRI signal, while the combination of the organic chromophore and the complex will provide an optical signal. Current work involves establishing a liposome formation method as well as synthesizing several polar and amphiphilic lanthanide complexes. Following structure and purity determination, the resulting compounds will be incorporated into liposomes and the optical and MR properties will be investigated.

Faculty Sponsor: Osasere Mary Evbuomwan, Gonzaga University

PS2-q Drake Martin, Justin Schneider, and Brandon Kautzman: “Influence of Mazama Ash on the Unconfined Compressive Strength of a Soil from a Residential Development in Cheney, WA”

We tested soil from the Harvest Bluff (HB) residential development in Cheney, WA, which sits at the boundary between loess hills to the north and the Four Lakes Ice Age Flood path to the south. We also

tested Mt. Mazama ash (5677 BC eruption), which is locally abundant in the Spokane-Cheney area, to assess the impact of volcanic ash on soil properties. We determined unconfined compressive strength (ASTM D2166-85) of HB soil, Mazama ash, and a combination of 50% of each sample by weight. Samples were compacted and tested at varying water contents to determine sample strength. Pure HB soil reached its maximum unconfined compressive strength (5486 psf) at 15% water content, pure Mazama ash (5347 psf) at 35% water content, and the mixed sample (4692 psf) at 20% water content. We hypothesize that Mazama ash will have similar impacts on the compressive strength of other soils undergoing development.

Faculty Sponsor: Richard Orndorff, Eastern Washington University

PS2-r Cassandra Hennings and Justin Luppens: “Geotechnical Analysis of the Impacts of Mazama Ash (5677 BC) on the California Bearing Ratio (CBR) of Soil from a Residential Construction Site in Cheney, WA”

We analyzed volcanic ash from Mt. Mazama, found in Turnbull National Wildlife Refuge south of Cheney, and soil from the Harvest Bluff residential development, located between loess hills and glacial outburst flood paths. Ash deposits beneath the surface in the region may not be properly represented by surficial analysis. To understand the possible effects this can have on construction of roads and runways, we conducted CBR (ASTM D1883) tests on the Mazama ash, 50% ash-Harvest Bluff mix, and Harvest Bluff soil. The CBR test is used to evaluate the penetration resistance of compacted soil and determines the suitability of soil for road construction. Results show a minimal increase in soil suitability from pure Harvest Bluff soil sample (28%) to 50% ash mix (31%). This allows its use as an excellent subgrade, good base and good subbase. Similar results are expected in other soils in the region.

Faculty Sponsor: Richard Orndorff, Eastern Washington University

PS2-s Riley Snyder, Kaila Savage, and Lourdes Garcia: “Influence of Mt. Mazama Volcanic Ash on the Optimal Water Content for Compaction of a Soil from a Residential Development in Cheney, WA”

We tested soil from the Harvest Bluff (HB) development in Cheney, WA, which sits between loess hills to the north and the Four Lakes Ice Age flood path to the south. We also tested Mazama ash (5677 BC), which is abundant in the Spokane-Cheney region, to assess the impact of volcanic ash on soil compaction properties. HB soil is classified as low liquid limit silt, and Mazama ash is classified as non-plastic silt. We determined optimal water content for compaction to be 16% with a maximum dry unit weight of 101 pcf for HB soil, 41% and 64.8 pcf for Mazama ash, and 31% and 79.9 pcf for a 50% mixture by weight. This test reveals the amount of water necessary to maximize grain-to-grain contact within soil during compaction, which correlates with enhanced compressive strength. Addition of ash increases optimal water content for compaction and decreases maximum unit dry weight.

Faculty Sponsor: Richard Orndorff, Eastern Washington University

PS2-t Sara Oberlander, Stephanie Herrin, Timothy Post, Charles Wilkes, Curtis Anderson, and Jacob Barbarino: “A Student Outcrop Mapping Project”

This student group project involved mapping and photographic documentation of an outcrop located along the northern boundary of the Spokane Valley of eastern Spokane County, within the southern portion of the Priest River complex. The project involved field examination of a 230 m long outcrop of Hauser Lake Gneiss (HLG), consisting of medium- to coarse-grained, quartzofeldspathic paragneiss with interlayered biotitic schist. Within the eastern portion of the outcrop is a 10 m thick amphibolite body that is concordant to the gneissic foliation. The general structure of the outcrop consists of westerly-dipping, foliated bands of quartz and feldspar-rich gneiss and biotitic schist. The foliation strikes at 207° and dips 35° to the west. This banded sequence of quartz-feldspar gneiss and biotite schist is consistent with the protolith lithology of the Prichard Formation (Proterozoic Belt Supergroup) found in northern Idaho and north-western Montana.

Faculty Sponsor: Andrew Buddington, Spokane Community College

PS2-u Mark Bronson: “The High Resolution Infrared Analysis of Allene”

The high resolution (0.0013 cm^{-1}) infrared spectrum of allene (C_3H_4) has been analyzed for the ν_{11} band centered at 352.6 cm^{-1} . Allene is a prolate symmetric top molecule ($I_a < I_b = I_c$) of D_{2h} molecular point group symmetry. The ν_{11} band originates from an excitation of a vibrational mode perpendicular to the molecular symmetry axis and results in infrared transitions in which both the K and J quantum numbers necessarily change. Over 2150 transitions were assigned to K and J levels extending up to $K=14$ and $J=52$, and no perturbations were observed. This vibration is low in energy and provides a reliable way of measuring the ground state rotational constants which can then be used to determine structural parameters for the molecule as well as facilitate determining the energy levels of other higher energy vibration states that are perturbed.

