8th Annual Undergraduate Research, Scholarship, Creative Activity Symposium

April 29-30, 2014
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PREFACE

On behalf of the students, faculty and staff of the University of California, we welcome you to the Seventh Annual Undergraduate Research Symposium. Undergraduate research encourages our students to go beyond studying and to actually put into practice their research, scholarship and creative endeavors. Research is a difficult but rewarding enterprise, and the projects presented here represent a significant commitment of time and energy on the part of both the students and their faculty mentors.

We commend you on your creative efforts and wish you the best as you present your results of those efforts to the larger UCR community.

Steven Brint, Vice Provost
Undergraduate Education

and

Gladis Herrera-Berkowitz, Director Student Success Programs
Undergraduate Education
8TH ANNUAL UNDERGRADUATE RESEARCH, SCHOLARSHIP, CREATIVE ACTIVITY SYMPOSIUM

SCHEDULE OF EVENTS
ORAL PRESENTATION SESSIONS

TUESDAY - APRIL 29, 2014

8:00 – 9:00    HUB Lobby 3rd Floor
Registration & Poster Setup (HUB 302)

9:10-10:00    HUB 355    Moderator: David Reznick, Biology
A1  Disposable Electronic Cigarettes and Electronic Hookahs: Evaluation of Performance
    Sanjay Ghai, Biology
    Faculty Mentor: Prue Talbot, Cell Biology & Neuroscience
A2  Promoting the Amount of Potential Bone Marrow Donors from Certain Ethnic Backgrounds
    Heba Diab, Biology
    Faculty Mentor: David Lo, Biomedical sciences
A3  A Global Role for a Telomere Protein in Preventing Genome Recombination
    David Castro, Biology
    Faculty Mentor: Connie Nugent, Cell Biology & Neuroscience

9:10-10:00    HUB 367    Moderator: Morris Maduro, Biology
A4  The Influence of Parental Divorce on Both Childhood and Later Adult Perceptions of Cheerfulness
    Isabel Ramos, Psychology
    Faculty Mentor: Howard Friedman, Psychology
A5  “That’s a Nice Gesture”: The Role of Individual Differences in Impression Formation
    Sarah Jamal, Psychology
    Faculty Mentor: Howard Friedman, Psychology
A6  Prejudice and Intergroup Contact in a Diverse College Environment
    Michael Gamboa, Psychology
    Faculty Mentor: Carolyn Murray, Psychology

9:10-10:00    HUB 379    Moderator: Len Mueller, Chemistry
A7  Improving Cycle Stability of Lithium-Sulfur Batteries through Sequestration of Polysulfide Species in Functionalized Carbon
    Allen Tran, Chemical Engineering
    Faculty Mentor: Juchen Guo, Chemical Engineering
A8  Heating and Dryer Application using Solar Thermal Energy
    Christian Alcaraz, Chemical Engineering
Faculty Mentor: Kawai Tam, Chemical Engineering

A9 Curbing Political Corruption: Applying Brazil's Anti-Corruption Reforms to the Philippines
Aica Dizon, Political Science
Faculty Mentor: David Pion-Berlin, Political Science

10:10-11:00 HUB 355  Moderator: Isgouhi Kaloshian, Nematology
B1 Monstrosity Created
Christine Garavito, English
Faculty Mentor: George Haggerty, English
B2 Slavery, Villainy and Vice in City Crimes
Alexandra Fonseca, English
Faculty Mentor: George Haggerty, English
B3 Girlhood: Internet Post-Feminists Decentering the “I” Of Feminism
Alissa Medina, English
Faculty Mentor: Traise Yamamoto, English

10:10-11:00 HUB 367  Moderator: David Jassby, Chemical/Environmental Engineering
B4 Role of PAR2 and B-arrestins in Lymphocyte Chemotaxis
Sireena Sy, Biochemistry
Faculty Mentor: Kathryn DeFea, Biomedical Sciences
B5 Anticancer Activity of Gold(III) Complexes and Ligands Bearing Alkyl and Aromatic-substituted I, 10-phenanthroline Ligands
Pauline Olsen, Biochemistry
Faculty Mentor: Jack Eichler, Chemistry
B6 Toxoplasama gondii Infection Disrupts Glutamate Metabolism in the CNS
Elma Frias, Neuroscience & Music
Faculty Mentor: Emma Wilson, Biomedical Sciences

10:10-11:00 HUB 379  Moderator: Paul Green, Ethnic Studies
B7 Mexican Citrus Labor and Community in Riverside, California, 1910-1960
Lazaro Cardenas, Psychology and Ethnic Studies
Faculty Mentor: Robert Perez, Ethnic Studies
B8 Overcrowding as a Determinant of Violence in California State Prisons
John Maldonado, Sociology and Ethnic Studies
Faculty Mentor: David Swanson, Sociology
B9 Vietnamese and Latino Catholicisms: Multiethnic Religious Encounters and Sacred Space in Southern California
Rebecca Villareal, Religious Studies
Faculty Mentor: Jennifer Hughes, History

11:10-12:00 HUB 355  Moderator: Kurt Anderson, Biology
C1 The Effects of Predation Pressure on Chromosome Linkage of Color Pattern Genes in Wild Guppies
Daniel Goldberg, Biology
Faculty Mentor: David Reznick, Biology
C2 PMP-type Synthetic Elicitors as Molecular Probes Targeting Plant Defense Signaling and Leads for Novel Reduced-risk Pesticides
Adilene Gomez, Biology  
Faculty Mentor: Thomas Eulgem, Botany & Plant Sciences

11:10-12:00     HUB 367     Moderator: Dana Simmons, History
C3  Muslim Children’s Conceptualization of Allah & Prayer  
    Inzia Hirawala, Psychology  
    Faculty Mentor: Rebekah Richert, Psychology
C4  The Building Blocks of Empires: Territorial Expansion and Provincial Governance in the Russian and Ottoman Empires  
    Christopher Seeling, History & Political Science  
    Faculty Mentor: Andrew Robarts, History
C5  Children’s Kinetic Family Drawings: Projections of and Relations among Attachment, Psychopathology, Maltreatment, and Future Adjustment  
    Mayra Cazares, Psychology  
    Faculty Mentor: Tuppett Yates, Psychology

11:10-12:00     HUB 379     Moderator: Alec Gerry, Entomology
C7  Northern Flies at Southern Latitudes: Investigations of Range and Diapause in Face Fly, Musca autumnalis  
    Fallon Fowler, Entomology  
    Faculty Mentor: Brad Mullens, Entomology
C8  Minimizing Hexavalent Chromium in Drinking Water: Understanding Hidden Reaction Pathways  
    Han Sohn, Environmental Engineering  
    Faculty Mentor: Haizhou Liu, Chemical Engineering
C9  Antioxidants Improve the Healing of Chronic Wounds in a Diabetic Mouse Model  
    Monika Garcia, Biological Sciences  
    Faculty Mentor: Manuela Martins-Green, Cell Biology & Neuroscience

12:00 – 12:10  Welcome  
    Steve Brint, Vice Provost for Undergraduate Education

12:10 – 1:00  Poster Presentations 1-13, 34, & A (see pg. 14 for abstract titles)  
    HUB 302

1:10 – 2:00     HUB 355     Moderator: Victor Rodgers, Bioengineering
D1  Jimi Brown  
    Eli Reich, Theatre  
    Faculty Mentor: Rickerby Hinds, Theatre
D2  Discourses of Gender Norms, Heteronormativity, and Frameworks of White Privilege in Bend it Like Beckham  
    Geneveive Newman, Media & Cultural Studies  
    Faculty Mentor: Setsu Shigematsu, Media & Cultural Studies
D3  La Sandunga: Transcribed Music Composition and Analysis of Music Learned Through Performance Compared to Music Learned by Ear  
    Johanna Parado-Lazareno, Music  
    Faculty Mentor: Paulo Chagas, Music
<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Moderator</th>
<th>Title</th>
<th>Faculty Mentor</th>
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<tbody>
<tr>
<td>1:10 – 2:00</td>
<td>HUB 367</td>
<td>Richard Hooley, Chemistry</td>
<td><strong>Investigation of the Mechanism of a Potential Glioblastoma Chemotherapeutic</strong></td>
<td>Jack Eichler, Chemistry</td>
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<td>Elma Frias, Neuroscience and Music</td>
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<td><strong>Faculty Mentor:</strong> Jack Eichler, Chemistry</td>
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<td>D4</td>
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<td><strong>Ultraviolet photodissociation dynamics of 3-cyclohexenyl radical</strong></td>
<td>Jingsong Zhang, Chemistry</td>
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<td>D5</td>
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<td><strong>Faculty Mentor:</strong> Jingsong Zhang, Chemistry</td>
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<tr>
<td>1:10 – 2:00</td>
<td>HUB 367</td>
<td>Dimitrios Morikis, Bioengineering</td>
<td><strong>Islam, Science, and Gender: The Role of Women in Islam and the Question of Public Space in Mosques</strong></td>
<td>Andrew Robarts, History</td>
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<td>Lilia Hachim, Psychology and Middle Eastern &amp; Islamic Studies</td>
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<td>D6</td>
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<td><strong>Faculty Mentor:</strong> Andrew Robarts, History</td>
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<td>D7</td>
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<td>Why Cheat?</td>
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<td><strong>Faculty Mentor:</strong> Carolyn Murray, Psychology</td>
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<td>D8</td>
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<td><strong>Implications of Health Technologies on Doctor-Patient Communication, Patient Health Outcomes and Transparency Issues</strong></td>
<td>Robin DiMatteo, Psychology</td>
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<td>Deborah Kim, Psychology</td>
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<td><strong>Faculty Mentor:</strong> Robin DiMatteo, Psychology</td>
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<tr>
<td>2:10-3:00</td>
<td>HUB 355</td>
<td>Jack Eichler, Chemistry</td>
<td><strong>Proprioception and Surrealism: Reimagining Giacometti’s Surrealist Table within a Heideggarian Spatial Complex</strong></td>
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<tr>
<td>E1</td>
<td></td>
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<td>Courtney Rawlings, Philosophy &amp; Art History</td>
<td>Susan Laxton, Art History</td>
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<tr>
<td>E2</td>
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<td><strong>Characterization of Biofilms from a Novel Animal Model of Chronic Wounds</strong></td>
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<td>Jane Kim, Plant Biology</td>
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<td></td>
<td><strong>Faculty Mentors:</strong> Manuela Martins-Green, Cell Biology &amp; Neuroscience Eugene Nothnagel, Botany &amp; Plant Science</td>
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### Wednesday, 30, 2014

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<tr>
<th>Time</th>
<th>Location</th>
<th>Moderator</th>
<th>Title</th>
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<tr>
<td>8:00 – 9:00</td>
<td>HUB Lobby 3rd Floor</td>
<td>Registration</td>
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</tbody>
</table>
| 9:10-10:00 | HUB 355           | Moderator: Edith Allen, Botany & Plant Science | Italian Fascism: In Thought and Action  
Kevin Sood, Political Science  
Faculty Mentor: John Laursen, Political Science |
|            |                   |                                    | Political News Media Analysis of Asian American Voting Frequency: 1988-2012 Presidential Elections  
Rebecca Chiang, Political Science  
Faculty Mentor: Karthick Ramakrishnan, Political Science |
|            |                   |                                    | Lenin and Khomeini: A Theoretical Comparison  
Kevin Hack, Political Science  
Faculty Mentor: John Medearis, Political Science |
| 10:10-11:00| HUB 355           | Moderator: Marko Princevac, Mechanical Engineering | A Story of a Split Cohort: Fostering Network Connections among Medical School Students  
Ivie Egiebor, Biochemistry  
Faculty Mentor: Kendrick Davis, School of Medicine |
|            |                   |                                    | Effect of Physiological-Temperature on Absorption and Fluorescence Properties of Near-Infrared Erythrocyte Mimicking Transducers  
Leela Tanikella, Bioengineering  
Faculty Mentor: Bahman Anvari, Bioengineering |
|            |                   |                                    | Electrostatic Analysis of Complement Factor D  
Basil Baddour, Bioengineering  
Faculty Mentor: Dimitrios Morikis, Bioengineering |
|            |                   |                                    | Imperialist Norms within Wuthering Heights and Jane Eyre  
Sneha Sharma, English  
Faculty Mentor: Susan Zieger, English |
| 11:10 – 12:00| HUB 355          | Moderator: Christine Victorino, Undergraduate Education | Ovid’s Poetic Response to Augustan Moral Policies  
Gianna Newberry, History and Classics  
Faculty Mentor: Wendy Raschke, Comparative Literature |
|            |                   |                                    | Understanding and Intervening in Hotspots of Crime: The Case of San Bernardino, California  
Ruth Robertson, Political Science  
Faculty Mentor: Robert Parker, Sociology |
|            |                   |                                    | A Computational Model of the Linguistic Patterns of Leadership  
Wun (Doria) Huang, Psychology  
Faculty Mentor: Curt Burgess, Psychology |
| 11:10-12:00| HUB 367           | Moderator: Cindy Larive, Chemistry | A Global Study of Higher Education and Labor Markets  
Hoai-An Nguyen, Sociology  
Faculty Mentors: Matthew C. Mahutga, Sociology  
Ellen Reese, Sociology |
H5  Expanding UCR’s Diversity in Engineering Classrooms
Mitzi Salgado, Women’s Studies
Faculty Mentor: Chikako Takeshita, Women’s Studies

H6  12 Week Leadership Development Program for Incarcerated Youth
Gabriela Olguin, Sociology
Faculty Mentor: Robert Parker, Sociology

11:10-12:00  HUB 379  Moderator: Andrea Denny-Brown, English
H7  The Intersection of Myth and Religious Tropes and Gender and Sexuality in Toni Morrison’s Beloved, Jazz, and Paradise
Zachariah Zendejas, English
Faculty Mentor: Erica Edwards, English

H8  Narrating Murder in Poe’s Tales
Jasmine Dietz, English
Faculty Mentor: George Haggerty, English

H9  Threshold Terrors
Alythia Ortiz, English
Faculty Mentor: George Haggerty, English

12:00 – 1:00  Poster Presentations 14-33 (see pg. 16 for abstract titles)
HUB 302

1:10-2:00  HUB 355  Moderator: Steve Brint, Undergraduate Education
I1  From the Corners to the Streets: Worker Centers’ Struggles for Social Justice
Jacqueline Maciel, Sociology
Faculty Mentor: Ellen Reese, Sociology

I2  The Need for Family Friendly Policies: Student Parents in U.C.R.
Judith Osorio, Sociology
Faculty Mentor: Ellen Reese, Sociology

I3  Reggae Movements: The role American reggae music, musicians, and their lyrics, play in mobilizing fans for social movements
Gloria Vargas, Sociology
Faculty Mentor: Ellen Reese, Sociology

1:10-2:00  HUB 367  Moderator: Gary Coyne, Undergraduate Education
I4  "Cottage on the Hill": A Quilted Narrative of the New Hampshire Hayes Family
Nicole De Silva, History and Business Administration
Faculty Mentor: Molly McGarry, History

I5  Investigating the Origins of the Transatlantic Trade and Investment Partnership
Kassandra Taira, Business Administration
Faculty Mentor: Jana Grittersova, Political Science

1:10-2:00  HUB 379  Moderator: Philip Brisk, Computer Science & Engineering
I6  Quantitative Modeling of the Alternative Pathway in Complement System
Nehemiah Zewde, Bioengineering
Faculty Mentor: Dimitrios Morikis, Bioengineer
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<tr>
<th>Session</th>
<th>Title</th>
<th>Presenters</th>
<th>Faculty Mentor(s)</th>
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<tbody>
<tr>
<td>I7</td>
<td>Network Analysis of Intra-Molecular Interactions of the HIV-1 gp120 V3 Loop</td>
<td>Ilya Lederman, Bioengineering</td>
<td>Dimitrios Morikis, Bioengineer</td>
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<tr>
<td>I8</td>
<td>Enhanced Corrosion Resistance of Anodized Magnesium for Orthopedic Applications</td>
<td>Christopher Miller, Bioengineering</td>
<td>Huinan Liu, Bioengineering</td>
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<td></td>
<td>2:10-3:00 HUB 355</td>
<td>Moderator: Greg Blaha, Biochemistry</td>
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<tr>
<td>J1</td>
<td>Deciphering the Role of Lipoxygenase2 in the Ethylene Signaling Pathway of Arabidopsis thaliana</td>
<td>Sang Nguyen, Biochemistry</td>
<td>Daniel Gallie, Biochemistry</td>
</tr>
<tr>
<td>J2</td>
<td>Sustainable, Reagent-Free Synthesis of Pyroglutamic Acid Peptides</td>
<td>Nicole Godfrey, Chemistry</td>
<td>Michael Pirrung, Chemistry</td>
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<tr>
<td>J3</td>
<td>Synthesis, characterization, and biological activity of five-coordinate gold(III) complexes possessing sec-butyl-substituted 1,10-phenanthroline ligands</td>
<td>Charles Ruiz, Chemistry</td>
<td>Jack Eichler, Chemistry</td>
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<td>2:10-3:00 HUB 367</td>
<td>Moderator: Thomas Perring, Undergraduate Education</td>
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<td>J4</td>
<td>Understanding the Response of Riverside seniors to Electronic Health Information</td>
<td>Violet Canales, Anthropology</td>
<td>Juliet McMullin, Anthropology</td>
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<tr>
<td>J4</td>
<td>Allegorizing the Event: French Horror Films in the Post-World War II and Post-9/11 Contexts</td>
<td>Michael Turcios, French and Media Cultural Studies</td>
<td>Michelle Bloom, Comparative Literature and Foreign Languages</td>
</tr>
<tr>
<td>J5</td>
<td>The Ability of a Computational model to predict emotional intensity</td>
<td>Jacklyn Kozich, Psychology</td>
<td>Curt Burgess, Psychology</td>
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<td>2:10-3:00 HUB 367</td>
<td>Moderator: Jim Burnette, CNAS Dean’s Office</td>
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<tr>
<td>J6</td>
<td>Ellie and the Virobots: A Literary Approach to Science Education</td>
<td>Chenise Chapin, Physics</td>
<td>Brian Siana, Physics and Astronomy</td>
</tr>
<tr>
<td>J7</td>
<td>The Effect of Large Earthquakes on Global Seismicity</td>
<td>Lisa Cahn, Geophysics</td>
<td>Abhijit Ghosh, Earth Sciences</td>
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<td>3:10-4:00 HUB 355</td>
<td>Moderator: Sang-Hee Lee, Anthropology</td>
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<td>K1</td>
<td>Emancipated Foster Youth: Examining Change, Stability, and Narrative Messages Regarding Education</td>
<td>Tina Yang, Psychology</td>
<td>Tuppett Yates, Psychology</td>
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</tbody>
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*UC Riverside's 7th Annual Undergraduate Research, Scholarship & Creative Activity Symposium*

*Schedule of Events*
**UC Riverside's 7th Annual Undergraduate Research, Scholarship & Creative Activity Symposium**  
**Schedule of Events**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Presenter(s)</th>
<th>Faculty Mentor</th>
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<tbody>
<tr>
<td>K2</td>
<td><strong>A semantic analysis of &quot;slave&quot; and variations of the &quot;N-word&quot; in Mark Twain novels</strong></td>
<td>Peter Cao, Psychology</td>
<td>Curt Burgess, Psychology</td>
</tr>
<tr>
<td>K3</td>
<td><strong>&quot;Deliciousness, Made for You&quot; - Strategic Marketing Plan of McDonald's McCafé Beverage Line</strong></td>
<td>Genevie Co, Business Administration</td>
<td>Sean Jasso, SoBA</td>
</tr>
<tr>
<td>K4</td>
<td><strong>Commodification of Wealth in Core/Periphery Hierarchies in the Context of the Evolution of Market Exchange</strong></td>
<td>Sandor Nagy, Global Studies</td>
<td>Christopher Chase Dunn, Sociology</td>
</tr>
<tr>
<td>K5</td>
<td><strong>It's All How You Use It: Connectivity in the Age of Social Media</strong></td>
<td>Carolyn O’Brien-Price, Global Studies</td>
<td>Juliann Allison, Political Science</td>
</tr>
<tr>
<td>K6</td>
<td><strong>Wasteland</strong></td>
<td>Matt Kanemori, Creative Writing</td>
<td>Susan Straight</td>
</tr>
<tr>
<td>K7</td>
<td><strong>An Adventureland of Commodities: Disney and Borders</strong></td>
<td>Michael Turcios, French and Media &amp; Cultural Studies</td>
<td>Amalia Cabezas, Ethnic Studies</td>
</tr>
<tr>
<td>K8</td>
<td><strong>Two Faces of Dimethoxyalkanes: Steric Repulsion and Hyperconjugative Stabilization</strong></td>
<td>Juan Sanabria, Neuroscience</td>
<td>Thomas Morton, Chemistry</td>
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**3:10-4:00 HUB 367**  
Moderator: Ellen Reese, Sociology

**3:10-4:00 HUB 379**  
Moderator: Ilhem Messaoudi, Biomedical Sciences

**4:00 – 4:15 HUB 302**  
**AWARDS AND CLOSING SESSION**  
THOMAS PERRING, ASSOCIATE VICE PROVOST  
UNDERGRADUATE EDUCATION
**POSTER PRESENTATION SESSIONS**

**HUB 302**

**Tuesday, April 29, 2014**

**Poster Session One**

12:00 – 1:00 p.m.

