Program & Abstracts

8th Annual
UNIVERSITY OF THE
PACIFIC

Undegraduate Research & Creativity Conference

May 3rd, 2008

Showcasing the innovation, creativity and diversity of projects undertaken by undergraduate students in their academic disciplines this past year at Pacific.
Program for the 8th Annual

Pacific
Undergraduate
Research &
Creativity
Conference

PURCC-2008

May 3, 2008
Program

Oral Presentations
9:00 AM – 12:30 PM
Wendell Phillips Center, Room 140

Poster Presentations
1:00 – 3:00 PM
Wendell Phillips Center, 1st floor hallways

Engineering Senior Project Demonstrations
2:00 – 3:30 PM
School of Engineering & Computer Science

Senior Art & Design Exhibition
1:00 – 5:00 PM
Reynolds Gallery

Junior Art Exhibition
1:00 – 5:00 PM
Studio Art Building
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<td>Lois Steele</td>
<td>Balance: The Depiction of Women in the Photomontages of Hannah Hoch</td>
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<td>Cassie Peters</td>
<td>Sex as Sin: The Legacy of St. Augustine of Hippo</td>
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<td>Marie-Antoinette and the Construction of Royal Feminine Identity in the Portraits of Élisabeth-Louise Vigée-Le Brun</td>
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**Moderator: Dr. Lisa Wrischnik**  
1:00 – 3:00 PM, 1st Floor WPC

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<td>A microarray experiment to determine the biological activity of metronidazole in <em>Trichomonas</em></td>
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<td>Chirag Vaid, Huy Cao, Justine Fong</td>
<td>HSP-70 ATPase Chaperon Protein</td>
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<td>Kelley Hoang, Christina Hsieh, Amanda Nguyen, Christopher Tishner</td>
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<td>Titus Hou, Phillip Kieu, James Lee, Vi Nguyen, Jason Quach</td>
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<td>Dana Simas</td>
<td>American Idle- The Case for Dock Electrification</td>
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## Engineering Senior Project Demonstrations
2:00 – 3:30 PM

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Fluids Lounge

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<td>Brandon Garbus, Kennedy Nguyen, Sophon Nhong, Robert Arauz</td>
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<td>Victoria Ong, Pheng Thao, Scott Zubrycki</td>
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<td>Stacy Costello, Jennifer Shore, Jason Balatti, Brad Ingels</td>
<td>Shisasari Community Fresh Water Protection Project</td>
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<td>Gabriel Rivas, Randy Maroukel, Jose Torres, Emmanuel Salcedo</td>
<td>Lakeview Residential Design</td>
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<td>Jose P. Hernandez, Allen King, Miguel Macias, Emily Byers</td>
<td>Jose Hernandez Park and Community Center</td>
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<td>Tara Dougherty, Mary Kissinger, Michael Stanwick, Justin Peterson</td>
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<td>Clay Slocum, Michelle Hawley, Sarah Maher, Scott Collins</td>
<td>WERC Engineering, Inc. Presents Windrun Development’s Master Infrastructure Plan</td>
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<td>Ryan Hansen, Chris Deorksen, Greg Felter, Travis Ford</td>
<td>Lone Tree Village: Develop from within</td>
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<td>Alfonso Borja Jr., Vincent Ladiao, Trong Huynh, Thoa Huynh</td>
<td>XYZ Tractor Company New Site Development and Administration Design</td>
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<td>Kaben Kramer, Robert Hansen, Chad Parsons, Troy Tisthammer</td>
<td>Ruiru Bridge Design</td>
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<td>Matt Vinson, Jaime Kamenicky, Ricardo Salcedo, Randolph Noriega</td>
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<tr>
<td>Kevin Petros, Richmond Hollen, Ben Pemberton, and Thomas Smith</td>
<td>Walk Hard: Designing a Pedometer</td>
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<td>Sean Ceballos-McGee, Jason Ladiao, Ravi Mohan, Urmil Dave</td>
<td>Pedometer Design: Not just a walk in the park</td>
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<td>Blake Gentry, Leocharis Ramos, Jason Giang, Hoan Cai</td>
<td>Medical-grade Digital Weight Scale</td>
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<td>Haitham Alabdulali, Emmanuel Eckardt, David Pitzer, Bunhay Phy.</td>
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## Mechanical Engineering
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<td>Janick Corpuz, Kelsey Kam, Benjamin Kessel, John Torres</td>
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<td>Daniel Gowans, Chris Kerth, Alan Love, Russell Masuda</td>
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<td>Manuel Pelaez, Eller Torres, Daniel Vizcaino</td>
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<td>Adrian Hernandez, Ahmad Yateem</td>
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### Senior Art & Design Exhibition
1:00 – 4:00 PM
Reynolds Gallery

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<td>Christina Chinn</td>
<td>Send Your Love and Spread the Word</td>
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<td>Diana M DeLoach</td>
<td>Before Your Time; Your Mother Should Have Known</td>
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<td>Jessica Erickson</td>
<td>A Lifetime</td>
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<td>Andrea Gutierrez</td>
<td>Wait One Cotton Pick’n Minute</td>
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<td>Kellyn Loehr</td>
<td>Time to Wonder: Ethical Design Crimes</td>
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<td>Shali Nguyen</td>
<td>“Time to Discover” the Stockton Miracle Mile</td>
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<td>John J. Pratt</td>
<td>Biomorphographs</td>
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<td>John J. Pratt</td>
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<td>John J. Pratt</td>
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<td>Rachael Rajala</td>
<td>Once Upon a Time</td>
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<td>Arlie Righos</td>
<td>Mass Media Mirage</td>
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<tr>
<td>Alexandra Youngblood</td>
<td>Boob Tube Cops</td>
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<tr>
<td>Amanda Zobel</td>
<td>Going Green for Selfish Reasons</td>
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Junior Art & Design Exhibition  
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Studio Art Building