Faculty Sponsor: Anthony Masiello, Eastern Washington University

PS2-v Jonathan Smith: “Vapor Pressure Determination using Infrared Spectroscopy”

The vapor pressure of a variety of organic compounds has been determined at various temperatures by comparison of the intensity of infrared spectral signatures to quality-assured, calibrated infrared spectra. A gas saturator was used in conjunction with a temperature controlled bath to transport saturated vapor to an infrared gas cell where it was analyzed. This approach allows for the accurate determination of vapor pressures, Antoine coefficients and enthalpies of vaporization for many compounds whose vapor pressures are too low for conventional analysis.

Faculty Sponsor: Anthony Masiello, Eastern Washington University

PS2-w Kyle Elsasser: “Length Determination using Interferometry”

Determining the distance light must travel through a gas (the path length) is often difficult to determine, especially in multipass gas cells which have multiple reflections and curved mirror surfaces that are used to increase the path length in these devices. The goal of this research is to explore an alternate method to determine the optical path length of a multipass gas cell utilizing interferometry and the known index of refraction of a gas. Path length determination is accomplished by analyzing interference fringe patterns that result from changing the pressure in a gas cell that is on one arm of an interferometer. This results in interference fringes that are counted and related to the change in pressure, obtaining the path length of the cell. This method yields lower uncertainties in the measurement of the path length compared to physical measurement, leading to greater certainty in gaseous chemical concentrations.

Faculty Sponsor: Anthony Masiello, Eastern Washington University

PS2-x Hannah Souers: “Synthesis of Molecules with Potential Biological Activity: A Social Justice Project in Chem 331L: Organic Chemistry II Lab”

In past years, students in organic chemistry II lab (Chem 331L) at Gonzaga University have synthesized α,β -unsaturated ketones, commonly called chalcones, which can be reacted in Michael addition and aldol condensation reactions to make cyclohexenone molecules that could potentially display biological activity such as antibacterial properties. We aim to synthesize molecules similar to these, yet replacing one of the carbons in the ring with a nitrogen because nitrogen has better biological compatibility due in part to greater hydrophilicity. We were successful in synthesizing an intermediate in the synthesis, N-acetyl-4-methyl-benzamide, in high yield. The intermediate was then reacted with chalcones. Although we have signs of success, many side-products also appear to have been formed. Further purification and analysis should reveal whether or not the 5,6-dihydropyridin-2(1H) derivative was formed. When the desired product is formed and finally purified, we will then work with the microbiology lab (Biol 370) to test the molecules antibacterial properties.

Faculty Sponsor: Gemma D’Ambruoso, Gonzaga University

PS2-y Amanda Martin: “The Effect of Deleting the Gene Rru_A2871 on Rhoquinone Biosynthesis in *Rhodospirillum rubrum*”

Many parasitic helminths require the metabolic cofactor rhoquinone (RQ) for anaerobic respiration. Inhibition of RQ biosynthesis may shut down the anaerobic respiration pathway and provide a new target for anti-helminthic drug design. The bacteria *Rhodospirillum rubrum* (*R. rubrum*) was used as a model organism for RQ biosynthesis because it utilizes the same respiration pathway as the helminths when grown under anaerobic conditions. Previous studies have shown ubiquinone (Q) is a required precursor to RQ, and that the gene, *rquA*, is required for this conversion. Since this process likely requires additional enzymes, further investigation has identified potential gene targets within the *R. rubrum* genome that may be involved in the pathway. This project involved creating a knockout mutant with the deletion of the gene Rru_A2871 from the *R. rubrum* genome through homologous

recombination, as well as the quantitative analysis of RQ production in eight similar mutant strains, using LC-MS analysis.

Faculty Sponsor: Jennifer Shepherd, Gonzaga University

PS2-z Lucas Evart: “Geochemical and Field Identification of a Landslide at Steamboat Rock, Washington using Portable X-ray Fluoresce”

An approximately 24,000 square meters section at the north tip of Steamboat Rock slid about 130 meters downslope. This large landslide likely occurred sometime during, or following the catastrophic draining of glacial Lake Columbia/ Missoula floods. Samples taken from the slump block were analyzed using portable x-ray fluorescence. Geochemical results were correlated to the stratigraphy along the basaltic cliff to help estimate the offset and to confirm that the block is a landslide deposit. Geochemical composition of the basalt was estimated using a new calibration developed between Bruker and Eastern Washington University, based on samples from eastern Washington that had previously been measured at the Peter Hooper GeoAnalytical Laboratory at WSU. The mass wasting event may have been due to preferential erosion of interbeds and/or possibly weathered granitic bedrock at the headward side of the Steamboat Rock during the Missoula Floods.

Faculty Sponsor: Chad Pritchard, Eastern Washington University

PS2-aa Sam Carpenter, Megan Hall, Kelley Stone, and Desirae Marion: “DNA Sequence Analysis of a *Pseudomonas fluorescens* Genomic Library”

Gaeumannomyces graminis var. tritici is a soil-borne fungus that affects the roots of wheat crops. Commonly called “take-all,” this disease causes the yield of wheat crops to drop between 10% and 50%. However, *Pseudomonas fluorescens* bacteria, common in the soil and water, produce antibiotics that inhibit the growth of the fungus and are able to control the disease. We hope to find a biological control solution intertwined in the genetics of *Pseudomonas fluorescens* L5.1-96, a strain known to colonize wheat exceptionally well and fight “take-all” disease. DNA sequence analysis was performed on 24 different DNA fragments from a *P. fluorescens* L5.1-96 genomic library to elucidate genes contributing to the exceptional ability of this particular strain to super-colonize the wheat and control “take-all.” Among the sequences analyzed, the function of one gene is likely involved in protocatechuate metabolism and the function of another may involve seed storage proteins.