**Poster 1**  
*The Irrelevant Sound Effect: Performance in Bilinguals*  
Sagar Akre, Psychology  
Faculty Mentor: Lawrence Rosenblum, Psychology

**Poster 2**  
*Effects of Gatorade and Red Bull on Voluntary Wheel Running in Genetically Selected High Runner Lines of Mice*  
Kristianna Wi, Biology  
Faculty Mentor: Theodore Garland, Biology

**Poster 3**  
*Investigating the Impact of Fluidic Agitation on Human Pluripotent Stem Cells in Dynamic Suspension*  
Ronak Joshi, Neuroscience  
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

**Poster 4**  
*Citizens’ Prejudices against Policewomen under Certain Conditions*  
Kathleen Truong, Psychology  
Faculty Mentor: Carolyn Murray, Psychology

**Poster 5**  
*Effects of Shadowing Delay on Processing of Auditory and Visual Speech*  
Maria Loyola, Psychology  
Faculty Mentor: Lawrence Rosenblum, Psychology

**Poster 6**  
*Analysis of Tobacco Expressing Candidate Methyltransferase Transgenes from Moss*  
Gabriel Juloya, Biochemistry  
Faculty Mentor: Eugene Nothnagel, Botany and Plant Sciences

**Poster 7**  
*The Significance of Social Relationships on the Psychological Well-Being and Problem Behaviors of Emerging Adults*  
Raven Mendez, Psychology  
Faculty Mentor: Mary Gauvain, Psychology

**Poster 8**  
*Characterization and Crystallization of Escherichia coli BipA*  
Joseph Hahm, Biochemistry  
Faculty Mentor: Gregor Blaha, Biochemistry

**Poster 9**  
*Enhanced Corrosion Resistance of Anodized Magnesium for Orthopedic Applications*  
Christopher Miller, Bioengineering  
Faculty Mentor: Huinan Liu, Bioengineering
Poster 10  Can a Computational Model of Semantics Encode Social Stereotypes?  
Dawn Carroll, Linguistics  
Faculty Mentor: Curt Burgess, Psychology

Poster 11  Study of Flash Pyrolysis of Methyl Nitrate Using Vacuum Ultraviolet Photoionization Mass Spectrometry  
Blake Riser, Biochemistry  
Faculty Mentor: Jingsong Zhang, Chemistry

Poster 12  Adverse Metabolic Effects of a Soybean Oil Diet  
Cynthia Perea, Microbiology  
Faculty Mentor: Poonam Deol, Cell Biology & Neuroscience

Poster 13  Coupling of Metal Halides with a Green Co-Solvent to Enhance Production of Fuel Precursors from Residual Plant (Lignocellulosic) Biomass  
Priyanka Singh, Chemical Engineering  
Faculty Mentor: Charles Wyman, Chemical Engineering

Poster 34  Mark-Making with Individuals on the Spectrum  
Danni Wei, Studio Art Chemical Engineering  
Faculty Mentor: Erika Suderburg, Art

Poster A  Separation and Characterization of Enoxaparin Oligosaccharides  
Adanma Nwachuku  
Faculty Mentor: Cynthia Larive, Chemistry

Wednesday, April 30, 2014  
Poster Session Two  
HUB 302  
12:00 – 1:00 p.m.

Poster 14  Young Children’s Coping with a Parent’s Military Deployment  
Nabila Orozco, Psychology  
Faculty Mentor: Mary Gauvain, Psychology

Poster 15  Imaginary Companions: Children’s Fantastical Beliefs  
Jesenia Rivera, Psychology  
Faculty Mentor: Rebekah Richert, Psychology

Poster 16  Effect of Pretreatment Severity on Digestibility of Polysaccharides in Lignocellulosic Biomass by Consolidated Bioprocess  
Anna Almario, Chemical Engineering  
Faculty Mentor: Charles Wyman, Chemical and Environmental Engineering
Poster 17  
**Micrometeorological Edge Effects on Agricultural Sorghum bicolor in a Desert Climate**  
Kyle Ricio, Biology  
Faculty Mentor: Darrel Jenerette, Botany and Plant Sciences

Poster 18  
**Synthesis of [(di-methylphen)AuCl3] and [(di-n-butylphen)AuCl3]: Anti-tumor Activity of Gold(III) Complexes**  
Julia Jenkins, Biochemistry  
Faculty Mentor: Jack Eichler, Chemistry

Poster 19  
**Monte-Carlo Simulations for Improving Rydberg Positronium Atom Detection with Possible Applications to Anti-Matter Gravity Experiments**  
Ethan Roeder, Physics  
Faculty Mentor: Allen Mills, Physics and Astronomy

Poster 20  
**Aging Investigation on Optical Characteristics of Copper Sulfide Bio-Templated Nanowires**  
Gabriel Grajeda, Materials Science & Engineering  
Faculty Mentor: Elaine Haberer, Electrical Engineering

Poster 21  
**Electronic and Conventional Cigarette Topography Differs**  
My Hua, Cell, Molecular and Developmental Biology  
Faculty Mentor: Prue Talbot, Cell, Molecular, & Development Biology

Poster 22  
**Catalan Numbers and Action Graphs**  
Ruben Lopez, Mathematics  
Faculty Mentor: Julie Bergner, Mathematics

Poster 23  
**Effective Removal of Hexavalent Chromium by Sulfite**  
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The Irrelevant Sound Effect: Performance in Bilinguals
Sagar Akre, Psychology
Tung Leung, Psychology
Rosa Ayala, Psychology
Joshua Dorsi, Psychology
Faculty Mentor: Lawrence Rosenblum, Psychology

Abstract: The Irrelevant Sound Effect (ISE) is the degradation recall accuracy during serial recall tasks performed in the presence of irrelevant background sound. Serial recall tasks are tasks that require participants to recall a list of items in the correct order. Research has shown that irrelevant sound reduces one’s performance on serial recall tasks (Colle & Welsh, 1976). The changing state hypothesis assumes that ISE occurs due to finite space in short term memory and that both tonal changes in the stimuli and to-be-recalled items occupy the finite space. The primacy model assumes that attentional resources are diffused across items presented in a series. Decreased performance in serial recall tasks is a function of this diffused attention. In ISE, each tonal change is assumed to cause individuals to further divide their attentional resources. That is, the primacy model assumes that disruption occurs at the attentional level while the changing-state hypothesis assumes that disruption by irrelevant sound occurs in short-term memory. Bilinguals have been shown to possess superior attentional capabilities compared to monolinguals but show similar short-term memory capabilities. The current study examines the difference in ISE between monolinguals and bilinguals. The results show a significant performance difference between bilinguals and monolinguals, with bilinguals outperforming monolinguals. Since bilinguals have an advantage over monolinguals in attention and not short-term memory, the results provide evidence that ISE occurs at the attentional level but not in short-term memory. Therefore, the results provide supportive evidence for the primacy model and evidence against the changing state hypothesis.

Heating and Dryer Application using Solar Thermal Energy
Christian Alcaraz, Chemical & Environmental Engineering
Julianne Rolf, Environmental Engineering
Samantha Mak, Environmental Engineering
Ryan Schoeman, Environmental Engineering
Faculty Mentor: Kawai Tam, Chemical & Environmental Engineering

Abstract: Reduction of energy consumption from non-renewable sources is a challenge that faces society today. The residential sector is responsible for 22% amount of non-renewable energy consumption. A large portion of energy goes to space heating and drying applications. Finding an alternative form of energy for the residential sector to use for these purposes are imperative. The sun is a renewable resource that provides between 4.8 and 8.8 kWh per meters squared day. Utilizing the vast amount of daily energy created by the sun would greatly reduce overall domestic energy consumption. The solar thermal closet combines a solar collector and an insulated unit for clothes drying and space heating. It utilizes the heat generated in the attic to preheat the air before going into the solar collector which, uses the irradiated energy from the sun to heat the air to around 155°F, the typical temperature of a commercial dryer. The temperature of the air can be varied by manipulating the amount of time the air spends in the solar collector. The time spent in the collector can be adjusted by varying the speed of the fan that will be connected to a microcontroller. The microcontroller is connected to a touch screen LCD
screen that allows the user to control the features of the solar thermal closet. Preliminary tests have been done with an insulated tool shed and solar collector. Ambient air data has been collected and is shown to meet the desired temperature.

*Effective Removal of Hexavalent Chromium by Sulfite Radical in UV Process*

**Lamees Alkhamis, Environmental Engineering**

**Faculty Mentor: Haizhou Liu, Chemical & Environmental Engineering**

Abstract: Hexavalent Chromium Cr(VI) is a carcinogen that is present in drinking water sources in California and nationwide due to 1) historically improper industrial waste disposal and 2) geological weathering of naturally occurring chromium-containing aquifer minerals. Since the presence of Cr(VI) in drinking water causes a serious threat to public health, the California Department of Public Health is proposing a new and much stringent standard of Cr(VI) this year. With this new standard, current water treatment systems need to be upgraded to be more efficient in the treatment and removal process. This study is focused on a new efficient and cost-effective Cr(VI) removal process based on UV/sulfite system. In this study, UV photolyzes sulfite into sulfite radical (SO$_3$•), hydrogen atom (H•) and hydrated electron (e$_{aq}$•). All three of these species are short lived and act as strong reductants that reduce Cr(VI) to Cr(III) that is insoluble and non-toxic. The impacts of various pH levels in the rate of Cr(VI) degradation were examined. In addition, this study looks into the effect of varying ratios of sulfite and Cr(VI) on the rate of degradation of Cr(VI). It was found that the rate of reduction was higher at lower pHs in the range between 6 and 8. It was also found that a 1:40 ratio of sulfite to Cr(VI) gave a better performance of Cr(VI) removal when compared to a ratio of 1:20.

*Effect of Pretreatment Severity on Digestibility of Polysaccharides in Lignocellulosic Biomass by Consolidated Bioprocess*

**Anna Almario, Chemical Engineering**

**Vanessa Thomas, Chemical Engineering**

**Faculty Mentor: Charles Wyman, Chemical & Environmental Engineering**

Abstract: Developing processes that generate energy from sustainable sources is a societal challenge, especially as energy demands rise while production is limited by the availability of fossil resources. A viable alternative is converting polysaccharides within lignocellulosic biomass, a ubiquitous and renewable feedstock in such forms as woods and grasses, into the biofuel ethanol. One approach is through hydrothermal pretreatment followed by consolidated bioprocessing (CBP). Pretreatment allows access to cellulose contained in biomass and is accomplished by breaking down cell walls at high temperatures and pressures. CBP combines hydrolysis and fermentation of polysaccharides using the anaerobic, thermophilic microbe, Clostridium thermocellum. The objective of this project is to understand the interaction between these two conversion steps and determine the most effective combination for eventual scale-up to industrially relevant levels. Milled poplar wood was pretreated over a range of severity factors and incubated with C. thermocellum. The composition of poplar after fermentation was compared to that before and after pretreatment to measure the effect of pretreatment severity on overall sugar release from the two steps combined. Results show that increasing pretreatment severity increased the ability of C. thermocellum to consume poplar cellulose and convert it to ethanol. The overall sugar release was comparable to that obtained from hydrolysis with fungal enzymes, a more established, yet costly, system. Thus, because CBP achieved similar yields to conventional enzymes without the need for a separate enzyme production step, costs will be reduced, indicating that combining pretreatment with CBP may be an economical solution to sustainable energy production.
The Synthesis and Biological Testing of [Mono-sec-butyl-bipyridine AuCl₃] as a Potential Chemotherapeutic Drug
Noah Angel, Chemistry
Michelle Smith, Biochemistry
Faculty Mentor: Jack Eichler, Chemistry

Abstract: In an ongoing effort to find an alternative to the drug cisplatin, our group has investigated the in-vitro antitumor activity of various 1,10-phenanthroline (phen) and 2,2'-bipyridine (bipy) ligands complexed to gold (III). In particular, this report describes efforts to make stabilized 6-sec-butyl-2,2'-bipyridine gold (III) complex [(mono-sec-butylbipy)AuCl₃] to compare the activity to the original 2,9-di-sec-butyl-1,10-phenanthroline complex [(sec-butyphen)AuCl₃]. To date, we have successfully synthesized mono-sec-butylbipy ligand and characterized it via ¹H NMR, and synthesized and characterized the corresponding gold (III) complex via ¹H NMR and X-ray crystallography. Biological activity of the gold (III) complex in biological media has been tested via reduced glutathione (GSH) stability tests utilizing UV-Vis absorption spectroscopy. The structure of the [(mono-sec-butylbipy)AuCl₃] complex is very similar to the original [(sec-butyphen)AuCl₃] complex synthesized and characterized by others in our group. We also see similar results in the GSH stability tests that we have conducted between the [(mono-sec-butylbipy)AuCl₃] complex and the aforementioned sec-butyphen ligand. In the future, we hope to draw more definitive conclusions about whether the various gold (III) complexes synthesized in our lab have a distinct mechanism of anti-tumor activity, and from there find the functional groups and/or metal complex combination that is responsible for the underlying chemistry of this activity. We also hope to continue to expand our repertoire of alkylbipy gold (III) complex analogs in an attempt to see which ligand design yields the most activity.

Electrostatic Analysis of Complement Factor D
Basil Baddour, Bioengineering
Ronald Gorham, Bioengineering
Faculty Mentor: Dimitrios Morikis, Bioengineering

Abstract: The alternative pathway of the complement system is a part of the innate immune system which acts as a persistent line of defense against pathogens. Its activation undergoes an amplification step whose propagation is limited by the cleavage of the C3b-FB complex by Complement Factor D (FD). The interaction of FD with the C3b-FB complex is an essential, rate limiting factor to the activation of the alternative pathway. Over-activation of the alternative pathway has been shown to be strongly linked to autoimmune disease such as dense deposit disease, macular degeneration, and atypical hemolytic uremic syndrome. Here the C3b-FB-FD interaction is analyzed using electrostatic free energy calculations and electrostatic clustering to identify the electrostatic contribution to binding for each charged amino acid in FD. The computational framework AESOP (Analysis of Electrostatic Similarities of Proteins) was utilized to perform computational alanine scan mutagenesis for all charged residues. Free energy calculations were performed on each mutant and hierarchical clustering was used to group mutants based on their deviation from the parent structure. Results highlight the extent to which charged residues are critical to binding of FD to the C3b-FB proconvertase. Understanding the electrostatic contribution of each charged residue provides insight into FD’s unique specificity to Factor B (FB). This analysis aids to further delineate characteristics critical for FD’s binding and cleavage, in addition to characterizing differences from other serine proteases. This knowledge is useful for designing FD inhibitors as target therapeutics for autoimmune disease suppression.
Electronic and Conventional Cigarette Topography Differs
Rachel Behar, Cell, Molecular & Developmental Biology
My Hua, English & Biology
Faculty Mentor: Prue Talbot, Cell, Molecular & Developmental Biology

Abstract: In this study, topography data were collected and analyzed from nine a-cigarette (EC) users (5 male; 3 female) over 2 days within a 7 day period. Individuals were prescreened to ensure they were 18 and over, experienced users, accustomed to 12-18 mg of nicotine/cartridge, and were in good health. Participants used two popular brands (A and B) and were asked to puff them as they would normally in two 10 min intervals separated by a 15 minute break on 2 different days. The brand order of use was reversed on the second day. The brands required different flow rates for activation (A= 14 ml/sec; B = 12 ml/sec). A handheld topography device attached to the EC was used. Puff counts across both bands ranged from 21-42 puffs/10 minutes. The average puff count for individuals using brand A was 33 ± 5.9 puffs/10 min and for brand B was 27 ± 4.5 puffs/10 min for both days. Puff duration ranged from 1.24 to 3.84 seconds for brand A and from 1.59 to 3.81 seconds for brand B. The average volumes/puff were 141.4 ml/puff (brand A) and 48.3 ml/puff (brand B). These values exceed the ISO standard for conventional cigarettes which is set at 35 ml/puff over 2 seconds once a minute. This study provides new data on EC topography and will be useful in future EC smoking machine protocol development and will aid researchers in designing experiments involving EC.

The Effect of Large Earthquakes on Global Seismicity
Lisa Cahn, Earth Sciences
Faculty Mentor: Abhijit Ghosh, Earth Sciences

Abstract: The purpose of this project is to study the effects of large (magnitude 7 and larger) earthquakes on global seismic activity in remote locations (outside the aftershock area). This is done by defining an aftershock zone for each M = 7 and larger earthquake then comparing global seismic activity outside the aftershock zone before and after each earthquake. I used the ANSS (Advanced National Seismic System) earthquake catalog from 1976 through 2012; during this time there were 432 M ≥7 earthquakes. On average, there does not appear to be any significant change in global seismic activity after large earthquakes, although there are some isolated events that seem to be followed by an increase in seismic activity beyond the aftershock area. Two specific examples are a M8.0 in 1993 in the Pacific Ocean and a M8.1 in 2009, also in the Pacific Ocean.

Understanding the Response of Riverside seniors to Electronic Health Information
Violet Canales, Anthropology
Faculty Mentor: Juliet Mc Mullin, Anthropology

Abstract: As more information and services continue to become electronic and can only be accessed through the web, the growing population of seniors must adjust to this shift. This process in which health and technology has merged is termed biomedicalization by many researchers and it has resulted in the decentralization of health information. By conducting a series of structured interviews with elderly participants that frequent a local Riverside senior center, my study examines five case studies of individuals who are 55 years and older. These interviews reveal that my participants feel it their responsibility to find online health information on their own, while not being a burden to younger generations. Additionally, on the other hand, they feel pressed to obey their doctor’s expert opinion, without researching for their own information. Moreover, my research includes a survey that I have
conducted on thirty elderly participants who also frequent this center. These surveys reveal that the participants spent an average of 1.5 hours a day using the internet and about half of those surveyed feel that it is best that a lot of health information has been placed online, however, about half of the participants also felt that they would rather go to their physician than go online when seeking health information. Thus, my study demonstrates the elderly feel pushed to take individual responsibility for learning online health information and another push to adhere to their doctors’ orders without questioning their recommendations; in the end, they are deemed as fully responsible for their own health outcomes.

A Semantic Analysis of "slave" and Variations of the "N-word" in Mark Twain Novels
Peter Cao, Psychology
Faculty Mentor: Curt Burgess, Psychology

Abstract: The use of the “N-word” is viewed by most as an egregious term with strong racist intention. Current controversy exists regarding school boards and parents wanting to remove classic novels, such as Adventures of Huckleberry Finn, from school libraries or replace the “N-word” with the word “slave” within these texts. Etymological research reveals that during Twain’s era, the N-word was relatively neutral in meaning, and it was not until the late 1800’s, that the word acquired its pejoratively racist connotation. In order to test the hypothesis that the word was used in a neutral sense in early literature, a semantic model was built using the texts from Tom Sawyer and Huckleberry Finn and then compared to the results of a model built from USENET text from the 1990’s. The comparisons were made by an analysis of the semantic neighborhoods of various forms of the “N-word” using the HAL (Hyperspace Analogue to Language) memory model of semantics. The results are consistent with the reported etymological history in finding a relatively neutral meaning for the “n-word“ when compared to sets of negative and positive emotionally-valenced words. This suggests that certain problems with the substitution of the word “slave” for the “N-word” would significantly misconstrue the semantic usage of these words and the common definition of the “N-word”. A follow up study examined the values of these negative and positive words closer by reducing the ambiguity of the words ‘black’ and ‘white’ by identifying the speaker and its context usage.