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<tr>
<td>Lauren Carter</td>
<td>The Collective Condition</td>
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<tr>
<td>Eliana Cetto</td>
<td>Nightmares and Dreamscapes: A Journey to Self Realization</td>
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<td>Katherine Draeger</td>
<td>Ocean Environmental Degradation</td>
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<td>Susannah Pilcher</td>
<td>Studio Apartment Series: Student Edition</td>
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<td>Gina Polana</td>
<td>Unforgettable, Undeniable</td>
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<td>Brandi Young</td>
<td>Stereotypes and Subversions</td>
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Oral Presentations
Oral Presentation: 9:00

The Loss of the Individual, or How Japan Learned a Nationalist, Collectivist Identity Through Education
Andrea Lake

This paper analyzes the social impact of radical primary school education reforms in Japan beginning with the Meiji Restoration in 1868 through the early 1910s, with an emphasis on a growing collectivist, nationalist identity, as well as government roles in education. The school system shifted from its foundations in the individual home or community to being standardized and Westernized by the government, which had a lasting impact upon the individual and national identity of the Japanese population. However, contrary to general understanding of Japanese modernization, the Westernized education was replaced by more traditional Japanese forms of education originating from samurai traditions, while teaching adherence to a new, national identity. This shift in focus laid the foundations for the imperialist national identity that would propel the nation through World War II. Sources of information include the *History of Education Journal* and other education history journals, the "Imperial Rescript on Education," the "Policy for the Construction of a New Japan," and other secondary analyses.

Faculty Mentor: Greg Rohlf

Oral Presentation: 9:15

Balance: The Depiction of Women in the Photomontages of Hannah Hoch
Lois Steele

Hannah Hoch, a Berlin Dadaist who produced art from 1919 to the late 1960s, often showed women in striking and original ways. Her method of photomontage—cutting and pasting photographs together—allowed her to depict women as androgynous figures, with features both young and old, black and white. In her work, she seeks a balance between traditional roles and that of the New Woman, who was free to vote, wear comfortable clothes, and work outside of the home. Hoch produced her images from magazines and newspapers of the time, and therefore was limited to published images; however, Hoch subverts the meaning of the photographs by changing their context to suit her.

Despite the traditions of her German culture, Hoch managed to illustrate women in an innovative—if not feminist—way. Her works include strong women such as athletes and politicians and also bring attention to the suffering of women.

In my essay "Balance: The Depiction of Women in the Photomontages of Hannah Hoch," using methodologies from history, art history, sociology, and gender theory, I demonstrate how Hoch's artwork was hampered but not hindered by traditional German society's view of women.

Faculty Mentor: Merrill Schleier
Oral Presentation: 9:30

Sex as Sin: The Legacy of St. Augustine of Hippo

Cassie Peters

I will discuss Augustine's ideas about sexuality and how those ideas impacted later Christian thought. Augustine was one of the most influential writers in the early Catholic Church and many of his ideas have survived through the twenty first century. Because of this, not only did his ideas about how God and humankind interact survive but also his ideas about how men and women should relate. In my preliminary readings I have found that Augustine had many feelings about women that would have been shared by other men of his time but it is unfortunate that because he had such great influence they would carry on until today.

Augustine had certain ideas about lust, sexuality, and celibacy and these ideas have influenced later Christian thought on contraception, abortion, and sex. Augustine also believed that woman was the weaker sex and Aquinas furthered his ideas in later times. From the early times of the Catholic Church there is evidence that discrimination against women was self-perpetuating. Augustine's writings are used to this day in order to keep women from becoming priests in the Church.

Through my research I hope to find out whether or not Augustine's life experiences and former beliefs influenced his later Christian beliefs. Beyond this I will explore the extent to which Augustine's writings influenced later Christian theology. To what extent does his writing influence the world of today?

Faculty Mentor: Caroline T. Schroeder

Oral Presentation: 9:45

A Different Look at the First Amendment and Speech Codes

Vietnam Nguyen

There is a growing problem among universities across the United States. The problem is how to combat hate-speech on campus without limiting students' First Amendment constitutional right to free speech. A prominent solution that many universities are developing and have tried to implement is speech codes. However, many of the universities' speech codes have been struck down by courts as unconstitutional due to their vagueness and over breadth. The purpose of this essay is: to analyze the First Amendment from a critical race theory perspective, and to argue for the implementation of speech codes on universities. First, I will address a few critical First Amendment court cases that have greatly impact the debate on speech codes. Secondly, drawing from a wide range of theory base sources, I will argue that the First Amendment is not equally applied to minorities as it applies to the majority. Thirdly, I will argue that speech codes are needed: to give minority a legal mechanism to address their hurt that gives legitimacy to their hurt, voice and rights. In this essay I will not be arguing for a specific type of speech code or for any alterations in the current speech code models. Rather, I am advocating for the implementation of the idea of a speech code in general. I leave the meticulous task of drafting a well written, narrowly drafted, and specifically tailored speech code for others.

Faculty Mentor: Zhou Xiaojing
Oral Presentation: 10:00

Millet's The Gleaners: Rural Laborers Taken for Granted

Madalyn Friedrich

In the mid-nineteenth century the French Realist painter Jean-Francois Millet was known for his depictions of the plight of peasants. In The Gleaners (1857), Millet depicts three peasants engaged in the difficult task of gleaning, the scavenging of the remains after harvest. This work stimulated contradictory readings; some have asserted that Millet had a political agenda to start a revolution while others saw him as a passive peasant painter, one who intended to paint an apolitical pastoral scene. The Gleaners received criticism as a “socialist” painting because of the dissonance between the Parisian understanding of peasants and the actuality of their suffering. Parisians were aware of the peasants who were located thirty-five miles from Paris who supplied their labors for the city. These peasants were relatively well off. On the contrary, deep in the countryside, such as in the Barbizon forest, peasants were engaged in backbreaking labor. These are the laborers that Millet chose to depict to the Parisians. In contrast to the previous interpretations of The Gleaners, I will explore Millet’s dualistic vision of peasants as both noble and oppressed in order to garner recognition for their plight. By employing formal and socio-economical analyses, relying on artistic and literary influences, and Millet’s own attitudes toward peasants, I aim to develop a more balanced understanding of The Gleaners. After analyzing the painting and the response that it received from critics, it is evident that often critics’ own political motivations were projected onto Millet’s work.