Faculty Sponsor: Suzanne Bassett, Spokane Community College

PS2-bb Bernt Goodson and Austin Armstrong: “Preliminary Mapping and Structural Interpretation of an Aureole in Eastern Washington”

Bedding and foliation at Willow Lake in Eastern Washington generally dips to the east, which is very different than primary features associated with the Cordilleran. To determine more of the structural significance of the area a preliminary geologic map was produced using Google Earth. This project

identifies the source for eastward dipping strata as magmatic intrusions. Geologic structures range from small-scale flow folds in the contact metamorphic aureole, small scale faults, flexural slip, localized folds associated with emplacement of mafic-dikes, and tilted bed associated with emplacement of a larger granitic pluton(s). Plutonism likely occurred during the Cretaceous and Eocene periods. The creation of the preliminary map begins to show the complexity of contact metamorphism, assimilation, and partial melting processes in the context of regional geology and magmatic emplacement.

Faculty Sponsor: Chad Pritchard, Eastern Washington University

PS2-cc Aurora Kraus: “Knockdown of p27 Down Regulates GATA3 Expression in HEI-OC1 and MEF Cell Lines”

Hair cell death leads to hearing loss, which is permanent due to the inability of mammals to regenerate hair cells. To regenerate hair cells researchers seek to transdifferentiate supporting cells into new hair cells. Atoh1 is a transcription factor that is necessary during development, but not sufficient but not sufficient to regenerate hair cells in the adult cochlea because it requires the correct background of other co-transcription factors to adequately transcribe its target genes. From previous work in the Zuo lab, we know that knocking down p27 can up regulate GATA3 – a known co-transcription factor for Atoh1– in adult supporting cells, thereby enabling transdifferentiation into immature hair cells. Here we investigated how p27 is affecting GATA3. By knocking down p27 with A2CE in both MEF and HEI-OC1 cell lines, we found that p27 can regulate transcription of GATA3. While these *in vitro* data not match the *in vivo* data, they did suggest that p27 may regulate GATA3 expression and might have implications in cancer research.

Faculty Sponsor: Kevin Measor, Gonzaga University

RS11-a Phillip Allevato: “The Constitutionality of the Espionage Act”

This paper analyzes the constitutionality of the Espionage Act in the context of charges brought against Edward Snowden, a whistleblower who leaked NSA information to the press. It contains original research on precedent and Supreme Court jurisprudence, by answering an as yet unanswered, critical question: does the 1917 Espionage Act, which prevents the leaking of information considered vital for national security, violate Edward Snowden's First Amendment right to free speech, or is his right subordinate to national security? To answer this important constitutional question, this paper uses past decisions and precedent from current justices, and predicts their individual and collective responses.

Faculty Sponsor: Julia Stronks, Whitworth University

RS11-b Francesca Bisciglia: “The Constitutionality of English Language Development Programs in US Public Schools”

Immigrant children are one of the fastest growing sectors of the U.S. child population. Because of the growing number of students coming from different language backgrounds, school districts have felt pressured to seek out ways to accommodate non-English speaking students. Do English Language Learners have a constitutional right to a bilingual education? This yet unanswered question is the focus of my research. Through an analysis of the Fourteenth and Fifth Amendments of the United States’ Constitution along with research related to state and federal court precedent, this paper suggests that the US Constitution supports English development programs. Because of the growing importance of this issue, the paper explores best practices for accommodating ELL students through state and district case studies in California, Arizona and Texas. It concludes with suggestions regarding possible pedagogy that could be implemented from other countries around the world.

Faculty Sponsor: Julia Stronks, Whitworth University

RS11-c Jerusha Dressel: “Montgomery v. Louisiana: The United States Supreme Court and Retroactivity in Criminal Law Collateral Review Cases under the Teague Standard”

In *Miller v. Alabama* (2015) the Supreme Court ruled that mandatory life sentences for crimes committed by individuals who were under the age of 18 violated the Eighth Amendment of the U.S. Constitution. My research examined the facts of *Montgomery v. Louisiana*, a case currently before the U.S. Supreme Court whose issue is “Whether *Miller v. Alabama* adopts a new substantive rule that applies retroactively on collateral review to people condemned as juveniles to die in prison.” It then looked at the history and evolution of retroactivity in criminal law and the arguments of both the Respondent and the Petitioner in the *Montgomery* case. Finally, it analyzed statements and voting patterns of the current justices in relevant cases and predicted that the Court’s decision would be 6-3 in favor of *Miller’s* retroactive application.

Faculty Sponsor: Julia Stronks, Whitworth University

RS11-d McKenzie Legg: “The Constitutionality of Contraceptives”

This paper examines the constitutional legality of the required provision of contraceptives under the Affordable Care Act. It discusses the implications and nuances of *Zubik v. Burwell*, the lawsuit slated to appear before the Supreme Court in March, which sets religious freedom against governmental regulations of the Affordable Care Act and contraceptive rights. The issue to be decided is whether or not the accommodation scheme that was created for religious employers in *Burwell v. Hobby Lobby* is an acceptable alternative which lessens the burden on the religious exercise of non-profit organizations as well as for-profit companies. The paper discusses the background of the case, the precedent, including district and appellate court rulings, and concludes with original research leading to predictions regarding how the current justices will vote based on their individual ideologies and prior decisions.