Mexican Citrus Labor and Community in Riverside, California, 1910-1960
Lazaro Cardenas, Ethnic Studies
Faculty Mentor: Robert Perez, Ethnic Studies

Abstract: The development of citrus agribusiness in California at the onset of the twentieth century saw the birth of the California Fruit Growers Exchange. Such industrialization and high citrus output dictated a need for cheap labor. Mexican migrants were a significant source of labor in California agriculture and often developed communities, or colonias, throughout the citrus belt. Communities today in Riverside, California, a major player in the California citrus industry, carry the legacy of these citrus laborers decades after the decline of citrus. The Casa Blanca neighborhood in Riverside, CA retains much of this narrative from recent/current residents. This work aims to provide a labor and community oriented historical analysis of Casa Blanca, and other relevant Riverside communities, as a citrus colonial in order to understand and relate this local historical narrative to discourse regarding issues of immigration and labor that contribute to the atrocious conditions of agricultural-labor in California today.
Can a Computational Model of Semantics Encode Social Stereotypes?
Dawn Carroll, Linguistics
Laura Bermudez, Psychology
Faculty Mentor: Curt Burgess, Psychology
Abstract: Albert Mehrabian (2001) found that individuals were attributed stereotypical characteristics based on their first names. Through a series of studies, Mehrabian discovered four factors, Caring, Popular Fun, Successfulness, and Masculinity/Femininity that people would attribute to names. For example, men's names were given more masculine characteristics, less caring, and more successful characteristics than women's names. Androgynous names for men were considered to be more fun and less masculine, however, women with androgynous names, were described as more popular fun, less ethical caring, and more masculine. These characteristics associated with each name, either male, female or androgynous, are also associated with particular occupations. This would not be the case in gender specific names. This study investigated whether or not the Hyper-Analogue to Language (or HAL) model of semantics encodes these more social relationships between proper names, gender, personality traits and occupational stereotypes. Thus, we predict that there will be more semantic similarity between gendered names and their stereotypic occupations.

A Global Role for a Telomere Protein in Preventing Genome Recombination
David Castro, Biology
Chris Caridi, Cell Molecular & Developmental Biology
Faculty Mentor: Connie Nugent, Cell Biology & Neuroscience
Abstract: Telomeres are repetitive sequences located at the ends of chromosomes that protect the ends from inappropriate degradation and end-to-end fusion events. In the budding yeast S. cerevisiae, the interacting Cdc13, Stn1 and Ten1 proteins play a key role in providing this protection. Cdc13 is a telomere single-stranded binding protein, and Stn1 and Ten1 bind to Cdc13. All are essential for cell viability; loss of function leads to degradation of the ends and cell cycle arrest. While it is generally accepted in the field that the essential function of these proteins is executed at telomeres, data from our lab suggests the possibility that Stn1 may function elsewhere in the genome. Here, we test that hypothesis that Stn1 promotes genome stability not exclusively at telomeres, but also at alternative loci within the genome. To examine Stn1’s potential global role in assisting replication/repair, we utilized an assay developed by Symington et al. This assay tests the stability of an inverted ADE2 heteroallele, located far from telomeres, to examine recombination between two partial ade2 alleles. It has been previously shown that inverted repeats are unstable and prone to undergo recombination. Our results indicate that a stn1 truncation mutant has an increased recombination rate when compared to wild type cells, suggesting a role for STN1 at non-telomeric loci. We hypothesize that STN1 has an anti-recombinogenic role at difficult to replicate regions, which can assist replication fork movement, repair or stability.

Children’s Kinetic Family Drawings: Projections of and Relations among Attachment, Psychopathology, Maltreatment, and Future Adjustment
Mayra Cazares, Psychology
Faculty Mentor: Tuppett Yates, Psychology
Abstract: The Kinetic Family Drawing (KFD) is an illuminating yet controversial projective test for assessing child attachment patterns, which can be secure or insecure (Fury, Carlson and Sroufe, 1997), and detecting psychopathology (Leon, Wallace, & Rudy, 2007). The KFD can detect markers of child psychopathology, including child internalizing symptoms, such as anxiety and depression, and
externalizing symptoms, such as attention and conduct problems. A subset of ~140 children (8-years old; 50% Hispanic/Latino, 25% African American, and 25% White) will be used in these. Children and parents have completed a 3-4 hour lab-based assessment, which include a range of questionnaire and observational data collection procedures. The goal of this study is to observe relations between psychopathology and attachment, which will be assessed via kinetic family drawings, and prior child maltreatment, concurrent observations of parenting, and future child adjustment. Specifically I expect: (a) Children with histories of maltreatment will evidence more psychopathological drawing features (e.g., scribbling) and higher vulnerability, emotional distance, tension, bizarre ness, global pathology and disorganization of self-scores; (b) Observations of positive parenting (i.e., support and boundary maintenance) will evidence higher vitality and family pride drawing scores and lower role reversal, emotional distance, global pathology, and disorganization of self-scores; (c) Future adjustment (i.e., child internalizing and externalizing problems) will correspond to higher vulnerability, tension, bizarre ness, global pathology, and disorganization of self-scores; and (d) The relations between psychopathology and attachment in drawings and maltreatment, parenting, and adjustment will be comparable across ethnic groups, suggesting that the kinetic family drawing is a culturally valid tool. Analyses of this project are pending.

Ellie and the Virobots: A Literary Approach to Science Education

Chenise Chapin, Physics
Faculty Mentor: Brian Siana, Physics & Astronomy

Abstract: Integration of science concepts into literature, through the use of educational science fiction stories, may be used to further understanding in science while improving literacy. Previous research in the field of science education has shown success in this approach, using experiments and creative activities to reinforce science concepts discussed in the literature. In the development of Ellie and the Virobots, a careful balance between imaginative science fiction and science fact, augmented by the addition of a glossary for potentially challenging words, has been used to illustrate how science and literature can complement each other. In addition, each chapter includes an experiment or creative activity that highlights the concept(s) discussed within the chapter. The experiments and creative activities have been designed to help develop critical thinking skills through the use of open-ended questions/scenarios that lack absolute answers whenever possible. To promote use of the text by parents and teachers of various socioeconomic backgrounds, the experiments have been designed to minimize cost, while maintaining maximum student participation, to improve learning through the use of hands-on experiences. Used together, the different components of the text come together to intrigue, entertain, and educate students, with the intent to encourage a continuous interest in science in high school, college, and beyond.

Political News Media Analysis of Asian American Voting Frequency: 1988-2012 Presidential Elections

Rebecca Chiang, Political Science
Faculty Mentor: Karthick Ramakrish, Political Science

Abstract: Amidst the 2008 Presidential Election, it has been noted that the strong presence of Asian American support and vote for President Barack Obama- has played an integral role in electing him to office. Through the examination of political news media coverage from the Presidential Election of 1988 up to 2012; to what extent is this correlation indeed true? Was this support in any way unprecedented? Has there been any frequency within the Asian American vote in association with either party? Moreover, to what affect has past survey data played in examining this phenomenon.
"Deliciousness, Made for You" - Strategic Marketing Plan of McDonald's McCafé Beverage Line
Genevie Co, Business Administration
Faculty Mentor: Sean Jasso, School of Business Administration

Abstract: This strategic marketing plan focused on McDonald's McCafé beverage line. After the current marketing situation was analyzed (including a 5 year financial overview of McDonald’s stock prices, description of McCafé’s targeted market, product review, competitive review, and channels and logistics review), a SWOT analysis (strengths, weaknesses, opportunities, and threats) and current objectives and issues were explored. The marketing strategy component looked into the “5 P’s” - positioning, product strategy, pricing place (distribution strategy), and promotion (marketing communication strategy) as well as marketing research. From there, action programs, budgets, and controls were recommended. The buyer decision process, rate of adoption, and total unit cost analysis were also evaluated. In conclusion, the recommended product strategy for McDonald’s McCafé coffee line is to open stand-alone McCafé coffee shops, increasing the number and convenience of distribution centers. Moreover, it will aid in resolving the inferior image if McCafé, as well as bring awareness to the product line.

Abiotic Factors Controlling NOx and N2O Fluxes in Arid/Semiarid Soils
Ariana Contreras, Botany and Plant Sciences
Faculty Mentor: Darrel Jenerette, Botany & Plant Sciences

Abstract: Increased anthropogenic nitrogen (N) input to agricultural soils has led to increased fluxes of nitrogen oxides (NOx) and nitrous oxide (N2O), gases that are risks to the environment and public health. Dry arid soils however have not been thoroughly studied for NOx and N2O flux dynamics despite indications of possible large pulses in the N cycle after rain events. This study analyzes the effects of two environmental controlling factors — soil moisture content and N supply — on the ratio of NOx/N2O gas fluxes from arid/semiarid soils. Soil samples were collected from an arid/semiarid land west of Coachella Valley, California, and then incubated ex situ up to 72 hours at varying water holding capacities (WHC=40%; 60%; 80%) and N additions (0 and 350 μg NH3NO3). Results indicate a positive correlation between N2O fluxes and WHC for both nitrogen treatments, which is consistent with existing nitrogen cycling models. Soils with no NH3NO3 addition, maximum fluxes were observed 24-30 hours post-wetting. Results also show wetter soils with no N addition have higher fluxes than drier soils with higher N addition, which indicates that moisture and N-supply have a synergistic effect on N2O flux. Characterizing N2O and NOx fluxes in drylands helps to constrain estimates of global total N trace gas fluxes in these areas that cover 40% of the terrestrial surface.

"Cottage on the Hill": A Quilted Narrative of the New Hampshire Hayes Family
Nicole De Silva, History/ Business Administration
Faculty Mentor: Molly McGarry, History

Abstract: This paper threads together a collection of nineteenth-century artifacts owned by a rural New Hampshire family, the Hayes. Using a material culture approach, my analysis weaves the textures and patterns that the Hayes family both encountered and created during America’s market revolution. This project attempts to construct the historical narrative of not only one family but also of a larger phenomenon. It seeks to explore the personal and material ramifications of mid-nineteenth-century shifts from household to industrial production, rural to urban, local to national, and artisan to professional. This paper examines the quilts and domestic handicrafts of Lydia B. Hayes (1808-1882); the pamphlets and
periodicals of her husband, Simon (1802-1866) and son, Seth (1831-1883); and the evolving, self-styled fashions of her youngest daughters, Phebe (1837-1917) and Annie (1845-1919). Additionally, it explores the expanding professional opportunities of Lydia’s grandchildren, Dr. Frederic Simon Cate, Henry Fall, and Katherine A. Fall. Individual aesthetic style and domestic industriousness are expressed in both Lydia’s quilts and in the elaborate homemade gowns of her daughters. The themes of economic self-reliance, a diligent work ethic, religious devotion, and community service are found in both Simon’s newspapers and the personal advice inscribed within Henry’s autograph book. The family’s ownership of these objects gestures to a larger implication for emerging middle-class culture. While workplace skills and material expressions may have changed, the ideologies of American uplift held dearly by families like the Hayes remained very similar throughout the nineteenth century.

Promoting the Amount of Potential Bone Marrow Donors from Certain Ethnic Backgrounds
Heba Diab, Biology
Faculty Mentor: David Lo, Biomedical Sciences

Abstract: In the battle against certain autoimmune diseases, such as multiple sclerosis, and genetic disorders, such as chronic granulomatous disease, bone marrow transplantation has risen as a powerful resource and tool. However, in order for this highly invasive weapon against such diseases to succeed, it must be obtained either from the patient or a genetically matched donor. Such a match is based on particular loci called the major histocompatibility complex (MHC). These genes encode molecules called human leukocyte antigens (HLA) which act to recognize foreign substances in the body. The MHC genes are noted to be the most polymorphic, or diverse, genes in the entire human genome, narrowing the frame of potential HLA matches for a patient. One becomes more likely to find a matched donor amongst a pool of those who share the same ethnic background. However, the amount of available donors is inconsistent amongst the various ethnicities, limiting the probability of finding a match for certain patients. In reviewing the literature, I explore the reasons behind such inconsistency amongst those who are willing to donate bone marrow based on their ethnicities. Furthermore, I analyze the success of clinical experiments that have been conducted to treat diseases, specifically ischemic heart disease, chronic granulomatous disease, and multiple sclerosis, with bone marrow transplantation. After compiling past findings, I convey whether bone marrow transplantation should be utilized for treating such diseases. Doing so can promote the need of attaining more bone marrow donors, especially amongst under-represented ethnicities.

Narrating Murder in Poe’s Tales
Jasmine Dietz, English
Faculty Mentor: George Haggerty, English

Abstract: Anonymous narrators in Edgar Allan Poe’s “the Black Cat” and “the Tell-Tale Heart” justify their violent crimes through irrational reasoning attributed to alcoholism and mental illness. The use of Poe’s first person narrative style for his killers lends to the unreliability of their personal accounts and thus, opening up the possibility of supernatural forces at work. The ghostly figures of their victims, such as cats and a beating heart, trigger feelings of inner guilt that manifest onto physical forms through walls and floorboards. Poe’s tales use these ghostly figures to reveal the guilty consciences of the killers and produce a terror within both the narrators and the readership as it remains unclear whether these figures truly existed or were a product of the imaginations of the killers.
Curbing Political Corruption: Applying Brazil’s Anti-Corruption Reforms to the Philippines
Aica Dizon, Political Science
Faculty Mentor: David Pion-Berlin, Political Science

Abstract: Corruption in the Philippines continues to be an obstacle to the country’s political and economic development. Filipino citizens are accustomed to hearing new scandals emerge of how political elites are once again stealing from the already impoverished public. While administrations routinely proclaim that they will not tolerate corruption, hardly any change has been seen. Anti-corruption efforts have proven to be superficial and inadequate, with the continued mishandling of state funds and little to no sanctions for those involved. If corruption persists in the Philippines, poverty will remain insurmountable, citizens will remain untrusting of the government, and more investors will be deterred from the country. Anti-corruption efforts by the state’s current president, Aquino, have highlighted the benefits of tackling corruption. The international community has taken notice of such efforts, allowing the Philippines’ economy to grow significantly. However, the Philippines must ensure that lasting reforms are created to keep the country on the path towards good governance. In order to do this, the Philippines could learn from the anti-corruption initiatives of Brazil, which have proven successful. Like Brazil, the Philippines could implement better enforcement to ensure that violators are held accountable; restructure existing anti-corruption institutions for better autonomy; and promote press freedom and transparency.

Social Networks and Social Media: Is There a Connection?
Ivie Egiebor, Biochemistry
Faculty Mentor: Kendrick Davis, UCR School of Medicine

Abstract: Research has indicated that the more social connections learners have and the stronger those connections, the greater one’s productivity. Unique to a new medical school which is situated in the southwest of the United States is the fact that entering cohorts are split between two groups of students. This school has split cohorts for their incoming classes of students. One half of the cohort consists of “home-campus-track” (HCT) students who are graduates from the host university, and “away-campus-track” (ACT) students who can be from any institution outside of the host institution. Given the importance of network ties and productivity we sought to investigate whether the curriculum at the host medical school, which is highly integrated with team-based and group activities, fostered network ties to develop among students who were not already tied. It is reasonable to assume that HCT students are more socially tied at the onset of the school year than ACT students. However, after a year of medical school curriculum it is imperative to explore how effective the curriculum is at fostering greater social ties among all of its students. Through surveys given to student in the biomedical sciences pool, data was collected, compiled, cleaned and analyzed to investigate the connections within HCT and ACT students at times one and two. We also looked at the relationships between the strength of social ties and academic performance outcomes.

Fabrication and Characterization of a Positron Accumulator
Alina Escalera, Physics
Parth Patel, Physics
Faculty Mentor: Allen Mills, Physics & Astronomy

Abstract: An electromagnetic coil, designed to house a positron accumulator has been constructed and its homogeneity tested. Measurement of the magnetic field homogeneity has been achieved through the
construction of a novel magnetometer, capable of measuring the field to an accuracy of at least 0.01 Gauss. The accumulator is a low-pressure Penning-Malmberg style buffer gas trap, used to accumulate substantial numbers of positrons which can then be used in the production and study of positrons (the antimatter equivalent of the electron) or positronium (a pseudo-atom comprised of a bound positron-electron pair). The design of the magnet was made to maximize both the lifetime of trapped positrons within the accumulator and the compression of the trapped charge cloud, allowing larger positron densities to be achieved. After characterization of the magnet and accumulator performance has been completed, the assembly will be integrated into the existing UCR positron beamline.

The Influence of Emotions in the Perception of Speech
Frank Flaherty, Psychology
Dale Lin, Psychology
Christopher Shinonuma, Psychology
George Kasira, Sociology
Theresa Cook, Psychology
Faculty Mentor: Lawrence Rosenblum, Psychology

Abstract: Communication is a fundamental part of human life; it facilitates social interaction and the exchange of valuable internal information (e.g. thoughts, emotions, opinions). Speech perception and emotion perception have traditionally been thought of as separate processes. However, a growing body of research suggests emotion and speech are perceived using common processes (e.g. Kitayama & Ishii, 2002; Nygaard & Queen, 2008). Additionally, whereas traditional speech perception theories suggest speech is primarily accessible through the auditory modality, other research suggests speech perception is multimodal. McGurk and McDonald (1978) demonstrated that when individuals see a person mouthing the sound /ga/ while simultaneously listening to the sound /ba/, perceivers hear the unified percept as /da/, an illusion known as the McGurk Effect. Importantly, the same gestural cues involved in speech processing could be involved in emotion processing. We hypothesized that if emotion and speech perception share multimodal processes, emotion in speech would hinder crossmodal speech integration. To test this hypothesis we recorded the audiovisual utterances of a model articulating /ba/, /da/, and /ga/, using happy, mad, sad, and neutral vocal tones and facial expressions. For experimental trials, an auditory /ba/ was synchronously presented with a visual /ga/ to create McGurk stimuli usually heard as /da/. Emotion (happy, mad, or sad) was present in the auditory channel (voice), the visual channel (face), neither channel, or both channels. The McGurk Effect was reduced when utterances contained emotion (p < 0.001). These results support the idea that emotion information and speech information share perceptual resources.

Slavery, Villainy and Vice in City Crimes
Alexandra Fonseca, English
Faculty Mentor: George Haggerty, English

Abstract: "If we preached what we ought, or if we taught the slaves to do what they ought, we would tell every one of them to cut their masters' throats," so says George Thompson, nineteenth century author and abolitionist. As this quote makes apparent, Thompson was a zealous abolitionist with strong opinions that were highly publicized. What is less recognized about him are his fictional narratives, a fantasy world where Thompson was allowed to act out his own opinions and imagined consequences of moral vice without persecution or physical consequence. In the narrative City Crimes; or, Life in New York and Boston, George Thompson uses fiction to allegorize moral vice in nineteenth century America. While
Thompson's text directly criticizes the church and open sexual indulgence within the community, he uses these actions to subtly examine civil tensions surrounding slavery. Anger becomes displaced onto villainy, licentiousness, and lust, forcing social responsibilities of community to come into question as the audience grapples with ethics through the repulsion of gratuitously violent and sexual moral vice. Displacement becomes a proper way to safely critique the government and community, garnering less criticism than blatant public calls for physical action.

*Northern Flies at Southern Latitudes: Investigations of Range and Diapause in Face Fly, Musca autumnalis*

Fallon Fowler, Entomology  
Faculty Mentor: Bradley Mullens, Entomology

Abstract: Musca autumnalis is a pestiferous fly well-known for mechanically transmitting Moraxella bovis (pinkeye) and reducing the productivity of cattle. It is originally from central and northern Europe where environmental conditions feature short winter daylengths and cool temperatures. In the past 50 years, M. autumnalis has invaded southern California along the coast where longer winter daylengths and warmer temperatures prevail. I am investigating how the range, behavior, and physiology of M. autumnalis may differ at extreme southern latitudes. After sampling irrigated pastures around southern California, it appears lack of precipitation and warm temperatures may account for the limited distribution of face flies, particularly inland. Manure samples and flies were collected at Cal Poly Pomona from early summer 2013 until present. The lack of emergence from manure pats and absence of face flies on cattle from late autumn to late winter suggest diapause. I showed that face fly adults accumulate fat body and cease egg development under local winter conditions, which is indicative of diapause. Experimental cohorts of adult M. autumnalis easily survived several months in southern California winter conditions. Field observations during early spring show resumption of adult face fly activity, but not necessarily reproduction. Light and temperature cues usually interact to control diapause in insects. Despite relatively warm winters in southern California, with temperatures approximating summer conditions in parts of its native range, M. autumnalis adults still undergo diapause. Even though our shortest days are still not that short (10.5 hours), this suggests that the photoperiod cues is dominant.