Faculty Mentor: Merrill Schleier

Oral Presentation: 10:15

The Romantic Ballerinas: What are guillotines compared to tutus and pointe shoes?

Natalie Sue

The Romantic Movement of the nineteenth century revolutionized the art form of ballet in France, and subsequently the social standing of women. Originally a counter movement to post-revolutionary Classicism, the Romantic Movement changed the ideals of male and female roles in ballet. In-depth analyses of Pas de Quatre and Swan Lake reveal a fundamental trend of the Romantic Movement: women’s centrality. This happened in part because of a change in the level of difficulty of ballet during the Romantic period. New techniques were invented to show off a dancer’s ability, specifically the development of pointe work for women and more liberating costumes. Because the newly developed methods highlighted the movement and grace of women, a progressive movement began where the women were centralized and the male role declined (at least on stage). Contrary to prominent dance scholars such as Christy Adair, my research proves that women significantly dominated Romantic ballet as interpreters, creators, and admirers.

After dancing ballet for eleven years, I always wondered about the perception of women ballerinas. There is so much hard work and sacrifice behind the scenes, much different from the glamorous performances on the stage. Because the Romantic Movement was so influential, I wanted to explore women’s newfound independence through re-stagings of the ballets today and resources commenting on the social situation of women in this time period.
Faculty Mentor: Belt Schumacher

Oral Presentation: 10:45

Marie-Antoinette and the Construction of Royal Feminine Identity in the Portraits of Élisabeth-Louise Vigée-Le Brun

Eliana Cetto

In an attempt to clear her name, French Queen Marie-Antoinette (1755-1793) created her own royal feminine identity through the use of propagandist portraiture. She enlisted the help of portraitist Élisabeth-Louise Vigée-Le Brun (1755-1842) to create images that represented her as an intellectual, a revolutionary and a caring mother. The relationship between Vigée-Le Brun and Marie-Antoinette is significant because patrons and portraitists are often male, whereas these portraits are the result of the collaboration of two women. By the use of symbolic objects, settings, and costumes, both women constructed a unique royal feminine identity that continually changed in accordance with historical events. Each image is tailored to promote Marie Antoinette’s popularity through eighteenth century notions of public advertising. The commissions were meant to counter Marie-Antoinette’s negative reputation and highlight both the private and public roles that she was expected to fulfill. For Marie-Antoinette, creating propaganda paintings that adapted to the changing attitudes of the French people was an important political strategy.

Faculty Mentor: Merrill Schleier

Oral Presentation: 11:00

The Public Perspective On Athletes Who Holdout From Sport Organizations

Morgan McSweeney and Zach Gottlieb

The purpose of this study was to determine the effect that an athlete’s contractual holdout can have on the public’s perception on a professional sports organization. A survey was developed that was then administered to a class of approximately 100 subjects at the University of the Pacific, in Stockton, CA.

The survey consisted of 4 separate scenarios of contractual holdouts by athletes, and ten identical follow-up questions were then asked of each scenario. The questions were based on a 1-10 scale, with 1 being negative and 10 being positive. The resulting numbers answered per question were then added together, and then summary statistics were tabulated for each scenario.

The first scenario, involving an underpaid athlete that goes to another country, had the highest average score, which indicates the biggest positive fan reaction. The least favorable reaction was given to the fourth scenario, where the athlete demands a trade and continues to bad-mouth the team until he gets the trade. A Repeated Measures ANOVA was run to show that a difference between the reaction to each scenario existed, and a multiple t-test showed exactly where the differences existed.
**Faculty Mentor:** Pete Schroeder

**Oral Presentation: 11:15**

**Influence of Public Relations, Media, and Scandals on Fan Interest**

Brett Hirsch, Cody Neftin and Terence Quinn

Our study looked to find out if poor public relations have an affect on fan interest in organized sport. The objective was to discover the importance that character plays in sport, so teams do not run into the same situations that have occurred over the last decade. Our study took a convenience sample of approximately 150 people from the University of the Pacific. The age of the participants were college students aged students. We administered three different surveys, a placebo on fan loyalty, and two scenarios with a public relations disaster. The first scenario was a performance enhancing drug scandal, and the second was a team wide rape case. After gathering our data, we ran repeated measures ANOVA, and multiple dependent t-tests to analyze our data. First we found there was barely a significance in our study at the .05 level. Second, we found that a significant difference existed between our placebo survey and the second scenario regarding a rape case. We concluded that public relations and scandals do have an effect on fan loyalty in certain situations.

**Faculty Mentor:** Pete Schroeder

**Oral Presentation: 11:30**

**Modeling the Housing Market's Decline: How Much, How Fast, and What People Value**

Andrew Padovani

One of the most severe threats to the U.S. economy is the current credit crisis that was sparked by the collapse of the sub-prime housing market. This collapse has spread to affect the housing market as a whole and has left many families unable to sell their homes, some falling into foreclosure, others getting stuck with two or more mortgages, and most watching the value of their most important asset— their home — fall sharply. It is important to examine this decline to obtain insight into when the decline began, how sharp the decline was, and whether or not there are signs of the decline slowing or reversing. This study attempts to examine the decline in the housing market in Modesto, CA — one of the hardest-hit communities in terms of foreclosures and unsold inventory in the country. Typical housing market research is done using multivariate hedonic regression models. As such, this study employs a hedonic log-lin model using data obtained from the MLS on 6500 homes sold between April 2005 and March 2008. This model controls for many standard variables included in typical housing research, but includes some unique variables for items such as Home Owner’s Association (HOA), HOA dues, and Real Estate Owned (foreclosed) homes. Initial findings reproduce the decline in housing prices and show that the most recent quarter shows an increased loss in value over the previous quarter, with prices peaking in the first half of 2006.
Characterization of the 5' Untranslated Region (5'UTR) of the Alcohol Oxidase I (AOXI) Gene in Pichia pastoris