Faculty Sponsor: Julia Stronks, Whitworth University

RS11-e Daniel Geiter: “Foster v. Chatman: Injustice in Juries”

In 1986 in Rome, Georgia, Timothy Tyrone Foster, an eighteen-year old African American was charged with the murder of Queen White, an elderly White woman. During the trial all of the African American Potential Jurists were summarily excluded through the use of peremptory strikes. This led to a thirty year *Batson* challenge that is being decided by the U.S Supreme Court today. Racial discrimination utilizing peremptory strikes as veil of secrecy continue to plague the judicial system. *Foster v. Chatman* has the potential to define when there should be interference with the peremptory strike and when oversight is inappropriate. The research that I performed examined the history of the *Batson*, the case that has defined jury discrimination, and incorporated an extensive analysis of how the Supreme Court Justices at the time of writing will likely decide on the issue.

Faculty Sponsor: Julia Stronks, Whitworth University

RS11-f Caleb Mathena: “Friedrichs v. California Teachers Association: Reexamining the Constitutionality of the Agency Shop”

This paper examines the constitutionality of agency shop agreements between public sector labor unions and employers through the lens of a current case before the Supreme Court, *Friedrichs v. California Teachers Association*. It contains original research on the history and precedent behind the issue, which is discussed and cited to answer the question of whether the agency shop, which requires those who opt out of union membership to pay a service fee, unjustifiably infringes upon First Amendment rights to free speech and association. In order to determine what the Court will decide on this issue, this paper analyzes each justice’s stance and past opinions and gives a prediction as to how each will vote.

Faculty Sponsor: Julia Stronks, Whitworth University

RS12-a Emalise Luzzo and Nathan Knox: “Cognitive Performance under Different Environmental Conditions”

When you are stressed about an upcoming test, do you prefer to study in a noisy coffee shop or in a silent library cubicle? Our research examined how well or poorly students perform on cognitive tasks in different environmental conditions. Participants were given a Stroop test and assigned at random either a noise or no noise condition. Participants completed pre- and post-test questionnaires to evaluate their perceived stress. We found a main effect for high stress and errors, as well as a marginal statistically significant interaction between initial stress and assigned condition.

Faculty Sponsor: Anna Marie Medina, Gonzaga University

RS12-b Bryce Bagley: “A Non-gestalt Theory of Objects”

Traditional efforts to describe mental phenomena have operated based on definitions of minds as singular, gestalt objects rather than collections of fundamental objects. By an argument against vague cases in categorizing objects, it will be shown that it is necessary to construct a novel metaphysical theory of objects, and particularly minds, which acknowledges gestalt objects to be arbitrarily defined.

Faculty Sponsor: Nathan King, Whitworth University

RS12-c Kathryn Hendricks: “A Christian Approach to Deification: What Protestants can learn from Eastern Orthodoxy”

Christ was made man that we might be made God.” This statement by Saint Athanasius captures one of the primary elements of Orthodox Spirituality called Deification or *theosis*, accomplished in Christ. The emphasis on one’s relationship with Christ as a journey rather than a destination marks one of the differences with Western spirituality. This presentation explores primary differences between Orthodox and Western spirituality. A major focus will be put on what it means to “become like God” for Protestant communities and movements and what they could learn from Eastern Orthodox liturgy, practices, and theology.

Faculty Sponsor: Karin Heller, Whitworth University

RS12-d Ellie Probus: “The Effects of a Strengths-Focused Approach on Paternalistic Prejudice in Volunteers”

Well-meaning but harmful paternalistic prejudices arise from judging an outgroup as being low in competence and high in warmth. Researchers hypothesized that individuals who had completed volunteer work and focused on the strengths of their aid recipients would judge that population as more competent, while those who focused on weaknesses would do the opposite. Researchers also studied the effects of strengths focus on judgments of warmth. Undergraduate volunteers (n=170, 127 females, 39 males, 4 other) were assigned to focus on strengths, weaknesses, or neither, and then rated their populations on competence and warmth. Results showed no significant differences between groups in overall judgments of competence or warmth. Findings suggest that short-term priming may be insufficient to alter stereotypes.

Faculty Sponsor: Alicia Epps, Whitworth University

RS12-e Katlyn Lee: “Adventure Based Leadership Education Through Hardiness”

How leadership development occurs through experiential adventure based learning by looking at psychological hardiness, the principles of Kolbs Experiential Learning model and lastly by reflecting on

the characteristics of Luthans PsycCap model and how together these contribute to overall leadership efficacy.

Faculty Sponsor: Adrian Popa, Gonzaga University

RS12-f Neal Jatekar: “Personality and Decision-Making”

Our study investigated the effect personality and mood had on decision-making. We compared the speed and accuracy of people who scored high vs. low on a measure of neuroticism and on a decision-making task. We also examined whether mood was related to speed and accuracy on the same decision-making task. We found no statistically significant evidence that either personality or mood distinguished participant's performance on our decision-making task.

Faculty Sponsor: Anna Marie Medina, Gonzaga University

RS13-a Marianne Sfeir: “North American Christianity? Quo Vadis?”