*Toxoplasma gondii Infection Disrupts Glutamate Metabolism in the CNS*

Elma Frias, Neuroscience & Music  
David Clement, Neuroscience  
Faculty Mentor: Emma Wilson, Biomedical Sciences

Abstract: *Toxoplasma gondii* is a protozoan parasite which can infect any mammalian nucleated cell. This parasite infects about 10-15% of Americans and as much as 80% of people in parts of South America and Europe. Infection by *T. gondii* is characterized by the lifelong presence of parasitic cysts in the brain, requiring a competent immune system to prevent parasite reactivation and massive neuronal death. In the immunocompetent individual, *T. gondii* infection is largely asymptomatic, though recent studies suggest that *T. gondii* infection strongly correlates to certain neurodegenerative and psychiatric disorders. Our lab has recently described the swelling of central nervous system (CNS) resident astrocytes during the chronic stage of *T. gondii* infection by live microscopy. One of astrocytes' most important function is in regulating levels of the neurotransmitter glutamate. Thus, we hypothesized that changes in astrocyte structure during infection would affect its function and compromise neuronal health. Our data demonstrates a significant reduction in RNA and protein levels of the primary glutamate transporter (GLT-1) that is exclusively expressed on astrocytes, and of the enzyme glutamine synthetase following infection. Analysis of dendritic spines in the cerebral cortex suggests that neurons in chronically infected
brains possess fewer dendritic spines, an indication of diminished neuronal health. *In vivo*, we measured glutamate concentrations in the extracellular space and observed a dramatic increase during the chronic phase of infection. Altogether, our data suggests that following an infection with *T. gondii*, the delicate regulation of glutamate by astrocytes is disrupted and might account for the behavioral and cognitive deficits observed in chronic infection.

**Investigation of the Mechanism of a Potential Glioblastoma Chemotherapeutic**

*Elma Frias, Neuroscience & Music*

*Faculty Mentor: Jack Eichler, Chemistry*

Abstract: Glioblastoma multiforme (GBM) is an extremely aggressive and invasive form of central nervous system tumor (CNS). The current prognosis for individuals diagnosed with GBM is approximately 15 months with treatment. The common chemotherapeutic used to treat glioblastomas is Temozolomide, moreover, this drug has displayed diminished therapeutic efficacy. Being that GBM is an extremely aggressive and invasive type of CNS tumor, great efforts are being made to find alternative forms of treatment. Our lab has synthesized a phenanthroline-based ligand known as 2,9-disecbutyl-1,10-phenanthroline (**secbutyl**phen). Previous in vitro and in vivo studies have found **secbutyl**phen to possess anti-tumor properties towards cancerous cell lines including GBM. More importantly, **secbutyl**phen has demonstrated to be more effective in inhibiting tumor growth in comparison to Temozolomide and displayed diminished toxicity to normal cells and peripheral organs. We hypothesize that **secbutyl**phen inhibits tumor growth via interaction with the Poly (ADP-ribose) polymerase protein (PARP-1) through a zinc finger; behaving as a PARP-1 inhibitor. PARP-1 is a protein utilized to repair DNA damage and its structure consists of zinc fingers that are necessary for this repair function. Studies to determine **secbutyl**phen behaves as a PARP-1 inhibitor were done using a PARP-1 Universal Colorimetric Assay, which assesses PARP-1 activity. Studies to determine changes in protein expression of PARP-1 were done by Western blot. Analysis of our data will demonstrate if **secbutyl**phen inhibits tumor growth via an interaction with PARP-1. Understanding the mechanism by which **secbutyl**phen inhibits tumor growth will contribute to optimizing its potential as an alternative cancer treatment.

**Prejudice and Intergroup Contact in a Diverse College Environment**

*Michael Gamboa, Psychology*

*Faculty Mentor: Carolyn Murray, Psychology*

Abstract: Positive outgroup contact is generally considered to be a significant factor in reducing prejudice. Intergroup contact theory literature, however, tends to focus on only two ethnic groups at a time, while the present study investigates the relationships between prejudice and intergroup contact among several combinations of four ethnic groups who regularly interact on a college campus. Participants completed the Quick Discrimination Index as an attitude measure regarding prejudice, and self-reported the percentage of their friends belonging to different ethnic groups as a measure of outgroup contact. Results indicate that outgroup contact is significantly related to lower levels of prejudice. However, outgroup contact is differentially related to prejudice for specific combinations of ethnic groups. Contact with Latinos tends to be related to less affective prejudice for all groups. In contrast, ingroup contact and affective prejudice appear to be negatively related among the Asian and Black group participants. These and other observed differences suggest that intergroup contact may work differently depending on the ethnic groups involved.
Monstrosity Created
Christine Garavito, English
Faculty Mentor: George Haggerty, English

Abstract: The moment in which Victor Frankenstein in Mary Shelley's Frankenstein is confronted with the fantastical aspect of science is the exact moment in which he becomes self-destructive. Though presented with both forms of science at the beginning of his studies, the “real and practical” and that of which is “possessed [with] much greater powers,” his interest lies within the realm of the “chimerical” and marvelous. Because of the knowledge he has acquired of the supernatural and of the creation of life, Victor becomes crazed with ambition for creating life of his own, disregarding any sense of morality, essentially ridding himself of humanity in the process. The Creature is thus an extension of Frankenstein’s madness, manifesting into an inhuman, monstrous being. The Creature’s physical inadequacy makes him monstrous, and because of this, he is unable to achieve humanity. However, the Creature is able to escape his own monstrosity by acquiring knowledge and becoming civilized; in doing so, he is able to overcome the rejection of the world around him and become a part of mankind. Victor attempts to create the perfect creature as an idealized extension of himself, yet the result is horrific. Dr. Frankenstein’s Creature is, therefore, a physical embodiment of his own internal madness, rendering him an abnormal being; however, as Victor surpasses the laws of nature, he himself becomes monstrous. The internal turmoil Victor struggles with after having completed his experiment takes a toll on him physically, ultimately placing him in the abject position he has created for his Creature.

Antioxidants Improve the Healing of Chronic Wounds in a Diabetic Mouse Model
Monica Garcia, Biological Sciences
Sandeep Dhall, Bioengineering
Faculty Mentor: Manuela Martins-Green, Cell Biology & Neuroscience

Abstract: Chronic wounds like diabetic foot ulcers, pressure ulcers, and venous leg ulcers occur most commonly in obese and elderly patients. Wounds remain open, cause damage to healthy tissue, and disrupt balances of molecules like reactive oxygen species (ROS), common to the inflammatory stage. The formation of chronic wounds has reached 6.5 million sufferers in the United States alone and continues to rise around the world. In addition to the pain inflicted by these expanding wounds, the cost of care for these 6.5 million people is estimated to be 25 billion dollars. The thesis work presented here focuses on the effects of ROS in a diabetic mouse wound model with impaired healing. By blocking two major antioxidant enzymes, glutathione peroxidase and catalase, we show that chronic wounds can be generated. These compromised wounds take three times longer to heal than their acute counterparts and reveal unstable tissue foundation. To prove that chronicity is caused by an increase in oxidative stress we reverse the course of non-healing wounds by applying antioxidants, N-acetyl cysteine and a-tocopherol. Chronic wounds treated in this manner show a closure time half that of inhibition only and wound integrity is restored to the same or better of an acute wound seen in diabetic mice. This research takes a step towards to conclusively identify a cause of chronic wounds and means to repair them. It also has the potential to form the beginning of new research in the pursuit of preventative care.

Disposable Electronic Cigarettes and Electronic Hookahs: Evaluation of Performance
Sanjay Ghai, Biology
Monique Williams, Biology
Faculty Mentor: Pru Talbot, Cell Biology & Neuroscience
Abstract: The purpose of this study was to characterize the performance of disposable button-activated and disposable airflow-activated electronic cigarettes (EC) and electronic hookahs (EH). The airflow rate required to produce aerosol, pressure drop, and aerosol density were measured during smoke-outs of nine disposable products. Three units of each product were tested in the smoke-out experiments. Button-activated models generally required lower airflow rates to produce aerosol and also produced lower density aerosol than the airflow-activated models. Pressure drop was low across button-activated models in contrast to airflow-activated products which had variable and higher pressure drops. With the exception of two units out of 27 tested, airflow did not have to be increased during smoke-out to maintain aerosol production, unlike cartridge and cartomizer models examined in prior studies. Three products from two brands had uniform performance characteristics with respect to all parameters examined. However, three of the brands had at least one product that did not function like the other two suggesting a defect in operation/manufacture. Button-activated models lasted about 150 puffs or less, while EH airflow-activated models often lasted over 400 puffs, but none of the models lasted as long as their advertisements claimed. The performance of button-activated and air-flow activated disposables was quite different with respect to the parameters examined. However, within the button-activated or airflow activated groups, performance was similar. Data suggest some brands have better quality control in manufacturing than others.

Sustainable, Reagent-Free Synthesis of Pyroglutamic Acid Peptides  
Nicole Godfrey, Chemistry  
Faculty Mentor: Michael Pirrung, Chemistry

Abstract: Efficient methods for peptide synthesis are greatly needed as their importance in the pharmaceutical industry as drug targets increases. Currently, the main method for synthesizing peptides is by using a coupling agent like N,N'-dicyclohexylcarbodiimide (DCC), which creates a lot of waste and causes racemization of chiral centers, making it difficult to isolate pure products or obtain good yields. Reagents like DCC are also harmful if they come in contact with the skin, even causing death in cases of extreme exposure. This project utilizes methods to synthesize the peptide pGlu-Ser-Phe-NH2, which has been shown to induce and prolong somnogenic sleep in rats, in solution phase without the use of added or harmful reagents or the risk of racemization. This, in turn, will make peptide coupling easier and less expensive, leading to faster discovery and ready availability of life-saving drugs. The two methods explored include serine couplings with substituted oxazolidinones and activated esters of pyroglutamic acid.

The Effects of Predation Pressure on Chromosome Linkage of Color Pattern Genes in Wild Guppies  
Daniel Goldberg, Biology  
Lora Roame, Biology  
Faculty Mentor: David Reznick, Biology

Abstract: Trinidadian guppies exist in two different ecotypes. Variable levels of predation pressure dictate the extent of male coloration, which is also highly variable. Male guppies are bright in low-predation populations to attract females, and less conspicuous in populations inhabiting predator-rich streams. Molecular studies show that high-predation guppies have colonized low-predation streams and rapidly evolve bright coloration. The genes for these color patterns are linked to the Y chromosome in HP populations: fathers and sons look alike. However, in LP environments, a greater proportion of color genes become linked to the X chromosome. We visualized X-linkage by treating female guppies with testosterone, which causes expression of male color patterns; females from low-predation locales are
predicted to be brighter than females from high-predation streams. We conducted these hormonal assays on guppies from five streams in Trinidad not previously investigated for color linkage, including one HP group and four LP groups descended from high-predation transfers. As part of an ongoing study of the evolution of color linkage, our project investigated the extent of this evolution in the five focal populations over the last four to five years.

**PMP-type Synthetic Elicitors as Molecular Probes Targeting Plant Defense Signaling and Leads for Novel Reduced-risk Pesticides**

Adilene Gomez, Biology
Yasemin Bektas, Botany & Plant Sciences
Faculty Mentor: Thomas Eulgem, Botany & Plant Sciences

Abstract: Plant diseases caused by pathogenic microbes cause dramatic losses in crop production. While wild plant species are equipped with an efficient immune system that protects them from diseases, crop cultivars used for food, fiber or energy production have often lost parts of their natural defense system. A major strategy of disease control in agriculture has been the use of pesticides. However, chemical pesticides currently in use typically rely on direct antibiotic or biocidal activity, which often leads to undesirable toxic environmental side effects harming farmers and consumers. Synthetic elicitors are small drug-like molecules that interfere with regulators of plant immunity and activate disease resistance. By high-throughput screening we identified numerous novel synthetic elicitors that induce immunity of the model plant organisms *Arabidopsis thaliana* (Arabidopsis) against *Hyaloperonospora arabidopsidis*, which is an oomycete pathogen. Several candidates that were identified belong to the chemical class of Phenylimino-Methyl-Phenols (PMPs). Like other previously characterized synthetic elicitors, PMPs appear to induce natural plant immune responses. I have been performing a comparative analysis of several PMP derivatives to discriminate them based on their potency in inducing immunity as well as their pharmacological mode-of-action. Several PMPs perform better than any other synthetic elicitors we tested so far and induce efficient immune responses at concentrations in the low micromolar range. They may serve as leads for the design of novel types of reduced-risk pesticides that are less harmful for the environment, as they do not rely on toxic effects and protect crops by enhancing their natural defense system.

**Aging Investigation on Optical Characteristics of Copper Sulfide Bio-Templated Nanowires**

Gabriel Grajeda, Materials Science & Engineering
Mohammed Zaman, Electrical Engineering
Faculty Mentor: Elaine Haberer, Electrical Engineering

Abstract: With energy consumption on the rise, we are currently in a state that demands the expansion of renewable energy. Present research into this subject analyzes the development of novel nanoscale materials that can be used for such applications, while eliminating present environmental dangers. Copper sulfide, which can generate photo-induced carriers upon exposure to sunlight and free carriers from copper vacancies while being non-toxic and readily abundant, holds particular interest in photovoltaic and plasmonic technology. In addition, recent literature has shown that fabrication of this material is possible by means of a viral template. However, reports indicate that the optical properties of nanoscale copper sulfide are not stable over long periods of time, but rather change as the material is exposed to ambient conditions. In order to determine the effects of these changes, optical absorption measurements may be used. Films of bio-templated copper sulfide synthesized using liquid chemical precursors and vacuum dried onto a glass slide were exposed under atmospheric pressure and room
temper temperature and the optical response was recorded using a Cary500 UV/VIS/NIR Spectrophotometer. Current work has revealed that time causes the intensity of the optical absorption associated with the localized surface plasmon resonance (LSPR) of the free carriers from copper sulfide to increase, and is believed to be caused by oxygen. This generation of free carriers poses interest for copper sulfide plasmonics, while also imploring further research into free carrier generation control for photovoltaic applications.

Islam, Science, and Gender: The Role of Women in Islam and the Question of Public Space in Mosques
Lilia Hachim, Psychology/Middle Eastern & Islamic Studies
Faculty Mentor: Andrew Robarts, History

Abstract: The concept of gender equality from the early era of Islam and contemporary day has altered. The purpose of this research is to examine the rights of women in mosques and the importance of equal space between men and women. Throughout Islam, Muslim women founded religious institutions, such as mosques; as mosques served as a space for worship and studying the Islamic Sciences, even until today. Such sacred institutions were not only for Muslim men but also for Muslim women. In some countries, women are denied the right to enter mosques. In early Islam, women did not encounter this issue. In the early period of Islam, a prominent woman named Fatimah al-Fihri established the world’s first degree-granting educational institution and mosque in Morocco. A contemporary example concerns the debate in Turkey and women’s public space in the mosques. This study, from a theoretical approach will use a combination of the Qur’an (religious text of Islam), hadith (sayings and teachings of the Prophet Muhammad), as well as published articles and books. Women are now at the forefront of taking lead in achieving gender equality and women empowerment in Islam, with not only men establishing religious institutions, but women as well.

Lenin and Khomeini: A Theoretical Comparison
Kevin Hack, Political Science
Faculty Mentor: John Medearis, Political Science

Abstract: The Iranian Revolution of 1978 and the Russian Revolution of 1917 are the product of two distinctly different ideologies, as espoused by two very different revolutionary leaders. Ayatollah Ruhollah Khomeini and Vladimir Ilyich Lenin are often characterized by their extreme polarity towards the political right and left respectively. However, through analysis of both of their ideological texts, as well as examination of their respective historical contexts, I find that this is not necessarily true. I intend to assess the degree of similarity that exists between the two as a result of the extremism necessary to produce revolution. In addition to this comparison, I also hope to isolate their differences and determine to what degree their differences are superficial. In particular, I examine their differing views on Capitalism and class society, and the extent of Marxist influence on the Islamic Republican agenda in Iran. I conclude that Lenin's revolutionary ideology targeted class society and the oppression that it entails, while Khomeini's primary concern was the increasing role of foreign, secularizing ideologies in determining Iranian policy. Both leaders share a common view of the international community, that of Western powers exerting ideological domination of the industrializing world, but differ in their perspectives of how this domination is reconstructed domestically.

Characterization and Crystallization of Escherichia coli BipA
Joseph Hahm, Biochemistry
Faculty Mentor: Gregor Blaha, Biochemistry
Abstract: X-ray crystallography has had enormous success in discovering the structures of many macromolecules, including proteins. This project will focus on the protein BipA, a bacterial GTPase. Bacterial GTPases coordinate many cellular functions, including protein synthesis, signal recognition, and cell differentiation. BipA is speculated to be highly involved during bacterial stress responses such as virulence, nutrient depletion, and low temperature. Therefore, BipA is required in bacterial survival. In this project, I will determine the structure of BipA. This structural information may provide insight on BipA’s interactions with the 70S ribosome, paving an avenue for developing new types of antibiotics.

Muslim Children’s Conceptualization of Allah & Prayer
Insia Hirawala, Psychology
Faculty Mentor: Rebekah Richert, Psychology

Abstract: The development of religious concepts has been researched among Christian and Jewish populations, but to gain a better understanding, participants from the three most predominant religions should be researched. This research project examines the religious concepts of God and prayer in a Muslim population of parents and their children. Examining interviews with 40 Muslim children between 3.5 and 6.5, along with questionnaires from their parents, on the concepts of Allah and prayer will provide a better understanding of how children perceive God and the role of prayer in children’s lives. This presentation will describe analyses of Muslim children’s concepts of Allah and prayer. The questionnaires collected from the parents provide insight into how parents’ beliefs have been incorporated into children’s upbringing. Also because a similar study has been conducted in Christian and Jewish populations, there will be data available to examine comparisons between children and parents from the three religions.

A Computational Model of the Linguistic Patterns of Leadership
Wun (Doria) Huang, Psychology
Faculty Mentor: Curt Burgess, Psychology

Abstract: Content models have been used to understand human cognition, emotion, personality and ability. The DICTION model used in Bligh, Kohles and Meindl’s (2004) experiment analyzes 74 of President Bush’s speeches and measures changes in his pre- and post-9/11 speeches. However, content models have been criticized because they process words out of context. Thus, the purpose of this proposal is to introduce a well-established semantic model HAL that encodes the meaning of words in the contexts in which they appear (Burgess & Lund, 2001) and examines the reliability and validity of the Bligh et al. (2004) results. This study then investigates the semantic neighborhood density of key words in the speeches of Presidents Bush and Clinton’s using. The study hypothesizes that Clinton usage of words would be denser in his speech than the one in Bush’s reflecting the difference in topical knowledge. The implications of semantic density of the two presidents’ speeches on their leadership style are discussed.

"That’s a Nice Gesture": The Role of Individual Differences in Impression Formation
Sarah Jamal, Psychology
Faculty Mentor: Howard Friedman, Psychology

Abstract: Gestures facilitate interpersonal communication and are related to learning, engagement, and impression formation. However, the role of specific gestures in nonverbal communication has been difficult to study experimentally, as gestures are inherently complex and difficult to isolate from other body movements and speech changes in humans. In the current study, we developed a software system
to evaluate the role of specific gestures in nonverbal communication. The direction of movement (vertical, inward-focused, or outward-focused) as well as the amount of movement (one arm, both arms moving asynchronously, or both arms moving in parallel) were manipulated while a computer avatar presented a math lesson. Undergraduate students (N = 56) completed surveys of personal charisma, self-monitoring, personality, and mood, and rated 18 videos of the computer avatar on various interpersonal characteristics. Then, the individual difference measures were correlated with ratings of the avatar lessons. The results have implications for impression formation in educational settings.

Synthesis of [(di-methylphen)AuCl3] and [(di-n-butylphen)AuCl3]: Anti-tumor Activity of Gold(III) Complexes
Julia Jenkins, Biochemistry
Raneer Khatib, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

Abstract: The investigation of gold (III) compounds as alternatives to cisplatin have been investigated in our lab. A gold complex possessing 2,9-di-sec-butyl-1,10-phenanthroline [(di-sec-butylphen)AuCl3] was previously synthesized, and proved to be more stable in reduced glutathione (GSH) than traditional square planar complexes. There was significant antitumor activity for in-vitro experiments, but the free ligand was also found to be very active on tumor cell lines. Current experiments aim to determine if the gold complex has a distinct mechanism. More specifically, steps are being taken to make a series of alkyl-substituted 1,10-phenanthroline (phen) ligands and the corresponding gold (III) complexes. The goal is to determine if the gold complex antitumor activity is dependent on ligand activity. The compound 2,9-dimethylphen-1,10-phenanthroline (di-methyl phen) and the gold (III) complex were remade as previously described by Robinson, et al. Furthermore, di-n-butylphen and the gold (III) complex were remade as previously described in our lab. The gold complex and ligands were structurally characterized via 1H NMR and were confirmed to match the aforementioned synthetic reports. GSH stability and in-vitro antitumor activity were examined for both the ligands and complexes. The complexes had similar stabilities as the previous sec-butylphen complex. It was also determined that the gold complex antitumor activity was not dependent on the ligand activity. Sulforhodamine B (SRB) analyses, in conjunction with other analogous complexes in our lab, indicate there is no correlation between ligand activity and complex antitumor activity. Investigation of the exact antitumor mechanism of both the gold complexes and ligands will be soon underway.