Amy Huang

The purpose of this study was to further characterize the 5' Untranslated Region (5'UTR) of the Alcohol Oxidase I (AOXI) gene in Pichia pastoris. The 5' UTR is fused to many coding sequences of heterologous proteins expressed by the yeast P. pastoris and thus influences the expression of the protein. Past studies have shown that changing the length of this 121 nucleotide long sequence has mostly decreased translation efficiency. Research done by Christopher Staley at the University of the Pacific has shown that deleting 21 nucleotides has actually increased beta-galactosidase expression in P. pastoris when this shortened 5'UTR was fused to this reporter enzyme. Deletions of 21, 25, 30, 43, 61, 78, and 95 nucleotides from the 5'UTR were all studied in terms of their effect on translation. However, the constructs with deletions of 25 (pCS25) and 30 (pCS30) nucleotides contained a mutation in the beta-galactosidase gene, resulting in zero beta-galactosidase activity. The rest of the deletions showed dramatic decreases in activity. This study determined the effect of a truncated 5'UTR on the beta-galactosidase activity in pCS25 and pCS30. First, the mutated beta-galactosidase coding region was replaced with normal beta-galactosidase coding regions. These constructs were transformed into E. coli, and restriction digestion and sequencing were used to confirm the correct construction. The constructs were linearized and transformed in P. pastoris. The transformants were selected for, purified, and beta-galactosidase activity assay was used to determine the effects of the 5'UTR deletions on translation in pCS25 and pCS30.

Faculty Mentors: Geoff Lin-Cereghino and Joan Lin-Cereghino

Folding of Proteins of Proteins that Cannot be Folded

Logan S. Ahlstrom

N-terminal cysteine-capping has been shown to increase helical stabilization of small peptides in the gas phase. We now show that this property plays an integral role in aqueous environments, stabilizing favorable interactions between charges and with water in biologically important peptide fragments. Replica Exchange Molecular Dynamics (REX-MD) along with Quantum Mechanical techniques are used to study this and other effects on the folding of a helical segment of the Yap1 protein from yeast. The initial unfolding of sequences from the LacI and 434Cro helix-turn-helix (HTH) motifs from a bacterial family of DNA regulation proteins was also studied, which included a simulation of the full 434Cro HTH motif.

Faculty Mentor: C. Michael McCallum
Poster
Presentations
Poster # 1

**Biochemical Characterization of a Cysteine Protease from Trichomonas vaginalis**

Kristie Akamine

*Trichomonas vaginalis* is a protozoal parasite that infects human urogenital tracts and causes a sexually transmitted disease known as trichomoniasis. While men are usually asymptomatic, women display symptoms of vaginitis. With infection come a number of adverse complications with pregnancy and greater risk for HIV. The current form of treatment is metronidazole and only recently, tinidazole. Because there is a rise in metronidazole-resistance cases, alternative forms of chemotherapy are necessary. *T. vaginalis* have at least four distinct cysteine protease genes which encode enzymes that have been shown to degrade the host’s extracellular matrix while evading the immune system. Thus far, there is no proven role for cysteine proteases in *T. vaginalis* other than for infection. Because they seem to play a large role in virulence, they make for great drug targets. The focus of my research is on the purification and characterization of cysteine protease-1 (CP1). CP1 is ~39 kD in size and is thought be contained in lysosome-like compartments. The possible major residues in the active site are Cys-25, His-163, Asn-187. The work presented here will describe our current efforts to express, purify, and characterize the biochemical properties CP1. A better understanding of cysteine proteases may shed light on alternative chemotherapies for this important human sexually transmitted pathogen.

**Faculty Mentors:** Lisa Wrischnik, Kirkwood Land, Conor R. Caffrey (UCSF), and James H. McKerrow (UCSF)

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Poster # 2

**3,4-Dichloroaniline Amides as Anti-trichomonal Agents: Structure Activity Analysis of a Compound Library in vitro**

Padraick Dornbush, Elizabeth Chang, and Jessica Cicone

*Trichomonas vaginalis* is a protozoan that causes the sexually-transmitted disease trichomoniasis in humans. The organism infects both men and women; however, men are asymptomatic, making treatment difficult between partners. Currently, trichomoniasis is one of the most common sexually-transmitted diseases.

The current FDA approved treatment is metronidazole. Due to the emergence of clinical drug resistant strains, there is a need to identify alternative chemotherapies. To support this effort, we have screened in vitro a compound library of 3,4-dichloroaniline amides. Of the twelve compounds, five were effective at inhibiting parasite growth. IC50 values are currently being determined for these five compounds, as well as structure-activity relationships.

**Faculty Mentor:** Kirkwood Land
Poster # 3

Antiviral Nucleoside Analogs as Potential Chemotherapy for *Trichomonas vaginalis* Infections

Van Le and Soaly Nguyen

*Trichomonas vaginalis* is an anaerobic parasitic protozoan. *Trichomonas* is a sexually transmitted disease which is found mostly in females. It has the highest rate of infection of humans in industrialized countries. An estimated that 180 million infections are acquired annually worldwide. The estimates for North America alone are between 5 and 8 million new infections each year, with an estimated rate of asymptomatic cases as high as 50%. Symptoms of *T. vaginalis* include: early delivery, low birth weight, and increased chance of getting HIV infection, AIDS, and cervical cancer. The only FDA-approved drug for this disease is metronidazole (Flagyl®). The rise in clinical drug resistance cases has spurred recent interest in the identification of alternative chemotherapies. To support such an effort, we screened a small compound library of six nucleoside analogs that have been previously characterized to have antiviral properties. Of the six compounds, two have potent inhibitory activity against *Trichomonas vaginalis*. We are currently determining mean inhibitory concentrations as well as determining structure activity relationships among the compounds.