Today, the American church finds itself in the midst of a secularization process, whereby Christianity has become increasingly irrelevant and obsolete to youth. The presentation focuses on one of the biggest challenges for the church in the 21st century, i.e. the need to adapt without compromising the gospel. Based on the spiritual journey of a Lebanese expatriate living in the U.S., it explores aspects of American church culture oscillating between secularization, atheism, and attraction to Christ. It calls on U.S. Christians to become a church that wrestles with hard questions, invests in individuals instead of mass numbers, and naturally depends on God.

Faculty Sponsor: Karin Heller, Whitworth University

RS13-b Lilly Davis: “Wisdom Psalms: Is the Category Worthwhile?”

Since its introduction in the early 20th century, the form-critical method of categorizing psalms has been highly debated. This presentation focuses on the recent debate, specifically as it addresses the category of wisdom psalms and argues that the category is no longer beneficial to one's understanding of the psalms. After reviewing the arguments on both sides of the debate, the presentation analyzes how such categorization could influence the reader's understanding of Psalm 1 and Psalm 37. Through this analysis, it becomes apparent that the categorization of either of these psalms as wisdom psalms emphasizes the connections they have to wisdom literature, yet hinders the reader from taking into account the other connections both psalms have to various portions of the Old and New Testament. Thus, I conclude that the category of wisdom psalms hampers our understanding of the psalms rather than providing enough benefit to warrant its continued pursuit.

Faculty Sponsor: Will Kynes, Whitworth University

RS13-c Brittany Decker: “Self Stratums”

A comprehensive look across my journey through art, including my obsession with plastic bags, my digital revelation and the many vector paths I've taken in order to get to where I am today.

The use of layers is important to my art in both process and concept. I have a belief that every action we do has an effect, and the culmination of those many actions by everyone contributing creates the bigger picture of the world we live in. When using layers in my work, I'm trying to emulate this process of numerous movements creating a unified object no matter how chaotic those movements may be.

Currently my work is a blending of my aesthetic and my presence. While not every piece has my image in it, most pieces relate back to some sort of body. Movements are often reminiscent of breathing, and the source images frequently abstracted living things.

Faculty Sponsor: Jenny Hyde, Eastern Washington University

RS13-d Kieran Abbotts: “Hip Hop Fans Perception of Race in Hip Hop”

Hip-hop is more than a music genre. What started in the South Bronx has grown and transformed in to a driving force behind music, fashion, and pop culture. Because of this, it is important to understand how people, especially the fans of this music, interpret how hip-hop addresses various topics and issues present today. This study seeks to answer the question how do fans of hip-hop interpret race in hip-hop? Data for this study was collected through semi-structured in depth interviews with participants. Participants in this study identified as fans of hip-hop and were gathered through both volunteer sampling and snowball sampling. The interviews have taken place and the transcriptions are being analyzed and coded for common themes, trends, and ideas. From these themes conclusions will be found about how fans of hip-hop interpret race in hip-hop.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS13-e Anna Welch: “A Narrative of Ecocentrism: A White Heron by Sarah Orne Jewett”

Sarah Orne Jewett is known to the literary world as a regionalist writer and a pioneer of ecocentrism: a school of thought that values the natural world and its living inhabitants over manmade infrastructure and technological advancement. Growing up at the height of the Industrial Revolution, Jewett was witness to the decimation and commodification of the natural world, including the extinction of the rural way of life of her dear pastoral Maine.

Sylvia, the protagonist of “A White Heron” parallels Jewett’s upbringing. Sent to her grandmother’s rural cottage from a busy industrial town, young Sylvy instantly feels kinship with her wild surroundings. In a deceptively simple narrative woven with arguments for the preservation of nature and the dangers of industrialization, Sylvia’s eventual victory over the oppressive influence of an outside force includes a plea from Jewett not to forsake the beauty and wholeness of nature.

Faculty Sponsor: Paul Lindtholdt, Eastern Washington University

RS13-f Bradley Rehwaldt: “Timbuktu: The Malpractice of Losing History”

Timbuktu is a principle case of “lost history”. Timbuktu was one of the wealthiest cities in all of history adding significant advancement in knowledge and wisdom and is unparalleled over against any city at its time in grandeur and greatness. This history became “lost” essentially because it was not taught due to being deemed as unimportant by Eurocentric historians as centuries passed by. History is completely integral to the cultural of an ethnic group. Therefore, this rich history was not attributed to peoples of North African descent and their cultural to some extent was robbed. Why is history lost? How can we recover, reclaim and ensure that it is shared? These will be some prescriptive questions to be answered. When searching for lost history what are the signals and warning signs to indicate history is missing, and how to establish preventive measures to discontinue the malpractice of “losing” history.

Faculty Sponsor: LaToya Brackett, Whitworth University

RS14-a Paxton Richardson: “From Pictures to Protests: The Social Psychology of Collective Action”

The research question is: how are news images of suffering and violence understood and processed by undergraduate students, and how are these reactions linked to social activism? The objective is to test reaction towards photos of other people’s pain to see the potential for social activism following initial reaction and then again following context between the two photos. Three experimental focus groups with ten students each were held with the following demographics: domestically raised, white students; non-native, international students; mixture of both. Students viewed three different slides with two photos each, answered general survey questions, and engaged in discussion. Then context was given to photos, and the slide was viewed again, followed by the same survey questions. All data has been obtained and the discussion is being thematically coded, and the survey question answers are being run through SPSS to find meaningful data between the groups.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS14-b Levi Detrich: “Black Wall Street: A Thriving Community Destroyed by Hatred”

Black Wall Street. What could it mean? Is it a region of New York? As it turns out, Black Wall Street was a label that Booker T. Washington used to describe the Greenwood District of Tulsa, Oklahoma in the early 20th Century. The city is a very unique economic and cultural wonder, and it serves as an example of a black community that persevered and prospered against all odds. Yet very few people have ever heard of it. This can be attributed to an act of hatred that whites have misleadingly dubbed the Tulsa Race Riot of 1921- a historical event which effectively terminated the existence of Black Wall Street, destroying the lives of thousands of black families who had worked so hard to make the city what it was. The goal of this presentation is to explore and inform others about this oft-neglected historical event and economic community.