Investigating the Impact of Fluidic Agitation on Human Pluripotent Stem Cells in Dynamic Suspension
Ronak Joshi, Neuroscience
Daniel Nampe, Biological Engineering
Faculty Mentor: Hideaki Tsutsui, Mechancial Engineering

Abstract: The indefinite ability of self-renewal and differentiation into any cell type makes human pluripotent stem cells (hPSC’s) a primary candidate in cell therapy. Biological stirred suspension bioreactors are ideal for a culturing system, but still lacks in ability to reach the high numbers needed for clinical based application. Unfortunately, propagation of undifferentiated hPSCs in dynamic suspension has not been looking until recently, and the microenvironment factors have not been properly understood. The agitation rate of the dynamic suspension is unique in the sense that it plays a major factor in the survival, differentiation, and self-renewal of hPSCs. In the research we assessed the impact of multiple agitation rates between 1-200rpm using a conventional spinner flask for 7 days in mTeST medium in which moderate agitation at 60 rpm achieved the highest cell yield, along with the most
uniform sized aggregates. Conditions under 60rpm resulted in very large sized aggregates, mostly above 400um, and conditions over 60 rpm resulted in very small sized aggregates, mostly below 400um. This result presented a strong relationship between size of the cell aggregates and the cell yield, indicating there is an optimal aggregate size for survival and growth of hPSCs. To certify this observation, we cultured aggregates of hPSC from 100-500um in mTeSR under static condition for 7 days. Aggregate size of 300um provided the highest cell yield with a 90% viability and high expression of pluripotency markers. Understanding the cellular and molecular mechanisms of dynamic suspension will help develop a scalable stem cell culture.

Analysis of Tobacco Expressing Candidate Methyltransferase Transgenes from Moss
Gabriel Juloya, Biochemistry
Lauren Kivlen, Microbiology
Lei Zhu, Plant Biology
Faculty Mentor: Eugene Nothnagel, Botany & Plant Sciences

Abstract: Arabinogalactan-proteins (AGPs) are complex glycosylated macromolecules found at the plant cell surface. These glycoproteins function in growth and development, although exact functions remain unknown. Hypothesized functions of AGPs include action as a marker of cell identity and involvement in cell signaling. AGPs from the moss Physcomitrella patens contain an unusual sugar, 3-O-methyl-L-rhamnose (3-O-Me-Rha), not found in angiosperm AGPs or polysaccharides. The present goal is to identify the gene encoding the methyltransferase that synthesizes 3-O-Me-Rha in the moss. Identification of this gene could lead to characterization of other methyltransferase genes and use of these genes to improve biofuel production. Three promising moss genes (KO1, KO9, KO11) have been expressed in Nicotiana tabacum. Gas chromatography-mass spectrometry showed increased abundance of m/z = 146 ion, which is characteristic of methylated sugars, in trimethylsilyl (TMS) methylglycosides from AGPs of some KO9 plants. To check this preliminary finding, AGP sugars from KO9 and wild-type plants were converted to alditol acetates. Analysis of the alditol acetates revealed the unanticipated presence of another methylated sugar, 3-O-methyl-pentitol, that was the principal source of m/z = 146 ion in the TMS methylglycosides. It seems now that none of KO1, KO9, or KO11 causes synthesis of 3-O-Me-Rha in tobacco. This result might indicate that none of KO1, KO9, or KO11 encodes the desired methyltransferase. Alternatively, lack of 3-O-Me-Rha might indicate a problem in subcellular targeting of the KO1, KO9, or KO11 gene products in the transgenic tobacco.

Wasteland
Matt Kanemori, Creative Writing
Faculty Mentor: Susan Straight, Creative Writing

Abstract: Since the beginning of civilization, most societies have been ruled by a patriarch, and because of our patriarchal society women have been oppressed in many ways. However, with the first and second Feminist movements, women have fought and achieved many social rights that men have kept from them. This is absurd, unnatural, and unjust, yet a harsh reality. It took centuries-much longer than it should have-for women to possess some sort of equality with men. In my novel, I wanted to explore what a futuristic society would be like if a matriarch ruled instead of a patriarch.

Internal Polarization of Bromine Adatoms on Si(111) Measured by Low Energy Alkali Ion Scattering
Josiah Keagy, Physics
Selcuk Temiz, Materials Sciences & Engineering
Faculty Mentor: Jory Yarmoff, Physics

Abstract: Previous work has shown that low energy alkali ion scattering can measure the internal polarization of halogen adatoms on solid surfaces by monitoring the neutralization of scattered ions as a function of emission angle. Such measurements are extended here for bromine adsorbed onto Si(111)-7x7. The surfaces were cleaned by standard methods, and Br was adsorbed from a solid-state electrochemical cell. X-ray photoelectron spectroscopy (XPS) was used to measure the surface purity and Br coverage. Time-of-flight spectra of scattered ions and neutrals were collected for incident 1.5 keV Li+ ions as a function of emission angle. The change of neutralization with angle is used to determine how the polarization of the Br adatoms changes with coverage.

Implications of Health Technologies on Doctor-Patient Communication, Patient Health Outcomes and Transparency Issues
Deborah Kim, Psychology
Faculty Mentor: Robin DiMatteo, Psychology

Abstract: Many healthcare experts believe electronic health records (EHRS) have the capacity to facilitate doctor-patient communication, increase patient adherence and lower health care costs. Patient adherence alone is estimated to cost the healthcare system up to $290 billion a year. “Meaningful use” of EHRS is reimbursed by the authorization of the Hi Tech Act of 2009. The four core functionalities of EHRS include: documenting clinical findings, recording test and imaging results, providing computerized provider-order entries and support clinical decision-making. It is imperative for providers to utilize EHRS as a method of tracking healthcare improvements and not simply as a record-keeping system.

Characterization of Biofilms from a Novel Animal Model of Chronic Wounds
Jane Kim, Plant Biology
Faculty Mentors: Manuela Martins-Green, Cell Biology & Neuroscience
Eugene Nothnagel, Botany & Plant Science

Abstract: Bacterial biofilms are composed of secreted polysaccharides and other polymers that serve as the structural stabilizer for matrix development. In this matrix, polysaccharides, proteins, lipids, and nucleic acids can adhere to this structure and provide an excellent environment for bacteria to flourish and persist, protecting them from antibiotic treatments, nutrient-limiting conditions, and the animal's immune system. In combination with the rise of antibiotic drug resistant bacterial strains, biofilms make it difficult to attend to and cure wounds, sometimes leading to a chronic state. An effort is being made in medicine and pharmaceuticals to understand the carbohydrate composition of biofilms so that effective drugs and treatments can be developed and used against these persistent bacterial infections. In this project, a method for carbohydrate analysis of biofilms was developed using polysaccharides that might be found in wounds as model compounds. The goal was a method that could detect uronic acids, amino sugars, sugars that had been sulfated, and neutral sugars. Cleavage by TFA hydrolysis has increased recovery of amino sugars not clearly detected by previous method using methanolysis. This method is now being applied to the analysis biofilms from wounds.

The Ability of a Computational Model to Predict Emotional Intensity
Jacklyn Kozich, Psychology
Priscila Mendoza, Psychology
Dawn Carroll, Linguistics
Faculty Mentor: Curt Burgess, Psychology
**Abstract:** Charles Osgood (1962) argued that emotional aspects of meaning are linguistically universal. Osgood found that emotional features could be categorized into three different categories: evaluation, potency, and activity. Our previous research (Carroll et al 2013), partially supported Osgood’s claim about the separability of these three components using the Hyperspace Analogue to Language model of semantics. Strauss & Allen (2008) conducted a norming study asking subject to rate emotional intensity and to categorize a set of 463 words. Their results indicate that words can be reliably classified into basic emotion categories and can reliably rate the emotional intensity. The Strauss & Allen norms are more recent than the Osgood norms (by about 40 years) and the goal of this study is to determine if the HAL model can make better predictions of human ratings using the more recent norming data. A multiple regression analysis was conducted using the computational word meaning vectors as predictors of the human emotional intensity ratings. These are the results that will be discussed.

*Network Analysis of Intra-Molecular Interactions of the HIV-1 gp120 V3 Loop*

**Ilya Lederman, Bioengineering**
**Faculty Mentor: Dimitrios Morikis, Bioengineering**

Abstract: The V3 loop is a contact point with which HIV attaches to its target cells by interacting with co-receptors CCR5 or CXCR4 depending on the stages of infection or disease. HIV, along with the V3 loop, is constantly mutating in sequence and is highly flexible in structure, but it continues to recognize and show preference towards these receptors. It has been previously proposed that the mechanism of recognition involves charge complementarity between the V3 loop and the extracellular domain of CCR5/CXCR4. The objective of this study is to utilize network theory to analyze networks of intra-molecular interaction within the V3 loop to search for and correlate persistency and differences in network properties to how they affect the V3 loop stability and co-receptor selectivity. Contact maps and hydrogen bonds from molecular dynamics simulations of two V3 loops with similar sequences, but different structures were used to define network nodes and edges for our analysis. Community analysis was used to identify intra-molecular communication within and between the different sections of the V3 loop, the base, the stem, and the tip. The network analysis confirms previous studies and provides new insights on the role of critical amino acids for the stability and co-receptor interaction as well as possible allosteric signaling. This work may be useful for mechanistic understanding of viral entry at molecular level as well as for inhibitor design of HIV-1 entry into cells.

*Young Children Form Ideas of What is Possible in the Real World*

**Celeste Li, Psychology**
**Faculty Mentor: Rebekah Richert, Psychology**

Abstract: Children have the ability to distinguish between real and pretend concepts. Here I explore how young boys and girls form their idea of what is actually possible in the real world. Study 1 and Study 2 involve the readings of stories either containing real content or fantastical content. The participants are then given analogical problems similar to those presented in the story, and they also are asked a series of questions about whether specific situations are possible in the real world. I examine these results and their answers and explore responses between boys and girls.
Catalan Numbers and Action Graphs
Ruben Lopez, Mathematics
Faculty Mentor: Juli Berner, Mathematics
Abstract: The Catalan numbers form a sequence that appears in different counting problems and there are approximately 200 ways of getting them. Now the action graphs developed in recent research of Bergner and Hackney are generated by adding arrows inductively to previous graphs. Our purpose is to show that the number of arrows added in each stage is given by the Catalan sequence. We can show this relationship by comparing the action graphs to the rooted trees pattern which is known to be described by the Catalan numbers. Then, this implies that the number of arrows added at each stage in the action graphs is given by the Catalan sequence. The proof of this relationship provides a better understanding of the action graphs and a new way to obtain the Catalan sequence.

Effects of Shadowing Delay on Processing of Auditory and Visual Speech
Maria Loyola, Psychology & Law & Society
Kevin Trung Le, Psychology
Brandon Tran, Psychology
Veronica Vazquez, Psychology
James Dias, Psychology
Faculty Mentor: Lawrence Rosenblum, Psychology
Abstract: Human perceivers have a tendency to imitate the idiolect (talker-specific speaking style) of others (e.g., Goldginer 1998; Pardo, 2006). When shadowing speech (saying aloud the speech perceived spoken by another individual) perceivers are found to imitate characteristics of heard and lip-read speech, suggesting a common underlying process when imitating auditory and visual speech (Miller et al., 2010). Goldinger (1998) suggested that imitation of auditory speech results from exposure to the idiolect of a speaker preserved within a spoken word-utterance. Maintaining these lexical episodes in working memory, by delaying shadowing response, decreases shadowing reaction times and imitation, perhaps because lexical episodes in memory encroach upon the most recent exemplar. The current experiment investigates the influence of delayed shadowing on reaction times to, and imitation of visual speech. If there is a common working memory process when imitating auditory and visual speech, then reaction times to and imitation of visual speech should decrease when shadowing responses are delayed. Undergraduate participants shadowed visual (lip-read) and auditory (heard) word-utterances with randomly assigned shadowing response delays of 0, 1, 2, 3, or 4 second(s). The results indicate that shadowing delay decreases reaction times for shadowed responses to auditory and visual speech. However, even though imitation of auditory speech decreased with delay, replicating previous findings (Goldinger, 1998), imitation of visual speech increased when shadowing was delayed. The results suggest there may be some working memory differences when processing idiolect between the auditory and visual modalities.

From the Corners to the Streets: Worker Centers’ Struggles for Social Justice
Jacqueline Maciel, Sociology
Faculty Mentor: Ellen Reese, Sociology
Abstract: Day laborers, a term which simply refers to an individual who is seeking day to day employment “in open-air markets by the side of the road, at busy intersections, in front of home improvement stores and in other public spaces” (Valenzuela 2006:i), are often considered to be “criminal,” “problematic,” “illegal,” and a “safety issue.” Likewise, worker centers from which day laborers solicit work are depicted
as “crime magnets” that work to undermine the United States’ immigration policy (Guerette 2006, Hogberg 2010). The assertions made in this literature and in public debate left me wondering: What role do day laborer centers play in the community and who gets involved in them? Drawing on existing research, my own participant observer data, and qualitative interviews I will demonstrate how worker centers are a community asset as opposed to a community liability in that centers: 1.) Offer work opportunity in an unstable/ fluctuating economy, 2.) Provide safe spaces from which community members can organize in order to promote a social justice agenda that demands better treatment of workers and undocumented individuals, and 3.) Serve as learning centers that supplement formal education curriculums by welcoming students from the high school to the university level and helping them develop praxis. In doing so I will provide a general overview of context from which worker centers arose and must operate within, a case study of the Pomona Economic Opportunity Center and my personal assessment of the movement objectives and tactics.

Overcrowding as a Determinant of Violence in California State Prisons
John Maldonado, Sociology/Ethnic Studies
Faculty Mentor: David Swanson, Sociology

Abstract: In February 2009, a panel of three federal judges ruled that overcrowding was the cause of constitutional violations in California state prisons. The substance of this ruling focused on the provision of healthcare within prisons and did not acknowledge the impact of overcrowding on inmate and staff safety. This study addresses this issue by exploring the relationship between prison overcrowding and levels of prison violence. Through the use of multiple regression analysis, I show that the impact of overcrowding on the number of prison assaults is negligible when controlling for other institutional-level variables. Instead, the presence of maximum-security inmates was found to have the most robust impact upon the number of assaults. Given that individual characteristics play a decisive role in determining the security level that inmates are assigned to, this study suggests that future analyses of prison violence include individuals as the unit of analysis. Moreover, this would also suggest moving away from viewing prisons as discrete institutions. Instead, future research would benefit from an attempt to understand the relationship between conditions that produce prisoners and prisons themselves.

Girlhood: Internet Post-Feminists Decentering The “I” Of Feminism
Alissa Medina, English
Faculty Mentor: Traise Yamomoto, English

Abstract: Beginning in the mid-80’s, young women have intervened and disrupted the hegemonic male gaze by producing work through collective authorship, thus becoming “cultural producers” by changing the social spectrum of media through the voice of the collective in riot grrrl zines (the extra “grrr” signifying a growl or grunt) (Kearney 3). Young women, as cultural producers, found a plural authorship in riot grrrl zines that instigated radically altered constructions of the self and self-representation (Kearney). Women emerged as “cultural producers” as they experimented with interpolating different identities in the creation of the feminist zine in order to provoke, disrupt, and alter the notions of the constructed self. Unlike earlier zines of participatory media — media that was not made by corporate culture industries but by the consumers – current neo-liberal girl sites such as Rookie.com, HelloGiggles.com, and gURL.com, aim reactivate the male gaze. For grrrl zinesters, participatory culture evoking the plural gaze became a way to mediate hegemonic culture and articulate a sense of girlhood to be remapped, renegotiated, and reconstructed by their community. In this paper, I trace the shift of old feminist zine making that evoked the plural gaze into new, online feminist neoliberal notions that activate the male gaze. I use the term
“internet post-feminists” to locate posters, commenters, and producers of these sites using a false “feminist” identity on social media sites that do not advocate for feminism as a clear term of equality, but as a site of locating femininity and practice self-constructed, self-perceived feminism. These “internet post feminists” reactivate the male gaze and use the content on their sites as a commodified, neo-liberal “governed gaze” as they intervene on the cartographies of female bodies and girlhood.

The Significance of Social Relationships on the Psychological Well-Being and Problem Behaviors of Emerging Adults
Raven Mendez, Psychology
Chirisy Espinoza, Psychology
Julienne Palbusa, Psychology
Faculty Mentor: Mary Gauvain, Psychology

Abstract: Emerging adulthood is a developmental period between 18-30 years that is characterized by instability in various life domains (e.g., work, social relationships, education) and identity exploration (Arnett, 2000). Few researchers have explored how social relationships, particularly family relationships, influence emerging adults as they navigate through this developmental stage. The purpose of this study is to examine how family and parental factors relate to emerging adults’ psychological well-being and problem behaviors. Emerging adults attending college in Southern California (N = 402) completed online surveys. These surveys measured perceptions of family intrusiveness, quality of parent-child communication, familial social support, life satisfaction, life purpose, self-esteem, depressive symptoms, and engagement in problem behaviors. Results revealed that emerging adults with better quality communication with their parents, higher levels of familial social support, and lower family intrusiveness were significantly related to greater life satisfaction, greater life purpose, higher self-esteem, fewer depressive symptoms, and a lower likelihood of engagement in internalizing and externalizing problem behaviors. This study demonstrates the importance of social relationships during emerging adulthood and highlights parents' and families' ongoing social roles in young people's lives during the transition to adulthood.

Enhanced Corrosion Resistance of Anodized Magnesium for Orthopedic Applications
Christopher Miller, Bioengineering
Aaron Cipriano, Bioengineering
Faculty Mentor: Huinan Liu, Bioengineering

Abstract: (Poster & Oral Presentations) Magnesium (Mg) is a promising implant material for orthopedic applications due to its biodegradability and desirable mechanical properties. However, in order for Mg to have wide-spread clinical relevance, engineering solutions that address the rapid degradation in physiological environments and promote increase bone-forming activity are necessary. The objective of this study was to evaluate the corrosion resistance of anodized Magnesium using a previously reported methodology. This methodology utilizes an alkaline electrolyte which offers an alternative to commercial processes which use highly toxic elements. The anodized substrates were annealed to ensure the generation of a corrosion resistant anodic oxide layer. The corrosion resistance of the anodized and annealed substrates was evaluated by performing the Tafel Test, an electrochemical in vitro evaluation of corrosion resistance, using Simulated Body Fluid (SBF) as an electrolyte. Our results indicate that our anodization and annealing procedures imparted significant corrosion resistance along with previously reported nano-scale surface morphology.
**Ultraviolet Photodissociation Dynamics of 3-cyclohexenyl Radical**

Jasmine Minor, Chemistry  
Michael Lucas, Chemistry  
Yanlin Liu, Chemistry  
Raquel Bryant, Chemistry  
Faculty Mentor: Jingsong Zhang, Chemistry

Abstract: Cycloalkanes are common components in conventional fuels. The combustion of cyclohexane fuels, a prototypical cycloalkane, leads to the formation of benzene, a precursor of polyaromatic hydrocarbons (PAH) and soot, common pollutants from combustion. The cyclohexenyl radical (\( \cdot \)-C\(_6\)H\(_9\)) is an important intermediate in the combustion of cyclohexane fuels. The ultraviolet (UV) photodissociation dynamics of the 3-cyclohexenyl radical was studied in the photolysis region of 232-262 nm for the first time using the high-n Rydberg atom time-of-flight (HRTOF) technique. The cyclohexenyl radical was produced by the 193-nm photolysis of 3-chlorocyclohexene and 3-bromocyclohexene precursors. The H-atom product yield spectrum (i.e. action spectrum) contains a broad feature centering around 250 nm. The cyclohexadiene + H product translational energy distributions, \( P(E_T) \)'s, contain a modest translational release, peaking at approximately 7 kcal/mol. The 3-cyclohexenyl radical shows an isotropic angular distribution. The dissociation mechanism is internal conversion from electronically excited state, followed by unimolecular dissociation of a hot radical to produce H + cyclohexadiene.

**Commodification of Wealth in Core/Periphery Hierarchies in the Context of the Evolution of Market Exchange**

Sandor Nagy, Global Studies  
Faculty Mentor: Christopher Chase-Dunn, Sociology

Abstract: The purpose of this paper is to take a closer look and examine, as well as analyze the process of commodification throughout history, especially since the 16th Century—the beginning of the period of colonization—in the core/periphery hierarchies of the modern world-system. In order to better understand this particular ‘phenomenon’ in human history—with its powerful and significant political, economic, and social dimensions, as well as its long-term global effects and consequences—it is paramount to analyze the origin, development, and evolution of market exchange, along with the evolution of the medium of exchange. Commodification of wealth, core/periphery hierarchies, market exchange and medium of exchange are closely related, interconnected, and interdependent concepts, thus it is essential to examine and analyze them together, in order to clearly see the emerging picture as a whole.