**Faculty Mentors:** Lisa Wrischnik, Kirkwood Land, and Stanislaw F. Wnuk (Florida International Univ.)

Poster # 4

Studies of the interactions between the *Drosophila* Rad51 paralog proteins

Cherie Musgrove

Every day cells undergo double strand breaks or other damaging reactions that would be lethal to a cell if there were no means of repairing them. One of the most complex and intriguing pathways that evolved to repair DNA is the homologous recombination repair mechanism, which fixes DNA damage by using the sister chromatid as template to restore the stretch of damaged DNA. The coordination of repair requires a careful dance of proteins and DNA that is not easy to accomplish. In humans and other eukaryotes, this is organized by a set of proteins of the Rad51 family (Rad51, Rad51B, Rad51C, Rad51D, XRCC2 and XRCC3). Since DNA repair is essential to survival, and key to cancer prevention, it is necessary to find a multicellular organism that can be used as a model for research on this repair pathway. Unfortunately, mutations introduced to Rad51 causes rapid death in laboratory mice. The purpose of my project is to isolate and characterize the fruit fly versions of the Rad51 proteins, and try to determine if the actions of the fly proteins are similar to the human proteins. Another intriguing aspect of fly HR is that flies lack the Rad51B protein, which is a major player in the human mechanism. Thus, the general aim of my research is to determine how the fly Rad51 proteins associate with each other, and to understand more fully how the fly proteins proceed with repair without the Rad51B homolog that is so crucial for human HR.

**Faculty Mentor:** Lisa Wrischnik
Poster#  5

Vesicle-Associated Membrane Proteins in *Trichomonas vaginalis*

Daniel Sassoon

*Trichomonas vaginalis* is an anaerobic, flagellated parasitic protozoan. It is the cause of trichomoniasis, which is the most prevalent protozoan infection in the industrial world. The mechanisms of *Trichomonas’* pathogenicity are still not completely understood, but several studies have implicated cysteine proteases in this process. The protists undergo a change of morphology when bound to human cells, which includes a reorganization of vesicular membranes in the cell so that vesicles are localized just under the surface that contacts the host cell. Cysteine protease 1 (CP1) appears to localize to vesicles in cultures of *Trichomonas*, and several other cysteine proteases are known to be secreted by the parasite. To better understand the protein sorting mechanisms of cysteine proteases, we have cloned and expressed a number of genes found in the *Trichomonas* genome that are known to produce proteins involved in vesicle membrane trafficking, exocytosis and endocytosis. We will use immunofluorescence microscopy to examine the localization of several tagged membrane compartment proteins. Similarly, we are using a fluorescent dye called Lysotracker to view acidic compartments in the cells. Acidic compartments are normally associated with lysosome-like organelles as well as some types of secretory compartments. Co-localizing these proteins (CP1 and proteins associated with exocytosis or endocytosis) through fluorescence microscopy will allow us to better understand whether the vesicles are acting to break down endocytosed materials, or fuse with the plasma membrane to exocytose internal materials, and this may help to answer how these CP1-containing vesicles may contribute to the pathogenicity mechanisms of *Trichomonas*:

**Faculty Mentors:** Lisa Wrischnik and Kirkwood Land

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Poster#  6

Protein expression studies of the Rad51 homolog in *Trichomonas vaginalis*

Priya Gandhi and Anisha Karnik

The purpose of our project is to ultimately find out where Rad51 localizes in the unicellular protist parasite *Trichomanas vaginalis* (T. vag) and how its expression levels react to drug treatment. We have been working on testing different bleeds from two different bunnies that have been injected with Rad51. They have been injected with Rad51 in order to produce antibodies. We have obtained bleeds (serum collected from the rabbits) at different stages post-injection to find at what stage the most anti-Rad51 antibodies have been produced. The Rad51 protein was transformed into bacteria and expressed as protein. We then ran Westerns to test which bleeds contained anti-Rad51 antibodies. After discovering the exsanguination bleeds (the final collection of blood serum from the rabbit) contained the most antibodies, we proceeded with our experiments. We carried out Westerns on *T. vaginalis* cells and immunofluorescence microscopy to study Rad51 expression and cellular localizations, but our experimental trials gave us too much background. We have proceeded to purify the Rad51 antibody in hopes of decreasing the background and will present the results of this purification in our poster.

**Faculty Mentors:** Lisa Wrischnik and Kirkwood Land
Poster # 7

Microarray analysis of colon cancer cells treated with the pro-apoptotic drug lucanthone

Will Smith

Lucanthone, a drug previously used for the treatment of schistosome parasites, has been shown to help in the treatment of cancers. Based on preliminary studies, it has been shown that lucanthone induces cell death in various cancer cell lines, most notably cells lacking functional p53. p53 is a major tumor suppressor protein that either induces cells to stop dividing, a process known as cell cycle arrest, or to kill itself, a process known as apoptosis. In 50% of all tumors, p53 has been either mutated or knocked out. Therefore, a cancer treatment that can cause cell death in p53 deficient cells can be beneficial towards the treatment of many different tumors. It has been proposed that the reason for the induction of apoptosis is due to the activation of the cyclin dependent kinase inhibitor, p21. This is surprising since the major transcriptional activator for p21 is p53, yet since lucanthone induces apoptosis in p53 null cell lines, p21 must be activated in a p53-independent manner. Whereas p21 is typically known to cause cell cycle arrest, overexpression of the protein has been shown to induce apoptosis in a p53-independent manner. The purpose of this research project has been to elucidate the apoptosis pathway activated by leucanthone via the use of microarray experiments to check the expression levels of proteins in treated and untreated cancer cells.