Faculty Sponsor: LaToya Brackett, Whitworth University

RS14-c Corey Horn: “Aristotle's Constitution of Athens and John Locke's Second Treaties of Government: What John Locke Could Learn from the Ancient Mind”

John Locke’s “Second Treaties of Government” is one of the most influential pieces of political philosophy. Locke’s view on a political society lays in a “state of nature” where people are the independent rulers of themselves, but government is in place to create common good and keep peace. Aristotle explains through his “Nicomachean Ethics” that a virtuous person is one that exhibits the “mean” of virtuous qualities. A government then, would be one that lies somewhere within the middle, or the middle class. In his “Politics” he references Solon’s “Constitution of Athens” because the soul of the legislation gave much control to the middle class. If John Locke used Aristotle’s government in the “Politics”, or more specifically the section on the “Constitution of Athens”, then his political theory could have been much stronger leading to greater success for those who used the literature as a template for their government.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

RS14-d Cassandra Hiatt: “Healthcare for All!”

American healthcare is the most expensive healthcare of any other developed nation. With all the money being spent towards bettering our overall health and taking care of illness and injuries, America should be among the healthiest of all developed nations. However, that is not the case. Despite the fact that most causes of health disparities can be explained with biology, individual behavior or choices, and access to healthcare, one of the biggest structural factors that affect dominant models of health and healthcare delivery. Race and class are two social forces that have the biggest impacts. In our society, healthcare is treated as a commodity rather than a right. This paper will document the disparities of health and healthcare systems. I will also provide recommendations that will ensure that every individual has access to adequate healthcare.

Faculty Sponsor: Vikas Gumbhir, Gonzaga University

RS14-e Claire Couron: “Inequality in American High Education”

Obtaining a college degree is crucial to finding financial stability. However, one’s social class often creates roadblocks in access to higher education, and in upward mobility after college. This research will focus on inequality in access to college and inequality within the structure of higher education itself. Low-income students continue to be at a disadvantage when compared to wealthy students. Although there are financial aid and work-study policies in place, low-income students remain at a disadvantage. The current structure provides little room for upward mobility, which often results in the rich remaining rich, and the poor staying poor. There needs to be greater outreach to encourage low-income students to enter college, as well as greater financial and social support through the college experience.

Faculty Sponsor: Marguerite Marin, Gonzaga University

RS14-f William Corbett: “Food Deserts”

Consistent consumption of foods that are high in fats, salts, and sugars as well as low in essential nutrients and vitamins are creating unnecessary stress for families, communities, and our healthcare system. This study explores existing data regarding food availability, location, health status, and government regulations, to gain a better understanding about suffering and at risk populations. Analyzing the data from the categories stated above illustrates the success of government programs and incentives in increasing access to healthy food as well as helps alleviate difficulties associated with constrained access to healthy food. This study documents that increasing availability of healthful foods is an effective strategy for combating many of the common health problems and diet related diseases many Americans currently face. Through government regulations and business incentives, equal access to food, that isn't detrimental to your health, can be achieved.

Faculty Sponsor: Marguerite Marin, Gonzaga University

RS15-a Christian Peterson and Om Neelay: “Antimicrobial Peptide Interactions with Bacterial Membranes”

Antimicrobial peptides are considering as a possible new therapeutic option to combat increasing bacterial resistance to traditional drugs. They are considered an option due to their mode of action which requires interaction with bacterial membranes that leads to cell death. However, the previously proposed method of action for these peptides only involves interactions with lipid membranes. This study focuses on the binding interactions of peptides with peptidoglycan and lipids.

Faculty Sponsor: Matthew Cremeens, Gonzaga University

RS15-b Rachel Noyes: “Interferon-gamma Antagonizes Type 2 Immune Drive Tuft Cell Hyperplasia”

Generation of a type 2 immune response, which underlies anti-helminth immunity and the pathogenesis of allergies, requires the secretion of the endogenous cytokines interleukin(IL)-4 and IL-13. Interferon(IFN)- γ , by contrast, promotes a type 1 immune response. The intestinal epithelium consists of a stem cell compartment and a variety of differentiated cell types, including tuft and goblet cells. Clearance of helminths from the intestine requires epithelial remodeling that leads to tuft and goblet cell hyperplasia, which result from IL-4/13 signals that bias progenitor fates toward these lineages. Here we demonstrate the ability of interferon gamma to suppress IL-4/13 induced tuft cell hyperplasia *ex vivo* using mouse small intestine epithelial organoids. These data suggest a previously unknown ability of IFN- γ to directly impact the differentiation of intestinal epithelial stem cells. This provides new insight into the mechanisms by which IFN- γ antagonizes type 2 responses that protect against parasitic helminthes and underlie allergic asthma.