**Ovid's Poetic Response to Augustan Moral Policies**

Gianna Newberry, History & Classical Studies  
Faculty Mentor: Wendy Raschke, Comparative Literature

Abstract: The Classical Roman poet Ovid lived during the late 1st century BCE through the early 1st century CE. This tumultuous period in Roman history included catastrophic civil wars, which divided the Roman people, and the rise of the Roman Empire with Emperor Caesar Augustus at its head. Upon his rise to power, Augustus brought a long-lasting stability to Rome founded on conservative legislation and on his influence over Roman society, both of which emphasized traditional, moral values. My research focuses on Ovid's poetry including his early elegiac love poems which propelled him to fame, his epic mythological masterpiece the *Metamorphoses*, and his poetry written after he was infamously exiled
Discourses of Gender Norms, Heteronormativity, and Frameworks of White Privilege in *Bend it Like Beckham*

Genevieve Newman, Media & Cultural Studies
Faculty Mentor: Setsu Shigematsu, Media & Cultural Studies

Abstract: This project critically analyzes how the film *Bend it like Beckham* engages with heteronormativity and gender norms within a framework that privileges whiteness, and questions whether or not this engagement is effective. The film discussed is chosen because it is written and directed independently, for its style of cinematography, and because it is produced and distributed by Fox Searchlight Pictures. Further, *Bend it Like Beckham* addresses audiences between 18 and 24-years-old. The film is analyzed based on theme, narrative, and cinematographically content, and analysis is based on foundational cultural studies theorists. The work of Stuart Hall, Cathy Cohen, and George Lipsitz is crucial to this analysis.

A Global Study of Higher Education and Labor Markets
Hoai-An Nguyen, Sociology
Faculty Mentors: Ellen Reese, Sociology
Matthew Mahutga, Sociology

Abstract: The economic crisis of 2007-2008 that purged the United States and the world economy as a whole, to what we term as the “Great Recession,” has continued pervasive and systematic effect on social programs in the United States, including severe cuts on higher education. This study questions where the United States stands along with fellow industrialized countries in terms of their response to current economic conditions that transcends domestic barriers onto a global platform. This research aims to look at higher education on a global scale while taking into account various factors that influence states’ decisions in its primary function as capitalist governments. In investigating the relationship between higher education and capitalism, the data we use is primarily sourced from the OECD Statistics website which provides time-series data of OECD membered countries’ allocation of funds and general information. In using this source, we are able to measure their proactively in curating productive conditions in producing high-knowledge based workers as a means to providing specific-typed labor for the new demands of a global technologized-service dominant economy, while also attending to other market demands of expansion and profit. Alongside this qualitative process, we also provide a historical narrative using a Marxian framework to attempt to explain how contemporary conditions have come to be as we account for processes and global policies that have emerged within the global political-economic stratum.

Deciphering the Role of Lipoxygenase2 in the Ethylene Signaling Pathway of Arabidopsis thaliana
Sang Nguyen, Biochemistry
Faculty Mentor: Daniel Gallie, Biochemistry

Abstract: In nature, plants receive their primary source of energy from sunlight. As the environment changes, plants, including agricultural crops, can experience different stress responses. In response to
stressful conditions, plants often produce ethylene. Ethylene is a gaseous plant hormone which affects plant growth and which can be easily detected as a ‘triple response’ which includes a shorten root, exaggerated curvature of the apical hook, and radial swelling of the hypocotyl. It is crucial to understand how to improve a plant’s ability to grow in stressful conditions by eliminating the effects of ethylene. By using Arabidopsis thaliana as a model, we hope to understand the plant mechanism of coping with stressful environments to produce better growth. For mutants with increased ethylene signaling, we use Arabidopsis thaliana mutants such as constitutive ethylene response (ctr1) and ethylene-overproducer1 (eto1). Previous studies show that the ethylene signaling pathway is highly induced in Arabidopsis thaliana mutant plants such as ctr1 and eto1. The recessive eto1 mutation results in increased ethylene production which ultimately leads to increased receptor signaling. ctr1 mutant plants exhibit constitutive activation of ethylene responses, indicating the negative regulatory role of CTR1 in ethylene signaling. Lipoxygenase2 (LOX2) is an enzyme required for the wound-induced synthesis of linolenic acid and its expression is impaired in ctr1 mutant plants and may be decreased in eto1 mutant plants as well. The preliminary data have shown that LOX2 overexpression improves the root growth in eto1 and wildtype. Interestingly, LOX2 might reduce plant growth in other stressful conditions.

Separation and Characterization of Enoxaparin Oligosaccharides
Adanma Nwachuku, Chemistry
Consuelo Beecher, Chemistry
Faculty Mentor: Cynthia Larive, Chemistry
Abstract: Heparin is a microheterogeneous linear polysaccharide known to bind to over 300 proteins. These heparin-protein complexes mediate an array of biological functions such as: cell proliferation and differentiation, tumor growth, etc. The best understood function of heparin is its anticoagulant activity through its high affinity binding to antithrombin-III. The glucosamine 3-O-sulfate group present in the pentasaccharide sequence that binds to antithrombin-III is critical; without it, binding affinity decreases 1000x. Knowledge of the extent to which this modification is important for binding to other proteins has been hampered by the challenges of identifying and isolating 3-O-sulfated oligosaccharides. My goal is to identify and isolate 3-O-sulfated oligosaccharides for structural characterization. The source material for these experiments is enoxaparin, a chemically digested low molecular weight heparin. Enoxaparin oligosaccharides are comprised of the repeating disaccharide unit uronic acid and glucosamine in a 1→4 linkage with various levels of acetylation, sulfation, and epimerization. Due to its microheterogeneity and the complexity introduced by digestion, enoxaparin is a complex mixture of oligosaccharides of varying degrees of size and charge. As a result, isolation of individual oligosaccharides for structure elucidation and protein binding experiments is a difficult process. To find 3-O-sulfated oligosaccharides, I use size-exclusion chromatography (SEC), strong anion exchange chromatography (SAX), and nuclear magnetic resonance (NMR). SEC and SAX separate oligosaccharides by size and charge. Using NMR we determine the unique structure of each oligosaccharide. Our long term goal is to use these oligosaccharides in experiments to characterize new protein binding motifs of heparin.

It’s All How You Use It: Connectivity in the Age of Social Media
Carolyn O’Brien-Price, Global Studies
Faculty Mentor: Juliann Allison, Political Science
Abstract: We are moving ever more towards a digital age. Social Media Networks have rapidly gained precedence in our society. The use of these networks has changed the very dynamics of our relationships, in some cases more than others. The question is: are we becoming so connected we are disconnected? As
the virtual world increasingly overlaps and perhaps has begun to overshadow the physical world. The source of this information comes from UCR students who have completed surveys that request both quantitative and qualitative answers. The results show a variety of answers and perspectives on the networks and their roles in the individual's life. Looking forward, as the world turns more towards the virtual world, will living and being present in the physical and tangible moment become a thing of the past?

12 Week Leadership Development Program for Incarcerated Youth
Gabriela Olguin, Sociology
Faculty Mentor: Robert Parker, Sociology

Abstract: Camp Glenn Rocky in San Dimas, California has about 75 male incarcerated youth. Recidivism rates concern the staff and organizations guiding these youth. Through a six month program we will conduct two 12 week courses that will teach self-advocacy to youth reentering their communities after incarceration. The goal of these courses is to lower recidivism rates through leadership development, life skills and literacy. Social workers, teachers, administrators and volunteers will collaborate to bring about these goals. Our head coordinator will evaluate the effectiveness of our methods at the end of the six month period. It is my goal to be active in the process and record and analyze my experience sociologically.

Anticancer Activity of Gold(III) Complexes and Ligands Bearing Alkyl and Aromatic-substituted 1,10-phenanthroline Ligands
Pauline Olsen, Biochemistry
ChiHyun Hwang, Chemistry
Charles Ruiz, Chemistry
Daniel Lussier, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

Abstract: Gold(III) complexes bearing polypyridyl ligands based on the 1,10-phenanthroline (phen) scaffold have shown promising anti-cancer activity against a variety of tumor cell lines. In particular, our laboratory has found that a five-coordinate gold(III) complex possessing 2,9-di-sec-butyl-1,10-phenanthroline, [(sec-butylphen)AuCl₃], was found to possess antitumor activity against in-vitro tumor cell lines, but limited activity against in-vivo tumors in mice. The current working hypothesis proposes the limited in-vivo activity of [(sec-butylphen)AuCl₃] is due to the fact that this neutral complex may be binding to the protein serum albumin, which subsequently impedes its delivery to the tumor. It was found that [(sec-butylphen)AuCl₃] did indeed have significant binding to serum albumin, possibly explaining why there was limited vivo-activity. Given these results future work will be aimed at determining the serum albumin affinity for new complexes possessing increased polarity. Parallel studies have also aimed to determine if [(sec-butylphen)AuCl₃] dissociates and imparts a ligand-centered cell death mechanism or kills tumor cells in a distinct manner compared to free ligand. Structural analogues of the sec-butylphen ligand have been synthesized, including 2,9-di-phenyl-1,10-phenanthroline (di-phenylphen) and 2,9-di-phenyl-4-methyl-1,10-phenanthroline (methyl-di-phenylphen). The corresponding gold(III) complexes, [(di-phenylphen)AuCl₃] and [(methyl-di-phenylphen)AuCl₃], have also been synthesized and structurally characterized. Sulforhodamine B assays have been performed to determine the IC₅₀ values of the entire library of phen ligands and gold(III) complexes, and the activity of the new ligands and complexes have been compared to the original IC₅₀ values of sec-butylphen and [(sec-butylphen)AuCl₃]. The data reported here indicates the IC₅₀ values of the gold complexes do not change as a function of the ligand IC₅₀. This lack of correlation suggests the gold
complexes have a distinct mechanism of imparting tumor cell death compared to their respective ligands. Future studies will use Western blot analyses to determine the intracellular targets of the free ligands and gold complexes, and help corroborate the current hypothesis that states the gold complexes possess a distinct mechanism of inducing tumor cell death.

*Young Children’s Coping with a Parent’s Military Deployment*

**Nabila Orozco, Psychology**  
**Tung Leung, Psychology**  
**Christina Nicolaides, Psychology**  
**Faculty Mentor: Mary Gauvain, Psychology**

Abstract: Deployment separation not only causes significant stressors for parents, but also influences their children’s functioning in cognitive development (Jenson & Shaw, 1993). Parenting plays an important role during the process of child development (Landry et al, 2003) and parental stress is the most significant predictor of child functioning during deployment (Flake et al. 2009). The current study examines the relations between at-home parent’s self-esteem support and children’s use of direct problem solving skills. Previous research has shown that parents’ social network and supports have both direct and indirect effects on children’s cognitive development (Cochran & Brassard, 1979). It was hypothesized that the social environment of the at-home parent will be related to children’s use of direct problem solving skills. The hypothesis was supported such that the at-home parent’s self-esteem support, a type of social support defined as the association of the concept of self with a valence attribute (Greenwald et al, 2002), is positively correlated with children’s use of direct problem solving coping strategies $r = .41, p = .01$. The findings show the connections between parental social support and children’s direct problem solving skills during parental deployment. Namely, the rate of children’s use of direct problem solving coping strategies tends to increase when the at-home parents have more self-esteem supports. Research in the past has focused largely on the military member and adolescent children. Future studies should build on this work to focus on at-home parents and children in military families in order to gain a better understanding of the population.

*Threshold Terrors*

**Alythia Ortiz, English**  
**Faculty Mentor: George Haggerty, English**

Abstract: The “dizzying [oneiric] sublimity” of an anisotropic ‘site’ (i.e., “it exhibits different properties in different directions”) hosting infinite limina, provides a compliment to the “grotesque [abject] sublimity” flourishing the first murder sequence in Dario Argento’s Susperia (1977). We observe our rational (Marginal) Subject – Pat Hingle – and her frantic arrival and entrance into the spare-room of an apartment building – she is alone – listening, waiting, and gazing out the window. Initially, the film offers no diegetic details for our rational (Marginal) Subject’s behavior – no reason to share her paranoia – then non-diegetic music and editing cue something sinister lurking outside the window. At this point, the films accumulated queerness is enough to cue skepticism – quickly countered as Susperia notes: skepticism is the “natural reaction of people... but magic is ever present... everywhere... all over the world, it’s a recognized fact, always.” Thus, aesthetic extremity “goes beyond gore,” reaching previously unrecorded levels of physical pain and mental anguish – Argento uses style, not logical reason, to build suspense – and
Susperia’s “most (in)famous [supernatural] murder” begins in earnest.

*The Need for Family Friendly Policies: Student Parents in U.C.R.*

**Judith Osorio, Sociology & Women’s Studies**  
*Faculty Mentor: Ellen Reese, Sociology*

Abstract: The University of California Riverside takes pride in being rated amongst the most diverse campuses in the country. According to the Free Application for Federal Student Aid, U.C.R. has approximately five hundred student parents in its diverse population. Research shows that this nontraditional student group faces many challenges, lacks institutional support that leads to greater college dropout rates when compared to their non-parenting counterparts. My research project examines the empowerment of student parents through R’Kids, U.C.R.’s first parenting support group, initiated by me. Through participant observation I documented the organization's progress from empowerment to discussions and development of family friendly policies and resources at U.C.R. The issues faced by student parents are ongoing needs but are treated as individual goals to help analyze how U.C.R. has improved the academic career for this student population and how it can continue to do so. Achieving a more student parent friendly campus and creating family friendly policies will lessen the needs and challenges these students face and essentially allow them to proceed and conclude their academic journey in a timely and successful manner.

*Early Versus Late Bilingual Interhemispheric Interactions*

**John Pangilinan, Anthropology**  
**Tammie Tran, Psychology**  
**Corrin Saenz, Psychology**  
*Faculty Mentor: Christine Chiarello, Psychology*

Abstract: Current research generally accepts that language is specialized in the left hemisphere for right-handed monolinguals. However, early bilinguals, those who acquired two languages before the age of 6, demonstrated bilateral hemispheric involvement for both languages as compared to left hemisphere exclusivity for late bilinguals and monolinguals. Previous studies found that early and late bilinguals used different strategies to process languages (Genesee et al., 1978, Peng and Wang, 2011). The current study sought to determine the degree each hemisphere is involved in early and late bilingual lexical processing. It was predicted early bilinguals would have a bilateral language advantage compared to late bilinguals. 64 undergraduate students (32 early and 32 late bilinguals) ages 18-31 performed a lexical decision task to discern between Spanish word and nonword stimuli. It was found that within both groups of bilingual speakers, processing in the left hemisphere was faster and more accurate than the right hemisphere. However, only partial support was found between early bilinguals and late bilinguals on reaction time but not on accuracy. Future studies can further assess the Interhemispheric differences between early-and-late monolinguals, bilinguals, and multilinguals.

*La Sandunga: Transcribed Music Composition and Analysis of Music Learned Through Performance Compared to Music Learned by Ear*

**Johanna Parado-Lazareno, Music**  
*Faculty Mentor: Paulo Chagas, Music*

Abstract: My thesis aims to research the music from the indigenous lands of Chiapas, a Mexican province, where I begin to analyze the little to no transcriptions of Chiapanecan music; however, Chiapanecan
music is found through performances. My research focuses not only on Chiapas, but also looks into the different regional style of Mariachi music. I compare and contrast the reason why Mariachi music is higher in demand and has been written down compared to the Chiapanecan music that is not in demand and has been passed down orally through generations. The second component of my thesis is a live performance of the piece I have transcribed, entitled: La Sandunga, an indigenous Chiapanecan song. I transcribe the piece based on what my ear hears and apply my musical knowledge to determine what meter and scale the piece finds itself in. Laura Sobrino, my mentor and professor, has provided another transcription of La Sandunga, which I use to compare and contrast the musical approaches we took to create our transcriptions. In addition, I compare a third transcription, a composer who took a very different approach to the piece from both Miss Sobrino’s and my own. Overall, both components of my research focus on combining learning music by ear but also transcribing the music in order to produce my live performance.

Adverse Metabolic Effects of a Soybean Oil Diet
Cynthia Perea, Microbiology
Jane Evans, Cell Biology & Neuroscience
Poonam Jot Deol, Cell Biology & Neuroscience
Faculty Mentor: Frances Sladek, Cell Biology & Neuroscience

Abstract: Linoleic acid (LA) is an essential fatty acid and a precursor to arachidonic acid, which is a key player in obesity and diabetes, but the role of LA in the current obesity epidemic is not well understood. To investigate effects of LA on obesity, we designed a series of isocaloric diets that are moderately high in saturated fats (40% kcal total fat) with or without supplementation of soybean oil to achieve 2% kcal LA (HFD) or 10% kcal LA (LA-HFD). Previous preliminary studies showed that the first-generation C57/BL6 mice on LA-HFD had increased weight gain and Insulin insensitivity as compared to the low-LA HFD. To determine if the obesogenic effects of LA are trans-generational, female mice on LA-HFD, HFD or vivarium chow (VC) were mated with VC males. Pups born from these dams were weaned on to LA-HFD, HFD, or VC. Pups born to LA-HFD moms had higher wean weights, than pups born to HFD or VC fed moms. However, as the pups matured, pups born to LA-HFD moms started gaining more weight relative to other two groups, with the difference reaching statistical significance at week 15. There was no difference in the mice food consumption. Results suggests that pre-natal exposure to a HFD may predispose mice to obesity, but putting these mice on the healthy VC can offset this effect In mice born to moms that consumed low soybean oil HFD. Mice born to moms fed soybean oil enriched HFD may be at risk of developing obesity.

The Influence of Parental Divorce on Both Childhood and Later Adult Perceptions of Cheerfulness
Isabel Ramos, Psychology
Faculty Mentor: Howard Friedman, Psychology

Abstract: Parental divorce during childhood has been linked to one’s later marital satisfaction, physical health, and mental well-being. Although childhood cheerfulness has been associated with better adjustment in adulthood, it is also associated with increased mortality risk. Relatively little is understood about how parental divorce influences contemporaneous and retrospective perceptions of childhood cheerfulness. The current study, using an archival longitudinal design, examined whether children of divorced parents retrospectively remember being more or less happy than children of consistently married parents. Using data derived from the Terman Life Cycle Study, which has followed 1,528 gifted Californian children since 1921, we examined whether parental divorce is related to retrospective self-reports of childhood cheerfulness (in 1940), as well as parent and teacher reports of childhood
cheerfulness (in 1922). The results of this study highlight the importance of multi-informant research and shed light on how parental divorce may color people's perceptions of their childhood.

Proprioception and Surrealism: Reimagining Giacometti’s Surrealist Table within a Heideggarian Spatial Complex

Courtney Rawlings, Philosophy/Art History
Faculty Mentor: Susan Laxton, Art History

Abstract: Alberto Giacometti, one of the most renowned artists of the 20th century, develops some of his most formative works during his stint with the Surrealists during the 1930s. 1930s surrealism begins to move away from relying completely on automatism towards a desire to activate the oniric world in live space. This was done by creating pieces that move us to question their use and value both as works of art and as "useful" objects. Having blurred the lines between art and object, Giacometti’s ‘The Surrealist Table’ reimagines the space of art and demands a reconfiguration of our understanding of it. Using a Heideggerian spatial frame one may better come to understand how ‘The Surrealist Table’ (and many other avant-garde pieces like it) act upon the lived environment. Heidegger's spatial complex will provide the structural basis from which one can come to better articulate how these art-objects act upon the body. Further, his work will allow one to think critically about what different art-objects due to space, what they move you to feel, and how they activate proprioceptive desires. Essentially, a phenomenological account of 'The Surrealist Table' will help explicate how certain art-objects are experienced, making clearer how some avant-garde pieces act upon the body to produce a particular experience.

Jimi Brown
Eli Reich, Theatre
Faculty Mentor: Rickerby Hinds, Theatre

Abstract: (Performance) Jimi Brown is a one man hip hop opera concerning the effects of dependence. Throughout the play, I explore how different characters’ dependencies on each other, substances, and ideas distort, control, and sustain their perceptions of reality. While Susan, Derek, Jimi, Oscar, and Cassie live under the cloaking effects of their various dependencies, they struggle with submitting to them. Due to the addictive nature of their dependencies, even when resultant negative effects are exposed by crises, personal epiphanies, or are revealed by other characters, the victim may not be able to simply “wake up” from the irrational thinking that comes with what he or she relies on. This leads me to question how aware these characters are and how much of what they truly believe is lost or discovered while in their cycles of dependence. My conjecture is that the answers to these questions flow in subjectivity according to the given character, his or her scenario, and the viewers’ interpretation of specific scenes. The ultimate goal for my project is to capture audience members’ attention through entertainment while challenging and expanding their perspectives on the above and many other issues. In the scene I have selected to showcase: “Plastic Bottles” I will display how Jimi grapples with fulfilling his alcohol addiction when confronted by the reality of seeing his mother, Susan bruised from domestic abuse as a result of his father’s (Derek) own alcoholism.