Faculty Mentors: Lisa Wrischnik and Uta Hellmann-Blumberg

Poster # 8

A microarray experiment to determine the biological activity of metronidazole in Trichomonas

Katelin Kehoe

The mechanism of action of metranidazole, the drug of choice for Trichomoniasis, is largely unknown. The aim of this study is to elucidate the biological activity of this antibiotic. This will be achieved by identifying the specific T. vaginalis genes that the drug acts on. A library of T. vaginalis genes has been built, and will be used to create cDNA microarray chips. The chips will be used to look at two different strains of T. vaginalis, one being more virulent than the other. One chip for each strain will be used to compare gene expression in untreated cells versus cells treated with metranidazole. After hybridization of the probe with the chips, they will be analyzed to determine which genes are up-regulated or down-regulated in response to drug treatment. Once we have determined which genes are affected, the genes will be sequenced. The function of the genes will then be determined by the function of homologous genes in other organisms. By identifying the genes that metranidazole regulates, a greater understanding of the drug’s mechanism of action will be gained.

Faculty Mentors: Lisa Wrischnik and Kirkwood Land
**Poster# 9**

**Functional analysis of the purified Rad51 protein from Trichomonas vaginalis**

Dustin Dovala

*Trichomonas vaginalis* is a parasitic protist that is responsible for the sexually transmitted disease Trichomoniases. It has been observed in other parasitic protists (such as Giardia and Trypanosoma) that the variable surface proteins (proteins on the outside of the cell) can be modified, essentially hiding the parasite from the host immune system. While this has yet to be directly observed in Trichomonads, the cellular machinery required for this process appears to be present. One protein that could play an important role is the Rad51 recombinase. Rad51 is involved in repairing double strand DNA breaks that can occur by accident or on purpose during meiosis. In Trichomonas, it may be involved in recombining DNA to express new functional gene products not recognized by the host immune system. This project deals with characterizing the Rad51 homolog in *Trichomonas vaginalis*. We are performing protein purification and functional assays to demonstrate different activities normally found in Rad51 proteins, such as ATP hydrolyzing activity, strand exchange and D-loop formation.

**Faculty Mentors:** Lisa Wrischnik and Kirkwood Land

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**Poster # 10**

**HSP-70 ATPase Chaperon Protein**

Chirag Vaid, Huy Cao, and Justine Fong

Because spider silks have extraordinary tensile strength and toughness, they have long been of interest to commercial industries that seek to harvest the durability of such fibers. However, this endeavor is only profitable if scientists are able to successfully uncover the assembly process that occurs in the silk glands. Research regarding dragline silk has been explored and specific proteins, such as MaSp1 and MaSp2, which compose dragline silk, have been completed sequenced and these proteins have been demonstrated to be chief components of dragline silk. However, little is known about the specific proteins that assemble the silk before it is released by the black widow spider. One gene, whose expression is induced upon pulling dragline silk from black widow spiders, is the heat shock protein, HSP-70. In vertebrates HSP-70 has been demonstrated to be involved in protein folding and is induced upon chemical stress. We propose that the black widow HSP-70 may participate in the assembly of spider silk within silk glands. Recently, we isolated a partial cDNA sequence from black widow spiders that represents the spider orthologue of vertebrate HSP-70. Our cDNA sequence has identified the closest matching homolog as a heat shock protein 70 (gene HSP70) from Ambystoma mexicanum (the axolotl salamander). All proteins of the heat shock family are transcriptionally up-regulated with increased temperature. In order to further investigate the role of this gene in the production of silk fibroins in the glands of spiders, we attempted to isolate the full-length cDNA of black widow HSP-70. The research done this semester has provided verification of a more complete cDNA sequence, which can be used in further studies of the function of this heat shock protein in the process of dragline silk assembly.

**Faculty Mentor:** Craig Vierra
Poster # 11

Isolation of the SEC6 cDNA Sequence from the Black Widow Spider

Thien Thao Ngo, Vinhyen Nguyen, Jiten Sidhu, and Fatima Ahmed

Spider silk has extraordinary mechanical properties and scientists have been attempting to produce synthetic silk for commercial applications, which include usage for bullet proof vests, ropes and cords, sutures and aircraft wings. Previously our lab identified several key target genes that are linked to the silking process in black widow spiders. Using DNA microarray analysis, we identified a few genes that had their expression profiles change upon pulling dragline silk from black widow spiders. One of these genes, which represented a partial cDNA sequence, showed similarity to the yeast secretory protein SEC6. This similarity, which was determined by searching the NCBI nr nucleic acid database against our partial cDNA sequence, supports this gene represents the orthologue of yeast sec6 and may play a role in the assembly process of silks during extrusion. In these studies, our goal was to isolate the full-length cDNA sequence of black widow sec6. To amplify the complete cDNA sequence, we employed 5’ and 3’ anchored PCR, which are forms of rapid amplification of cDNA ends (5’ and 3’ RACE). Anchored PCR led to the successful amplification of the 5’ as well as the 3’ end of the sec6 gene. Following the amplification of the cDNA inserts, these pieces of nucleic acid were placed into a cloning vector and sequenced. The full-length sequence was reconstructed using overlapping pieces of the nucleic acid pieces obtained by RACE. Our long-term goal is to be able to overexpress black widow SEC6 in bacteria, generate antibodies against SEC6 in rabbits, and use the antibodies to study the protein in vivo to learn more regarding its potential role in the extrusion process of silks in spiders.

Faculty Mentor: Craig Vierra

Poster # 12

Detangling the Web: Isolation of the MaSp1 Promoter from the Black Widow Spider

Titus Hou, Phillip Kieu, James Lee, Vi Nguyen, and Jason Quach

The long-term objective of this research experiment is to understand how the expression of silk genes is regulated in black widow spiders. Synthetic silk production will be possible in the near future but understanding how a spider expresses these genes is one of the most critical steps. In this research proposal, we attempted to clone the promoter region of the fibroin MaSp1 from the black widow spider. Different regions of the MaSp1 promoter were amplified using polymerase-chain reaction using different primers that were designed to amplify the 5’-flanking DNA region of the MaSp1 gene. We were able to successfully amplify promoter regions sized at 300 bp, 1000 bp and 1500 bp. After amplification of the different promoter regions from genomic DNA, we inserted the fragments into the cloning vector pBAD-TOPO. Acquisition of the promoter fragments were confirmed by restriction digestion and agarose gel electrophoresis. Our future goal is to insert these fragments into a promoterless reporter plasmid and measure the transcriptional activity of these DNA regions in insect cells.