Faculty Sponsor: Kirk Anders, Gonzaga University

RS15-c Laura Seifert: “DNA Extracted from Eggs Allows Study of Sexual Selection in the Acorn Woodpecker”

Acorn woodpeckers (*Melanerpes formicivorus*) exhibit cooperative breeding behaviors in complex social groups of up to fifteen adults, including up to seven males that compete for breeding in the social group. In order to evaluate female mate choice and reproductive competition among male breeders, our goal was to extract DNA from the sperm trapped on the perivitelline membrane of woodpecker eggs. Avian eggs are expected to retain a record of mating because sperm are trapped on this membrane during fertilization. DNA was successfully extracted from quail eggs to test the validity of this protocol. Our current goal is to use this procedure on acorn woodpecker eggs, and by using microsatellite markers, determine which males contributed sperm to the eggs. We will then use these results to test alternative hypotheses concerning the mechanism governing reproductive partitioning in acorn woodpeckers.

Faculty Sponsor: Joseph Haydock, Gonzaga University

RS15-d Chad Hicks: “Growth and Purification of the *Pseudomonas putida* HMG-CoA Reductase Enzyme”

This research project attempted to grow and purify soluble *Pseudomonas putida* HMGR (*PpHMGR*) enzyme for the purpose of experimentation on its hypothesized morphoein protein behavior. Inclusion body formation has been the primary limiting factor in the growth and purification of soluble *PpHMGR*. Variation on incubation temperature, IPTG concentration, and growth time were explored in the growth phase, and imidazole concentration, presence of DTT, and presence of TCEP were explored in the purification phase. *PpHMGR* was grown in an *E. coli* host, cell lysis was performed by sonication, and subsequent purification was performed by nickel column elution FPLC. The purified product was characterized by FPLC, gel electrophoresis, and enzyme kinetics to determine the reduction of inclusion body formation and presence of soluble *PpHMGR*.

Faculty Sponsor: Jeff Watson, Gonzaga University

FS15-e Michael Arnold: “Presenting Biological Research Data in a Web-Based Format/ A Key to Open-Source Research”

When you first open up your browser what is the first website you visit? Facebook? Google? Bing? Have you ever stopped yourself to think why? Or better yet what makes that particular website you love so much worth visiting in the first place? Is there such a thing as “the” perfect website? Now taking that premise, what if you are a scientist searching for new ideas or fresh perspectives? Or what if you need help analyzing data collected, what do you turn to? In group research and even individual research, the spreading of ideas and collecting peer input can be a strenuous task. There are large biological databases out there such as NCBI and Uniprot, however none are used for the sole purpose of sharing information about research to spark interest or help further others research. How do I get people excited to share their ideas? The INTERNET of course! However, before I can start, I have to delve into the question of “What makes a website successful? I will study what makes a biological database and website useful and looking at how an open community type database would be useful in contributing to

furthering other people's research. More specifically I will be applying these concepts and constructing a website, based on the Zebra fish study performed this summer, for our biology team and the affiliated research teams. This website will be built upon the Acquia and Drupal framework and ultimately will be creating a place for ideas and data to be openly shared and analyzed among the community.

Faculty Sponsors: Peter Tucker, Whitworth University

SS8B-g Braden Agueros: "Virtue and Democracy"

One would puzzle in contemporary democracy over what would be meant by ascribing the word "virtue" to a societal political body or electorate; we often do not even consider it material to associate the word virtue with the functional value of a political system. This confusion needs clarity.

I argue thus that our common notion of the word "virtue" needs a refresher of ancient nostalgia, for we stand to harmonize a discord in our values by its noble etymology. We ought then to take our retrospect no further than Aristotle, for his "arete" is the definition of which we are deficient, and for Aristotle, arete meant something of a more visceral function. This functioning was an ascription necessary for his political body. If we are to shed the tyranny of our present lexicon, I reason we may find a way to aptly understand why we ought to aim at a virtuous political body.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-h David Collins: "What is Democracy?"

This panel presents a few very interesting questions packed in one. Of primary concern to me is the question of democracy. What is it? Can or could it exist? If it can and does, what dangers are we warned by Aristotle that it might pose? This will manifest itself in a discussion of the types of government he might endorse and some potential objections one might raise, as well as similarities to present-day forms of governance.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-i Jason Heitzmann: "What Modern Democracies could Learn from Aristotle"

The societal understanding of luck, as a veil of ignorance for all circumstances outside the individual's control or perception, has been grinding at the core of human experience and connection. When the connectedness of events is taken into account the only circumstances examined are those which appear to be relevant to the individual(s) inquiring of these specific events. These would be considered the known knowns which are relevant the individual(s) perception of inquiry. All circumstances outside this perceived relevancy are then tossed into the category of luck. This includes; the unknown knowns (circumstances the individual(s) witness and understand, but do not think relevant), known unknowns (circumstances the individual(s) have witnessed but do not understand), and the unknown unknowns (circumstances which have neither been understood nor witnessed). This type of inquiry leads to a

flawed human perception and understanding of the connectedness of things; without a reformation into what this phenomenology represents human understanding will continue engrossed by ignorance.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-j Alfred Lapier: “Native Americans and Aristotle’s Notion of Patria”

The indigenous people of the early Americas exemplify the best aspects of Aristotle’s notion of patria, or “fatherland.” By looking to the people of the first nations, we might better understand what Aristotle had in mind. His idea is good, but if we want to avoid misunderstanding him, we should look to the way of life of early Native Americans. Such insights might help the modern U.S. democracy learn to be more inclusive and environmentally conscientious.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-k Jacob Schmauch: “Aristotle’s Aristos: The “Good Man” and Uncle Sam”