Micrometeorological Edge Effects on Agricultural Sorghum bicolor in a Desert Climate

Kyle Ricio, Biology
Faculty Mentor: Darrel Jenerette, Botany & Plant Sciences
Abstract: As uniform as agricultural plots may seem, they also include strong spatial variation, especially along their perimeters. These edge effects include biotic and abiotic gradients at the boundaries of adjacent land patches. This project investigated several of these effects on a 142m x 371m Sorghum bicolor agricultural plot in the deserts of Imperial County. A sensor array was deployed on a transect with points at 0m, 4m, and 16m away from the edge to record diel measurements of several abiotic gradients. This was supplemented with a series of manual measurements that aimed to assess differential responses on plant activity and growth. While measurements on water stress and stomatal conducctance yielded no detectable variation, sensors revealed several strong differences for relative humidity and temperature. The data shows significant differences among transect points with p<0.05 for 19 out of 19 days measured and p<0.05 for 9 out of 19 days respectively. The magnitude of differences between rows 1 and 16 increased through the growing season for humidity (r²=0.752) and temperature (r²=0.638). These results hold evidence for agricultural edge effects, with some gradients steep enough to hold strong disparities (e.g. differences up to 7°C) in less than 5m. The data also suggest that edge effects vary between days and that different gradients can appear before or after others in a growth cycle. Knowledge on microclimatic spatial variation in desert row crops may help mitigate differential crop growth and underproduction and be useful as a model system for understanding biological and micrometeorological edge effects.

Study of Flash Pyrolysis of Methyl Nitrate Using Vacuum Ultraviolet Photoionization Mass Spectrometry
Blake Riser, Chemistry
Paul Jones, Chemistry
Faculty Mentor: Jingsong Zhang, Chemistry

Abstract: The thermal decomposition of methyl nitrate (CH3NO2) was performed by flash pyrolysis with a 20-100 s time scale at 600 K-1500 K temperatures. The pyrolysis was followed by supersonic expansion to isolate the reactive intermediates and initial products, and detection was accomplished by vacuum ultraviolet single photon ionization time-of-flight mass spectrometry (VUV-SPI-TOFMS). Our initial analysis of decomposition steps appeared to produce methyl and nitrogen dioxide. After further analysis, there are three additional pathways proposed. We received small amounts of methylene and nitrous acid, suggesting loss of a hydrogen atom from methyl and loss of oxygen from nitrogen dioxide after methyl nitrate follows the first proposed pathway. Additionally, there were large amounts of nitric oxide. This suggests alternative roaming pathways and formation of methoxide, which was not observed in the spectra. A final proposed pathway suggests formation of formaldehyde and nitroxyxl.

Imaginary Companions: Children’s Fantastical Beliefs
Jesenia Rivera, Psychology
Stephanie Yoon, Psychology
Kassandra Guitierrez, Psychology
Faculty Mentor: Rebekah Richert, Psychology

Abstract: Imaginary companions are often a fundamental aspect of early childhood, however, not all children have imaginary companions. This research examines if preschool-aged children’s fantastical beliefs differ by having or not having imaginary companions. In this research, children ages 3.5- to 5.5 years-old answered questions measuring fantasy orientation, if they believe fantastical events are possible in the real world, and their relationships with fantastical characters from television programs. Approximately half of the sample have imaginary companions. We hypothesize children with imaginary friends have 1) high fantasy orientation scores (i.e. engage in more fantastical activities). In addition, we hypothesize they 2) more often believe impossible events are possible in the real world. We further
hypothesize that children with imaginary companions tend to have 3) high relationships with fantasy characters from educational media. Therefore, if we find support for our hypotheses that having imaginary companions impacts fantastical beliefs and relationships with characters, having imaginary companions may also impact learning from storybooks or educational television programs.

**Understanding and Intervening in Hotspots of Crime: The Case of San Bernardino, California**  
*Ruth Robertson, Political Science*  
*Faculty Mentor: Robert Parker, Sociology*

Abstract: With an emphasis on a metropolis in Southern California’s Inland Empire region, known as San Bernardino, criminological research has been conducted on hotspots of crime in order to gauge the impact that the independent variable in question, collective efficacy – with the inclusion of control variables like resource misdistribution, race and social class, poverty and high unemployment rates, and insufficient law enforcement – would have on the heightened levels of crime and disorder present in the targeted municipality. By means of spatiotemporal analyses and geoinformatic surveillance for the detection of hotspots alongside the application of longitudinal data models, empirical evidence has thus far confirmed that low levels of neighborhood collective efficacy – social atomization and essentially a dearth of communal cohesion and informal social control of public space – are correlative with said volumes of crime and disorderly behavior as further declared by the broken windows theory. Upon completion, the San Bernardino study seeks to establish that the lack of collective efficacy, namely in neighborhood hotspots of crime, is causally explicative of the transparency of social disorganization and the city’s crime-ridden state.

**Monte-Carlo Simulations for Improving Rydberg Positronium Atom Detection with Possible Applications to Anti-Matter Gravity Experiments**  
*Ethan Roeder, Physics*  
*Adric Jones, Physics*  
*Faculty Mentor: Allen Mills, Physics & Astronomy*

Abstract: There is currently interest in exploring the possibility that antimatter might exhibit antigravity, i.e., fall up in the Earth’s gravitational field. One possibility is to test this hypothesis using positronium (Ps: a pseudo-atom comprised of an electron and its anti-matter equivalent, the positron) \[A. P. Mills, Jr. and M. Leventhal NIM B 192 (2002) 102\]. Such an experiment would require the development of new techniques to make and detect long-lived Ps, i.e., Ps atoms with high principle quantum numbers (Rydberg Positronium, or Ry Ps). To improve the detection of Ry Ps, Prof. Mills suggested the use of a microchannel plate (MCP) detector combined with a large area grid for ionizing the Ry Ps and an electrostatic lens for focusing the ionized positrons onto the MCP. To see if the proposed design would cause positrons from ionized Ry Ps atoms to reach the MCP, Dr. Jones suggested a Monte Carlo simulation of the trajectories of positrons. A simulation begins with calculating the electrostatic potential within the detector using a finite element method implemented in the Matlab PDE Toolbox given the potentials on the electrodes. Ry Ps atom trajectories begin by entering the ionizing grid region at a randomly chosen radial position and with a longitudinal velocity randomly chosen in the range to be expected for a real experiment. If an atom is ionized during its passage through the grid region (assuming its ionization rate is that appropriate for the given grid electric field), the liberated positron is accelerated by the electrode structure and focused towards the channel plate. After calculating an ensemble of 1000 trajectories, the efficiency of the detector is estimated as the fraction of initial Ry Ps atoms resulting in trajectories that terminate on the active area assigned to the MCP. The key parameters varied were the applied potentials...
Degradation of Carbon Nanotubes

Julianne Rolf, Chemical & Environmental Engineering
Alexander Dudchenko, Chemical & Environmental Engineering
Nathan Rodriguez, Chemical & Environmental Engineering
Faculty Mentor: David Jassby, Chemical & Environmental Engineering

Abstract: Semi-permeable, electrically conductive thin films are becoming a promising membrane coating for use in membrane bioreactors (MBRs) because of their anti-biofouling properties; biofouling is the process where bacteria irreversibly attach and grow on a membrane surface, which prevents the clear passage of water. Current biofouling inhibition processes, such as air bubbling and turbulent flow, can be costly and ineffective. The application of an electrical potential has been shown to effectively inhibit biofouling and promote bacteria detachment from charged surface. The conductive thin films were prepared from poly (vinyl alcohol) and functionalized multi-wall carbon nanotubes that were deposited on commercially available membrane supports using pressure deposition. Studies have demonstrated that carbon nanotubes, when used as an anode, can begin to degrade over time even at potentials greater than 1.23 V vs. the Ag/AgCl electrode. The objective of this study was to study the degradation of carbon nanotube anodes and develop methods to reverse the degradation. The effect of an applied potential was determined using cyclic voltammetry (CV) and chronoamperometry. Fourier Transform Infrared (FTIR) spectrometry was used to analyze the changes in functional groups as the carbon nanotubes degrade. The addition of nanoparticulate tin was ascertained to slow down the effects of the applied potential. Improved conductive thin films were developed from this study that could potentially be used in MBRs to eliminate the need for air bubbling and turbulent flow.

Fluid Transport in Paper-based Microfluidics

Cindy Rosillo, Mechanical Engineering
Carlos Castro, Mechanical Engineering
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

Abstract: Paper-based microfluidics is an emerging field that strives for simple-to-use devices capable of accurate and quick fluid specimen analysis at a low cost. These devices can be simply manufactured by printing and later melting wax-based ink to define fluid channels. Most commercially available paper-based analytical devices are simple 1D lateral flow tests, which limit implementation of more sophisticated functions. To advance towards more complex detection mechanisms, a greater understanding of fluid transport in paper is required. In this study we investigated factors such as fiber swelling, channel boundaries, and fluid evaporation that could influence fluid transport. This study used three different paper types of defined particle retention sizes, which resulted in difference in wicking speed. A non-swelling liquid, octane, was used to calculate the effective pore diameter by fitting wicking data to the Washburn equation. By comparing the wicking speeds of an aqueous solution and octane, the swelling factor was calculated. The edges of the defined channels were found to contribute to the retardation of wicking speed and varied with the channel width. The relative humidity was also found to contribute to retardation of wicking speed. All these factors were combined to create a modified version of the Washburn equation resulting in a more accurate predictor of fluid wicking in paper under non-ideal conditions.
Synthesis, Characterization, and Biological Activity of Five-coordinate Gold(III) Complexes Possessing sec-butyl-substituted 1,10-phenanthroline ligands

Charles Ruiz, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

Abstract: Four coordinate gold(III) analogues of cisplatin were initially investigated as alternative chemotherapies but were unstable because of a highly positive reduction potential in the presence of glutathione (GSH). A five coordinate neutral gold(III) complex possessing a 2,9-di-sec-butylphenanthroline ligand \([\text{sec-butylphen}AuCl}_3\] has been previously reported in our laboratory. This complex has been shown to have enhanced reduced GSH stability compared to four coordinate square planar complex ions, and has also demonstrated in-vitro anti-tumor activity that was significantly superior than cisplatin in SRB assays. However, the sec-butylphen ligand was found to have higher anti-tumor activity (lower IC50 value) than the corresponding gold complex. In an attempt to determine if gold(III) complexes have distinct mechanism of tumor cell death, we have made a series of structural analogues. We have successfully synthesized and characterized three new ligands \([2\text{-sec-butylphen}], 2,9\text{-di-sec-butyl-4-methyl-phenanthroline (di-sec-methylphen)}, \text{and 2,9-di-methyl-phenanthroline (di-methylphen)}\) and subsequently made new gold(III) trichloride complexes with the ligands. Initial GSH stability experiments indicate that the gold complexes possess similar GSH stability to the previously reported \([\text{sec-butylphen}AuCl}_3\] complex. SRB assays did not yield a definitive trend in the superiority of the ligands to the gold(III) analogues, which may supplement the hypothesis that the gold(III) complexes may incur tumor cell death via a different mechanism. Our current work is focused on synthesizing 2,4,9-tri-methyl-phenanthroline (tri-methylphen) and its gold complex \([\text{tri-methylphen}AuCl}_3\]; characterization, GSH, and SRB assays are currently underway. Future work will consist of a direct probe of ligand and gold complex mechanisms via in-vitro analysis of enzyme expression using Western blot techniques.

Expanding UCR’s Diversity in Engineering Classrooms

Mitzi Salgado, Women’s Studies
Faculty Mentor: Chikako Takeshita, Women’s Studies

Abstract: In this presentation, I will provide qualitative evidence from interviews gathered from several current and former women students in Bourns College of Engineering at UCR (BCOE) and experienced doctorate professionals. Utilizing this evidence, this research examines the challenges women face in engineering disciplines within UCR’s academic environment. The statistics representing the low number of women in engineering and STEM disciplines are not unique to UCR, but are representative of a worldwide dearth of women in engineering majors. Data shows that a vast majority of men over women choose engineering majors. By the time that women choose their respective careers, it is likely that their social environment has already gendered them towards specific disciplines such as social sciences, humanities, and fine arts. Women who have already overcome these social constructions and chosen engineering majors or STEM disciplines must still suffer through discrimination via institutionalized racism, sexism, and stereotype embodiment in UCR’s academic environment. Because women entering BCOE have to submit to specific stereotypical masculine roles, those that fail to embody these characteristics will be marginalized by engineering classroom culture, and possibly drop out of BCOE entirely. I will present some qualitative data on female student body’s experiences of various intersectionalities of women within its major and its cross-listed required courses which include STEM disciplines in the College of Natural Agricultural Sciences (CNAS). These discriminatory constructions affect their learning environment, consequently, increasing the odds of being dropped from engineering majors. In light of my research, I
propose a mentoring program to increase retention rates of women in engineering at UCR, hence creating a safe space for women in the hard science disciplines.

Two Faces of Dimethoxyalkanes: Steric Repulsion and Hyperconjugative Stabilization
Juan Sanabria, Neuroscience
Erik Romero, Chemistry
Brittany Nguyen, Biology
Erika Varady, Biology
I-Chieh Wang, Biochemistry
Faculty Mentor: Thomas Morton, Chemistry

Abstract: Previous research has explored whether steric effects play the major role in determination of conformational stability, or if there are major factors to consider. One example is 1,2 difluoroethane, where the two fluorine atoms can be either synclinal (approximately 70° dihedral angle) or antiperiplanar (180° dihedral angle) to each other. This becomes a question of whether steric interactions, hyperconjugative, or dipole-dipole and dipole-induced dipole interactions have the largest influence on conformational energies. To determine which of these theories provide a better model, 1-propanol was examined in its neutral and conjugate acid forms. If steric interactions play the larger role, the conjugate acid ion should prefer to be in the antiperiplanar configuration. By contrast, the result has shown that the synclinal conformation is even more favored in the cation than in the neutral alcohol, consistent with a hyperconjugative model rather than steric attraction. This research further investigates the extent to which dipole-dipole and dipole-induced dipole interactions are to be weighed in comparison to steric interactions. Through examination of 1,7-dimethoxyheptane, and its isomers, we use DFT (at the B3LYP/6-31G** level) to compare the energetic effects of four types of non-nearest neighbor steric interactions and one electrostatic interaction. Using multiple regression analysis, the outcome shows that of the five interactions examined, three are destabilizing and one is stabilizing. In agreement with previous research, the effects of steric and electrostatic interactions are not additive in an obvious fashion.

The Building Blocks of Empires: Territorial Expansion and Provincial Governance in the Russian and Ottoman Empires
Christopher Seeling, History/Political Science
Faculty Mentor: Andrew Robarts, History

Abstract: The Ottoman and Russian Empires represent two of the largest and longest lasting imperial states in human history. These land-based Empires show remarkable similarities in their government and imperial administration, especially in contrast to their maritime counterparts, and as such, this paper will focus on how each empire expanded, incorporated new territories into the empire, and how these lands were divided administratively within the empire. Through analysis of such phenomena as spheres of influence, rationale for expansion, variety of provincial administration and territorialization of the lands of the empire, this paper attempts to directly compare the imperial administrative qualities and developments in search of common elements for land-based empires. What arises through analysis of these aspects of each empire is a set of characteristics of terrestrial empires that are unique when compared to maritime empires, implying that Russian and Ottoman Empires had more in common governmentally each other than with their western European neighbors and suggesting the possibility of independent and shared development of administrative structures between the Russian Empire and the Ottoman State, with much less European influence and direction than commonly held. This shows that, despite centuries of antagonism and friction between these two great empires, they shared a path of
development that was tailored to the shared characteristics that each faces as a transcontinental, multiethnic, multi-confessional, terrestrial empire, a system of evolution that remains unique from “conventional”, arguably thalassocratic, empires.

*Imperialist Norms within Wuthering Heights and Jane Eyre*

**Sneha Sharma, English**

**Faculty Mentor: Susan Zieger, English**

Abstract: Both Emily Bronte's Wuthering Heights and Charlotte Bronte's Jane Eyre reveal the power of the English imperialist project through their depictions of the characters of Jane Eyre and Catherine Earnshaw. Jane Eyre eventually finds happiness because she establishes her identity in relation to commonly accepted imperialist ideologies concerning class, race, and religion. The underlying imperialist ideologies within British society contribute to Jane's understanding of Bertha and the subsequent strengthening of Jane's identity. I will also analyze Jane's relationships to Rochester and St. John as examples of how Jane's social conformity strengthens her sense of self. Unlike Jane, Catherine Earnshaw fails to assimilate into English society which is revealed through her deviant religious beliefs as well as her relationships to Edgar and Heathcliff. Catherine’s relationship to Heathcliff will be closely examined as an example of how Catherine treats the Other as self and fails to follow the imperialist ideologies necessary to her success within English society. I will also use Andrea Arnold's film adaptation of Wuthering Heights to further analyze racist ideologies that contribute to Heathcliff’s status as the Other. In the novel Wuthering Heights, Emily Bronte emphasizes the importance of conforming to British imperialist norms through Catherine's internal torture and troubled death after she refuses to obey social expectations. Within Jane Eyre, Charlotte Bronte reveals the benefits of Conforming to imperialist norms by ending the novel with Jane Eyre in her stable position as Rochester's wife.

*Coupling of Metal Halides with a Green Co-Solvent to Enhance Production of Fuel Precursors from Residual Plant (Lignocellulosic) Biomass*

**Priyanka Singh, Chemical Engineering**

**Phillip Mui, Chemical Engineering**

**Charles Cai, Chemical Engineering**

**Faculty Mentor: Charles Wyman, Chemical Engineering**

Abstract: Although lignocellulosic biomass itself is much less expensive than petroleum, its natural resistance to breakdown to fuel precursors including monomeric sugars and their dehydration products is the major obstacle that must be overcome for biomass derived fuels to be economically competitive. We recently developed a novel co-solvent system using THF and dilute sulphuric acid to enhance the delignification, hydrolysis, and cyclodehydration reactions from raw maple wood to produce fuel precursors including furfural and a highly digestible glucan-rich material suitable for conversion into 5-HMF, LA, or ethanol. However, mineral acids typically used are highly corrosive and are not easily recyclable. In addition, sulphuric acid promotes the hydrolysis of 5-HMF to LA and rapid degradation of furfural, thus requiring a two-stage reaction to obtain the high LA yields. In this study, we exploit the Lewis acid activities of metal halide acid catalysts in our THF co-solvent system to achieve even higher yields of furfural and 5-HMF from raw maple wood and corn stover in a one-pot reaction. We also demonstrate how the catalyst can be recycled in the aqueous stream. In addition, after vacuum recovery of the solvent, K-lignin initially present in biomass was recovered as a highly oxidized powder suitable for conversion into valuable chemicals. This process enables a new pathway for the integrated catalytic
production of hydrocarbon fuels from both the hemicellulose and cellulose fractions of lignocellulosic biomass.

**Minimizing Hexavalent Chromium in Drinking Water: Understanding Hidden Reaction Pathways**

**Han Sohn, Environmental Engineering**
**Michelle Chebier, Environmental Engineering**
**Faculty Mentor: Haizhou Liu, Chemical & Environmental Engineering**

Abstract: Hexavalent chromium Cr(VI) is a highly toxic and soluble compound widely observed in groundwater across California. The presence of chromium(VI) threatens drinking water quality and poses health risks. Current water treatment technologies transform chromium(VI) to the less toxic particulate chromium(III) before removing the solids. However, these treatment processes are not effective in achieving low concentrations. In the water distribution system, residual chromium(III) can potentially undergo oxidation to chromium(VI) by disinfectants which leads to the recurrence in drinking water. The current study seeks to understand the redox chemistry of chromium and prevent the recurrence of chromium(VI) in drinking water. Results show the production of chromium(VI) and the consumption of chlorine which suggests that particulate chromium(III) was oxidized to chromium(VI) by disinfectants. In addition, chromium(III) oxidation in electrochemical systems suggests the formation of chromium intermediates before producing chromium(VI).