Faculty Mentor: Craig Vierra
Identification of Promoter Region of MaSp2 Protein
Kelley Hoang, Christina Hsieh, Amanda Nguyen, and Christopher Tishner

The goal of our project was to find the promoter region of the protein molecule MaSp2 from the black widow spider. We accomplished this task by performing polymerase chain reaction (PCR) with genomic DNA isolated from spider tissue and engineered oligonucleotides designed to amplify different fragments of DNA that contained the putative promoter region. Spider silks are known to have intriguing physical properties such as being lightweight, extremely strong and elastic. For a time, spider silk and its proteins, called spidroins, have been attempted to be massively produced as synthetic silks that mimic its versatility for use in commercial applications. But in order to do so, investigators must first unravel how spiders synthesize natural silk within their distinct silk glands and their precise mechanisms and processes. We were successful in amplifying the 5' flanking DNA region of the MaSp2 gene (300 bp, 500 bp, 1000 bp, and 2000 bp regions). After amplification, we inserted these fragments into the pBAD-TOPO cloning vector and verified the presence of the putative promoter regions using restriction digestion analyses and agarose gel electrophoresis. These promoter fragments were also subject to DNA sequence analysis. Our long-term goal is to use these upstream regions to identify the endogenous promoter region of MaSp2.

Faculty Mentor: Craig Vierra

Hanging off the Wall: Spider Protein Expression
Mary Cathy Tran, Davittin Tran, and Anabelle Visperas

Spider silk is one of the strongest natural materials found in nature. It is five times stronger than steel. The purpose of the study was to build a DNA construct that would allow the expression of a black widow spider silk gene in bacteria. Although the precise function of this gene is currently unknown, its expression pattern is restricted to silk-producing glands and its amino acid sequence has internal repeat blocks, a characteristic of silk family fibroin members. To generate the prokaryotic expression vector carrying a piece of this putative silk gene, polymerase chain reaction (PCR) was used to amplify a segment of this cDNA that encoded the C-terminal region of the putative silk gene. PCR products were monitored using agarose gel electrophoresis. Due to the repetitive nature of the sequence, multiple bands resulted during the PCR. A single band that had the closest expected size of 618 base pairs was extracted and purified from the agarose gel. Purified PCR products were inserted into the prokaryotic expression vector pBAD-TOPO and then transformed into competent E. coli cells. Restriction digestion analysis demonstrated that the expression plasmids carried the amplified cDNAs in the correct reading frame. We then attempted to overexpress this protein in bacteria. Our long-term goal is to use the purified protein to generate polyclonal antibodies in rabbits. These antibodies will then be used further characterize the endogenous protein in the spider.

Faculty Mentor: Craig Vierra
Poster # 15

**Hunting For Novel Spider Silk Genes in the Black Widow Spider: Exploration of L. hesperus cDNA sequences**

Sean Cualoping, Matt Klein, Kristen E. Mueller, Ryan John Pacheco, Parin Patel

Spider silks have been a major focus in today's society due to their exemplary mechanical properties such as high tensile strength and flexibility. Much of the research on spider silks has focused on how to mass-produce silk fibers for industrial applications. Through a series of techniques and procedures, our research hopes to discover new silk genes that encode silk proteins. Using a cDNA library constructed from the silk-producing glands of the black widow spider, *Latrodectus hesperus*, we randomly selected over 125 different recombinant viruses carrying potentially distinct cDNAs. We performed single clone excisions from the different recombinant viruses and transformed the recovered phagemid particles into *E. coli*. Plasmids were retrieved and digested with restriction enzymes to analyze the size of the cDNA inserts using agarose gel electrophoresis. Plasmids carrying cDNA inserts from the screen were then sent to the University of Florida for DNA sequence analysis. We then compared our nucleic acid sequences against sequences deposited in the GenBank® database using the computer program BLAST. Results will be discussed. Our long-term goal is to identify new silk genes, as well as use the known cDNA sequences to print on the surface of glass slides using robotics to create "spider DNA chips". These spider DNA chips will then be used to monitor global changes in gene expression profiles during the silk process of spiders to understand more regarding the in vivo production of spider silk.

**Faculty Mentor:** Craig Vierra

Poster # 16

**Characterization of a new egg case protein from the black widow spider, Latrodectus hesperus**

Taryn Fong, Veena Vaidyanathan, Purvi Shah

Spider silk is an extremely strong material and material scientists have demonstrated that silk is five times stronger than steel. It has been suggested that a pencil thick strand of silk could stop a Boeing 747 in flight. Because of its high tensile strength and biodegradability, scientists have taken particular interest in the expression, assembly, and spinning processes of silk in order to better serve the environment in the future. By using a cDNA library prepared from the silk-producing glands of the black widow spider, *Latrodectus hesperus*, primers were designed to amplify a novel gene called egg case silk protein 3 (ECP-3). The expression pattern for ECP-3 is restricted to the tubuliform gland, a gland that is responsible for manufacturing the large diameter fibers of egg case silk. Using PCR, the ECP-3 cDNA was amplified, then gel purified, followed by ligation into a bacterial expression vector. Restriction digestion analysis confirmed the ECP-3 cDNA was in the correct orientation in the cloning vector. Following the verification of the insert in the cloning vector, we induced the expression of ECP-3 in bacteria and verified its expression using western blot analysis. Our long-term goal is to produce the protein in large quantities and purify it from bacteria. This purified protein will then be used to generate anti-ECP-3 antibodies in rabbits, which then can be used as an immunological reagent for studying the molecular properties of ECP-3 in the black widow spider fibers.