Under the ideals of American exceptionalism and its relativistic notions of ethical moral conduct, Aristotle’s “good man” (awe-struck by eudaimonia) takes a form only conscious of its own afflictions and not of others. Which above all other attributes, or complexities strained by the never-ending importance of political power, holds an aristocracy above the lesser individuals who support them. A human, or men historically, incapable of avoiding a role in politics that seeks a continual holding of influence; whether by the acquisition knowledge or by force inflicted from its uses. A creature that, when confronted with human political interaction excels rhetorically and uses the modes of natural science to be the most effective citizen. Ultimately, they are creatures of superior birth that are supported by opulent means; whilst given the chance to free themselves from the chains of a perceptual infinity of human progress or production (as the duty of a common man to stand as the cogs for an Aristocracy to flourish). Seen as vessels carrying and distributing the ideas of justice to a collective majority that doesn’t possess the time to individually study the effects of reason and its applicability to all. Thus, the “good man”, or when grouped together an aristocracy, through appealing to their innate teleological interests subjects the common people to political pacification. Justice then is seen as a bridge between ethics and compensation, the ideological underpinning of a partially representative government that holds the disparity of political influence intact. Aristocracy is a mode of existence within the superstructure, in which ethical concepts are used in contractual agreements between individuals, or bodies of people, in hopes to effectively eliminate any antithetical solutions to similar dilemmas. To keep unity within the populous whilst continuing to keep power for a select few. This framework, a perverse creditor/debtor relationship, reflects the current economic, environmental, societal, and ideological exploitation happening within the US. Thus, the “good man” stands as an overseer for a new common wage-slave production class that's enthralled by aesthetics of consumerism and tricked by the illusory ideological benefits from this perceived good aristos, rhetoric from those in power, to continue an idea of infinite human progress.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS8B-I Loni Taber: “Hoi Polloi”

For the purpose of this critique we will endeavor to see the relationship between the dwindling middle class in America and the struggle or degradation of its democratic system in light of Aristotle’s political and ethical philosophy surrounding the hoi polloi. In this brief analysis of theoretical vs. our current governmental system the goal will be to view what possible contributions there are to gain from Aristotle’s polity. Can this ancient Greek thinker provide the much needed insight into developing a system for America that empowers the hoi polloi and brings stability back to the people? The United States could indeed gain from considering the implications of not only majority rule but of a stronger more virtuous middle class.

Faculty Sponsor: Christopher Kirby, Eastern Washington University

SS9-a Margaret Douglas: “Fatherhood in Victorian Era: Critical Analysis of Fatherhood in George Eliot’s Silas Marner”

Victorian England was a time of societal change and economic prosperity in the nineteenth century. This era of transformation also brought about a widespread societal questioning of gender roles. Literary productions of this time reveal of this domestic reconfiguration and hint at a larger issue of a masculine reordering of society. George Eliot’s novel *Silas Marner* arises out of the Industrial Revolution of the time period, and provides insight to this reordering of domesticity and assertion of fatherhood in Victorian English society. The character of Silas Marner is created to be a nuanced version of a father, and provides an example of what an emotionally intimate, yet authoritative family patriarch should embody. This research paper will seek to critically engage in the complexity and discontent of the concept of fatherhood in the Victorian Era, and will strictly consider this concept in the novel *Silas Marner*, analyzing the character of Silas in comparison to the paradigmatic, Victorian father.

Faculty Sponsor: Ingrid Ranum, Gonzaga University

SS9-b Emily Courchaine: “Women Writing Masculinities in the Victorian Era”

This paper examines the effects that Victorian constructions of gender have on the way in which men and women form interpersonal and intrapersonal relationships in the narrative poem *Aurora Leigh*, by Elizabeth Barrett Browning. In the 19th century, a new dichotomy between masculinity and femininity emerged, a phenomenon which David Rosen explains in *The Changing Fictions of Masculinity* as destructive to relationships and self-understanding. By analyzing the evolution of the relationship between Aurora Leigh and her cousin Romney in light of this new dichotomy, I intend to show that the agency and self-definition that Aurora Leigh is able to achieve through her writing allows both her and Romney to transcend the limitations of gendered expectations and participate in a spiritually fulfilling relationship in which they mutually recognize one another.

Faculty Sponsor: Ingrid Ranum, Gonzaga University

SS9-c Katie Polacheck: “The New Woman and the New Man as Androgynous in *The Story of an African Farm*”

Olive Schreiner’s *The Story of an African Farm* is often noted as “the first New Woman novel” for its female protagonist’s adventuring outside the domestic sphere, but it redefines masculinity just as much as it redefines femininity due to the way that the two are understood in conjunction (Richardson 114). Schreiner does more than redefine the two specific genders: she strives to unravel the cultural understanding of gender as binary and static. In order to do so, she blends traits traditionally masculine and feminine in the three nontraditional characters of Lyndall, Waldo, and Gregory. Schreiner herself, in her 1911 *Woman and Labour* calls this remodeling “a great movement of the sexes towards each other.” In this paper, I will examine the ways in which these three characters perform and mix gender as well as their relationships in order to understand Schreiner’s contribution to the New Woman movement with this novel.

Faculty Sponsor: Ingrid Ranum, Gonzaga University

List of Student Presenters

Abbotts, Kieran (Gonzaga University) - RS13-d
Agueros, Braden (Eastern Washington University) - SS8B-g
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