**Italian Fascism: In Thought and Action**

**Kevin Sood, Political Science**
**Faculty Mentor: John Laursen, Political Science**

Abstract: The objective of the thesis is to explore 20th century Italian fascism as it was contrived by its main philosophers, and how it was practiced by its political actors. For example, it is widely considered that thought and action are the core tenets of Italian Fascist philosophy. Thought must be applied into action in order to give the theory legitimacy. The thesis will explore the background and periphery of fascism such as how it was spurred, what its relations to Liberalism and Socialism were, and what the social and economic philosophy of the Fascist state was. Another aspect of the Fascist state that will be discussed is corporatism and its implementation in the Fascist state. As a follow up, by reading the speeches of Mussolini during the prime of his power, I will analyze his stance and the practice of Fascism and how it either compares or contrasts to its early thinks and if there is a correlation between its thought and action. Some philosophers of Fascism are not as widely known in the Anglo-American world as compared to their Socialist and Liberal counterparts such as Marx and Locke. Therefore, a second my task of the thesis is to bring to light prominent Fascist philosophers such as Giovanni Gentile, Alfredo Rocco, and the rarely known Mario Palmieri. In the end, the thoughts on what the ideal Fascist state should be by these philosophers will be compared to Mussolini’s implementation of Fascist philosophy through his speeches and how he implemented Fascist policies while in power.

**Why Cheat?**

**Stephanie Sural, Psychology**
**Brandon Carlisle, Psychology**
**Faculty Mentor: Carolyn Murray, Psychology**

Abstract: This study investigates causes of intimate relationship instability. The impetus for this study is the increasing divorce rates of the society in which we live. These divorces not only affect the two people involved in the romantic relationship, but can also have detrimental effects on the children causing them
to develop personality and psychological issues, as well as resentment towards the parents. Of particular interest are attitudes towards infidelity, one of the leading causes of relationship instability. Surveys were administered to eighty undergraduate students. The surveys included a Demographic Scale, an Attitudes toward Infidelity Scale, and Commitment Scale, the Big Five Personality Scale, a Self-Esteem Scale, a Love Styles Scale, a Relationship Scale, and an Infidelity Scale. The findings indicate that there are gender, religious, and ethnic differences in people’s attitudes towards infidelity. In addition, personality differences emerged in how people love and want to be loved. The results concerning infidelity are discussed in terms of the role individual characteristics play within the context of societal norms.

Role of PAR2 and B-arrestins in Lymphocyte Chemotaxis
Sireena Sy, Biochemistry
Faculty Mentor: Kathryn DeFea, Biomedical Sciences

Abstract: The inflammatory asthma response is an immune response that results in significant cell migration and mucus secretion in the airways. This inflammatory response is the result of an intracellular signaling cascade shown to be mediated by the G-protein coupled receptor (GPCR), Protease-Activated Receptor 2 (PAR2). PAR2 activates the downstream protein Beta-arrestin 2 (BARR2) which then goes on to activate the actin-reorganizing protein, cofilin. The significance of cofilin in this cascade makes it the ideal read-out for BARR2 signaling and, ultimately, PAR2 activation. Our lab has selected fungal spores from Alternaria alternata (AltA) and cockroach frass (BG) as the proteases for these experiments. These proteases are ideal for allergic asthma studies because they are common household allergens that produce a measured inflammatory response. Mixed lymphocytes were treated with these proteases to activate a signaling cascade, similar to the one found in allergic asthma. I wanted to determine if PAR2 and BARR2 were both necessary for lymphocyte cell migration and if in response to AltA and BG proteases, BARR2-induced cell migration required PAR2. Quantification of cofilin Western blots demonstrated that there were less levels of activated cofilin in BARR2 -/- mice, suggesting that PAR2 is necessary for the inflammatory response.

Investigating the Origins of the Transatlantic Trade and Investment Partnership
Kassandra Taira, Business Administration
Faculty Mentor: Jana Grittersova, Political Science

Abstract: In response to the damage of the 2008 banking and sovereign debt crises, the United States and European Union have sought to revive the transatlantic common market through a bilateral agreement entitled the Transatlantic Trade and Investment Partnership (T-TIP). Confronted by the breakdown of the Doha negotiations, persistent unemployment, and stagnation in their respective economies, the United States and Europe have pressed forward to implement T-TIP in order to integrate trade and investment structures and further coordinate policies so as to mutually cut economic and trade costs, stimulate growth and preserve the two sides’ respective positions in the global economy. Given these potential benefits, this paper will explore how and why T-TIP originated in the face of several competing special interests and political pressures by measuring the extent of incentives and externalities on these competing groups. Using a two by two framework, I analyze different combinations of incentives and externalities to determine which groups are more likely to support the T-TIP negotiations and eventual ratification. The US and EU governments face high incentives and significant externalities if they successfully conclude an agreement, and are therefore found to be the most influential actors in the negotiation process.
Effect of Physiological-Temperature on Absorption and Fluorescence Properties of Near-Infrared Erythrocyte Mimicking Transducers
Leela Tanikella, Bioengineering
Danielle Bacon, Bioengineering
Faculty Mentor: Bahman Anvari, Bioengineering

Abstract: Cell-based structures present a promising platform for the delivery of therapeutic and imaging agents due to their potential non-toxicity, biodegradability, and long circulation times. Our group has engineered nano-vesicles composed of hemoglobin-depleted red blood cells (erythrocyte ghosts) doped with the near infrared chromophore, indocyanine green (ICG), and has demonstrated the utility of these constructs as theronostic agents for fluorescence imaging and photothermal destruction of cells. We refer to these constructs as Near-infrared Erythrocyte-mimicking transducers (NETs). As the first step towards characterizing the expected in vivo optical performance of NETs, this project will investigate the effect of physiological temperature (37 °C) on absorption and fluorescence characteristics of NETs. We incubated NETs at 37 °C for up to 120 minutes, and acquired their absorption and fluorescence spectra at 20, 40, 60 and 120 minutes incubation times. Our results indicate that the absorbance of the NETs decreases with increased incubation time, while there is a slight increase in the fluorescence of the NETs with increased incubation time, which may be attributed to disaggregation effects of ICG.

Towards a Biomineralized Photocatalyst: Classification of a ZnO-binding Peptide
Marzieh Tousi, Chemical & Environmental Engineering
Chung Moon, Material Science
Tam Triet Ngo-Duc, Material Science
Faculty Mentor: Elaine Haberer, Electrical Engineering

Abstract: ZnO is a semiconductor metal oxide suitable for applications like photocatalysis. Photocatalysis is a technique that uses the sunlight to speed up chemical reactions to degrade pollutants into harmless compounds. The goal of this work was to identify a peptide with affinity for ZnO that could synthesize nanostructured ZnO. Unlike other conventional methods, biomineralized ZnO does not require high energy for fabrication because the synthesis is possible at ambient pressure and temperature. For this study, a conventional phage display technique called biopanning with a combinatorial library with phages displaying approximately \(10^7\) different peptides was used to select peptide sequences with affinity for ZnO. After five rounds of biopanning, two phages each displaying peptides VPGAAEHT and DRQVDA TA that showed great affinity to ZnO were isolated. To confirm the affinity of the selected phages to ZnO, binding tests were completed with phages displaying two peptides on planar ZnO grown on a silicon substrate. Since affinity found could be towards either the ZnO or the silicon surface, binding studies with the two phages on silicon substrate were also performed. The results confirmed strong affinity of VPGAAEHT phage to ZnO surface showing 43 times more affinity to silicon than M1 3 phage, which was less than half the affinity it had for planar ZnO while DRQVDA TA phage showed 60 times affinity to silicon than M13 phage, which was similar to planar ZnO. Further studies will be performed to test different nucleation conditions and confirm ZnO nucleation from the two selected phages for photocatalytic applications.

Improving Cycle Stability of Lithium-Sulfur Batteries through Sequestration of Polysulfide Species in Functionalized Carbon
Allen Tran, Chemical Engineering
Faculty Mentor: Juchen Guo, Chemical & Environmental Engineering
Abstract: A major challenge impeding further improvement of lithium sulfide cathode material is lithium polysulfide dissolution and shuttling during electrochemical cycling. To overcome this problem we propose applying a method of direct in situ infusion of sulfur into the carbon host material to induce polysulfide group isolation during the charging and discharging of the lithium-sulfur battery. We will study a new experimental synthesis method to incorporate sulfur or lithium sulfide into the host materials. The methods we will use and materials to be synthesized will be evaluated using coulombic efficiency, capacity, and cyclic stability as criteria. The proposed material of interest is cyanamide (CH2N2) undergoing two condensation reactions to form melem (2,5,8-triaino-tri-triazine) with sulfur infused within the nitrile matrix.

Citizens' Prejudices against Policewomen under Certain Conditions
Kathleen Truong, Psychology
Priscila Mendoza, Psychology
Dawn Carroll, Linguistics
Faculty Mentor: Carolyn Murray, Psychology

Abstract: Much progress has been made for women to work in male-dominated fields, but why do citizens still hold prejudices against women in these occupations? To examine this, participants watched a police woman depicted in a criminal confrontation. The confrontation featured an armed suspect who eventually opened fire on the squad and her reactions were visible to the participant. The positive group and negative group contained participants that explicitly mentioned the policewoman with positive or negative words, respectively, and the neutral group contained participants that did not explicitly mention the policewoman. By using the Quick Discrimination Index to measure prejudice, the Big Five Inventory to measure personality, the Attributional Complexity Scale to measure the likelihood of associating behavior or circumstances, Social Dominance Orientation, and counting the types of words used to describe the policewoman, we examined the relationship between personality characteristics and perceptions of the female officer. People who are more neurotic were more likely to use positive words and people who are more politically conservative were more likely to use positive words as well. A possible reason could be that neurotic or politically conservative people are unusually concerned about being socially desirable while in front of the video camera. Interestingly, the neutral group scored significantly lower than the negative group in SDO and created unusual findings in the data. However, further research must be done to uncover the logic behind the neutral group’s unique profiling. These unusual findings from the neutral group implicate how citizens treat women in male-dominated occupations.

Allegorizing the Event: French Horror Films in the Post-World War II and Post-9/11 Contexts
Michael Turcios, French/Media & Cultural Studies
Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages

Abstract: French horror films are not given the proper recognition they deserve due to their lack of aesthetical value, thus critics render them “low-brow” visual productions. Before dismissing them as important works, one should reconsider revisiting the films of this genre and search for the subtle themes that allegorize the major events that affect French society. Through the analysis of French horror films in the post-World War II and post-9/11 epochs, I will explore the socio-political conditions that transformed France and prompted the film industry to respond to the events through the horror genre. By analyzing Georges Franju’s 1949 Le sang des bêtes (Blood of the Beasts) and his 1960 masterpiece Les yeux sans visage (Eyes Without a Face), I will demonstrate how the post-World War II condition made audiences at that time confront the horrors of the war, particularly that of France’s involvement in the persecution of
Arab descent populations. As I continue with the theme of horror in the contemporary context of New French Extremism, I analyze Julien Maury and Alexandre Bustillo’s A l’intérieur (2007) and Xaveir Gen’s Frjasmineontière(s) (2007) as two films that treat the post-9/11 themes of invasion, insecurity, and threat of the “other.” In the process, I will come to answer: what makes a French horror film “French?” and what allegories affect the condition of France in their respective periods?

An Adventureland of Commodities: Disney and Borders

Michael Turcios, French/Media & Cultural Studies
Faculty Mentor: Amalia Cabezas, Ethnic Studies

Abstract: Disneyland is a geographical and ideological space that renders the amusement park as being synonymous with America due to its practices of exclusion and its creation of a protective escapist space. Through the park’s process of admission and strategic placement of attractions, this project investigates the borders Disney creates—particularly those in the Adventureland section of the park. Disneyland presents itself as apolitical, but this neutral stance is often conflicted by the misrepresentation of cultures and the revision of history that occurs within the park. By analyzing the attractions and their creation of racial themes in a world supposedly reserved for children, the notion of borders and commodification of cultures becomes ostensibly evident through the “journeys” of the attractions. This project pays close attention to Adventureland as a modern World’s Fair that contributes to building an ideology of the “other” by taking non-Western cultures as commodities and denigrating their cultural practices and presenting them as spectacles of ridicule. To elucidate further on the point that Disneyland creates its own borders and commodifies cultures, I analyze the attractions in Adventureland as closely resembling the 1931 Exposition coloniale internationale of Paris, France.

Reggae Movements: The role American Reggae Music, Musicians, and their Lyrics, Play in Mobilizing Fans for Social Movements

Gloria Vargas, Sociology
Faculty Mentor: Ellen Reese, Sociology

Abstract: American reggae music is a style of music that originated from Jamaica reggae. This research paper will focus on the role of American reggae created by American bands and musicians from all over the United States in mobilizing residents of Southern California for various social movements. The research that I plan on conducting aims to: 1) examine the role that American reggae music, its musicians, its lyrics, and its history play in activism and social movements, 2) examine the tactics that American reggae bands use to mobilize activism and social movements if any, and 3) attempt to make contributions to new knowledge about the role music, like American reggae, plays in mobilizing and uniting individuals to make social and political changes. The role of American reggae in social movements has yet to be studied. Therefore, the research that I plan on conducting will focus on the role music plays in mobilizing fans to participate in social movements. To conduct my research, I will be interviewing the fans of these American reggae bands, and I will also interview the American reggae band musicians.

Vietnamese and Latino Catholicisms: Multiethnic Religious Encounters and Sacred Space in Southern California

Rebecca Villareal, Religious Studies
Faculty Mentor: Jennifer Hughes, History

Abstract: Shifting immigration and demographic patterns in Southern California create ever-changing
dynamics between Asian and Latino immigrant communities. The multi ethnic Our Lady of La Vang Catholic Parish in Santa Ana, California is a location for precisely this phenomena. The church is located in a predominantly Latino neighborhood, but its Vietnamese parishioners are an increasing majority of the parish. Tensions that have emerged over the shifting demographics of this diverse Catholic community reveal that the religious relations between multi-ethnic communities produce a formidable juxtaposition of ethnic religious practices instead of some form of multi-ethnic religious hybridism. This ethnographic study of the different religious and ethnic dynamics builds on interviews and participant observation I have already completed.

*Mark-Making with Individuals on the Spectrum*

Danni Wei, Studio Art  
Faculty Mentor: Erika Suderburg, Art

Abstract: (Performance) Autism is an epidemic widely misunderstood by the general public. The purpose of this research-based creative activity is to put together a performance installation, depicting alternative perceptions and means of communication, while raising awareness on autism. By formulating an experience that attempts to further comprehend the world experienced by visual thinkers on the spectrum, I wish to shift spectators’ consciousness to challenge the idea of the “norm”. During meetings with diagnosed individuals, we engaged in intuitive mark-making activities and passed a small camera back-and-forth between the participant and me. A videographer was present to document the processes. I will demonstrate a performance installation, channeling shared experiences to audiences. The accumulated footage may be utilized in the final installation. This activity is my study of the individuals’ state of minds and my own during art-making processes, exploring what mark-making can do as a sublanguage.

*Effects of Gatorade and Red Bull on Voluntary Wheel Running In Genetically Selected High Runner Lines of Mice*

Kristianna Wi, Biology  
Gerald Claghorn, Ecology Evolution, and Organismal Biology  
Layla Hiramatsu, Ecology Evolution, and Organismal Biology  
Jarren Kay, Biology  
Zoe, Thompson, Neuroscience  
Faculty Mentor: Theodore Garland, Biology

Abstract: Mice from four replicate High Runner (HR) lines have been selectively bred for 20 years (69 generations) for the trait of voluntary running on wheels (1.1 m circumference). HR mice run approximately three times as many revolutions per day as do mice from four non-selected Control (C) lines, but each of the HR lines reached a selection limit more than 40 generations ago (wheel running within the HR lines has not increased despite continued selection). We tested the hypothesis that Gatorade or Red Bull might cause or allow mice to run more. On days 5 and 6 of wheel access, as is used to choose breeders every generation, HR mice ran 3.28-fold more than C (P<0.0001), and females ran 1.21-fold more than males (P=0.0290), with no linetype X sex interaction (P=0.2821). On day 7, mice were administered fresh water, Gatorade or Red Bull. During the subsequent 19-hour period, Gatorade had no effect on running, but mice given Red Bull ran 22% more in both sexes and in both HR and C lines of mice (no interactions were statistically significant). The increase in distance caused by Red Bull was attributable to an increase in the amount of time spent running, not a change in mean (or maximum) running speed. In future studies, we plan to determine which component(s) of Red Bull are biologically
active (i.e., caffeine, taurine, or glucuronolactone). (Previous studies have found that sucrose alone does not increase wheel running.) This research was supported by N.S.F. grant IOS-1121273 to T.G.

_Emanacipated Foster Youth: Examining Change, Stability, and Narrative Messages Regarding Education_
Tina Yang, Psychology
Fanita Tyrell, Psychology
Faculty Mentor: Tuppett Yates, Psychology

Abstract: In comparison to their peers, foster youth earn lower grade point averages, have higher school dropout rates, and are less frequently enroll in postsecondary education. Childhood maltreatment, school and placement disruptions, and lack of stable relationships with caring adults may undermine foster youth’s educational functioning. Thus, this investigation sought to understand individual differences in educational functioning among 172 recently emancipated foster youth who participated in an ongoing study of risk and resilience among former foster youth (Mage = 19.63, SD = 1.11; 66.3% female; 83.7% non-White). Findings indicated that emancipated youth experienced considerable educational (M = 5.49 schools) and residential (M = 7.18 placements) disruptions while in care (M = 107.39 months). Educational adjustment in this sample was poor relative to national averages with 40.1% of youth having dropped out of high school versus 8.1%, a 72.7% high school completion rate versus 89.9%, and only 39% enrolled in 2-year or 4-year colleges versus 68.1% of non-fostered youth (Chapman et al., 2010; US Department of Education, 2013). Further analyses extended these findings to include a follow-up time point (Mage = 20.77) to explore factors that may account for patterns of change in youth’s educational competence across the transition to adulthood. Specifically, we explored youth’s narrative reflections regarding the messages they received about education while growing up as potentially informative about their educational status. These preliminary findings can guide future studies and inform child welfare policy makers about best practices to address the educational needs of foster youth.

_The Intersection of Myth and Religious Tropes and Gender and Sexuality in Toni Morrison’s Beloved, Jazz, and Paradise_
Zachariah Zendejas, English
Faculty Mentor: Erica Edwards, English

Abstract: The purpose of this paper is to identify mythic and religious tropes within the novels _Beloved, Jazz, and Paradise_ by Toni Morrison. Furthermore, the mythic and religious tropes and symbolism within these novels correlates with the gender roles that the character’s operate in and then break free from, albeit it briefly. However, this brief liberation of gender roles through mythic and religious tropes focuses on the women of these novels. Certainly, the roles of mythic and religious symbolism dichotomize the genders of the characters of the novels because the genders are placed under these respective tropes. The roles of myth are associated more with the women of these novels due to the writing, as the religious symbols are placed over the men. Though, rather than this being some play for gender superiority for men because of the religious symbolism, what these tropes do is display the oppressive nature of the religious symbols as it is applied to the males of the novels, and how myth gives the females of the novels a space to break free from the oppressive structures that forces these women to be singular and obedient to men and the Word. Furthermore, these mythic tropes begin to move the women of the novels towards a space where their gender roles incorporate masculinity in an attempt to obtain freedom from a societal structure that condemns the woman and the feminine body if it deviates from the gender binary and the religious structure it is born out of.
Quantitative Modeling of the Alternative Pathway in Complement System
Nehemiah Zewde, Bioengineering
Angel Dorado, Mechanical Engineering
Ronald Gorham, Bioengineering
Faculty Mentor: Dimitrios Morikis, Bioengineering

Abstract: The complement system is the body's first line of defense that targets invading pathogens and prompts a series of inflammatory responses which aids or "complements" antibodies to fight infections. This is accomplished by three distinct pathways known as the classical, lectin, and alternative pathway. The alternative pathway mediates up to 80% of all complement activation, owed to an amplification loop that rapidly generates the protein C3b in response to pathogens. We have developed a quantitative model of the alternative pathway, in order to better understand the kinetics of C3b production during infection. Our model incorporates a system of rate equations that describe the steps in the alternative pathway amplification cascade, and provides kinetic data for all proteins involved. Kinetic rates and plasma concentrations of complement proteins were obtained from literature, and implemented to the rate equations. Our model yields a series of time-dependent concentration data for all alternative pathway proteins, protein fragments, and protein complexes. We show that C3b is rapidly produced upon initiation of the alternative pathway amplification cascade, a fact that is supported by experimental evidence of rapid complement-mediated elimination of pathogens. Our model also demonstrates the relation between complement proteins before and during amplification steps, which aids in our understanding of the mechanisms of interaction and kinetics of complement proteins during infection. Furthermore, this model provides a framework for development of a diagnostic tool for the prediction of C3b generation and infection fighting in pathological situations that involve deficiencies or mutations in complement precursors.
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Session Moderators

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