**Faculty Mentor:** Craig Vierra
Poster # 17

Investigations into Applications of Nickel Complexes for Future Breast Cancer Treatment

Robert Ginther

This research aims to investigate the binding properties of two nickel complexes (NiCR and NiCR-2H) with DNA. NiCR-2H was reported to show unusual cytotoxicity towards human breast cancer cells in contrast to NiCR although the two molecules have very similar structures. The studies here attempt to give an explanation on this significant biological phenomenon by exploring the binding modes of the title molecules with DNA. The on going mechanistic investigation, including viscosity studies, indicates that NiCR and NiCR-2H bind to DNA by way of minor groove interactions instead of intercalation. These investigations help lay the foundation for future applications of nickel complexes in breast cancer treatment.

Working as a paramedic for five years gave me the unfortunate opportunity to see many different faces of cancer. Working in an intimate environment with patients and their families I was able to see the wake of devastation lead by such a prevalent disease. Though my perspective in my professional career lead to an understanding of the dynamics of the disease, I fully did not appreciate the impact on a family until someone I loved fell to cancer. Here I hope to contribute to future success in fighting such a devastating disease.

Faculty Mentor: Liang Xue

Poster # 18

Conjugated Dye in Charged Environments

Logan S. Ahlstrom

We study the aggregation of a conjugated organic dye in aqueous solutions of different ionic strengths as a function of temperature. These experiments are important for many reasons, including their application as fluorescent cellular tags. However, the aggregation of such dyes convolutes their molecular absorbance spectrum and, thus, their effectiveness as biological markers. The thermodynamics of aggregation (ΔG, the driving force; ΔH, the heat of reaction; and ΔS, the possibility of converting any heat given-off in a reaction into useful work for the system) yields clues about the types of interactions causing this reaction. This data allows for better characterization of such compounds so as to improve their function in a number of charged environments. A Varian Cary Bio UV-Visible spectrophotometer and DATAN (DATa Analysis) 3.1 software package were used to study the spectra.

Faculty Mentor: Sylvio Rodriguez
STRAIN3D: A New Computer Program for Graphical and Statistical 3D Strain Analyses

Matthew A. Galon and Shawn Kerns

STRAIN3D is a new computer program designed to facilitate the analysis of deformed clastic sedimentary rocks. STRAIN3D utilizes linear algebra to calculate the three-dimensional magnitude and direction of deformation in a rock sample from three sets of two-dimensional strain measurements. STRAIN3D expands upon a previous version, STRAIN (Paterson, personal communication, 2003), by integrating new statistical capabilities and an enhanced user interface. Useful tools for statistical analyses of strain include statistical bootstrap averaging and matrix-based averaging. The STRAIN3D user interface is dynamic and utilizes pop-up menus and directional prompts to guide users through the various operations. To facilitate processing of large data sets, STRAIN3D is capable of importing data in tab or comma delimited, TXT and CSV file formats. STRAIN3D is capable of exporting graphs and plots as vector-based image files that are easily imported into computer drafting applications such as ADOBE ILLUSTRATOR. STRAIN3D is written in the PYTHON programming language, making it compatible with the WINDOWS, MACINTOSH, and UNIX operating systems.

Three-dimensional strain analyses are time-intensive processes that involve a series of detailed grain-scale measurements and complex mathematical operations. The time needed to complete three-dimensional analyses becomes significant in regional-scale strain studies, which commonly involve dozens to hundreds of samples. By automating complex and time-consuming operations, computer applications such as STRAIN3D, can both streamline strain analyses and reduce the potential for error. While many excellent strain analyses computer programs exist, many were created using out of date programming languages, rely upon text-based user interfaces, and are not compatible with current operating systems. In addition to providing a set of robust analysis tools, STRAIN3D follows the current computer industry trend of coupling increased cross-platform compatibility with simplified, window based, user interfaces that are simple to learn and utilize.

Faculty Mentors: Kurtis C. Burmeister and Scott Patterson (USC)
Over 100 years of fire suppression in the United States has led to frequent and intense wildfires, especially in the west. These wildfires cause changes in soil properties that lead to increased flooding and debris flows. For example, infiltration may decrease as a result of pore spaces becoming clogged with ash and debris. In addition, hydrophobic layers that repel water from the burned soils may form under certain conditions. Recent changes to forest management strategies are working to reestablish natural fire patterns in many regions. These strategies use regular prescribed burns that mimic natural fires that limit the available fuel load and minimize the potential for large wildfires. However, methods for prescribed burns vary greatly and depend on the types of vegetation and the forest history.

Our study investigates two sites in California's northern Sierra Nevada that differ in the type of vegetation (old growth vs forest with a logging and grazing history) and in the style of prescribed burns (high-intensity pile burns vs low-intensity broadcast burns). Both sites were treated with prescribed burns during Fall 2006. Data on infiltration (using mini disk infiltrometers) and hydrophobicity (using the water drop penetration test) of the soils from the surface to 6 inches depth in the two study areas were collected prior to the prescribed burns, as well as approximately one year post-fire. Both sites exhibited high hydrophobicity at the soil surface and low infiltration rates prior to the prescribed burn treatments. However, preliminary results indicate that the two sites respond quite differently to their respective prescribed burn strategies. The old growth site, with primarily pile burns exhibit post-fire hydrophobicity at depth, rather than near the surface, as was observed in the site treated by broadcast burn. Both fire management strategies resulted in the development of hydrophobic layers of the soils that will hinder groundwater infiltration. Further study is required to determine the long-term impacts on soil properties results from these management strategies.

Faculty Mentors: Laura K. Rademacher, Songa Lopez (UCLA) and Terri Hogue (UCLA)
Coastal erosion is exacerbated by natural and human-driven perturbations of the climate system. Natural climatic cycles such as El Nino and rising sea levels increase the erosive energy of waves. In northern California, erosion rates are also affected by uplift of emergent portions of the tectonically active coastline.

Our project establishes a record of intra- and inter-annual erosion processes at three Sonoma Coast State Beaches: Salmon Creek, Horseshoe Cove, and Goat Rock. Salmon Creek is a river-cut, estuarine spit-bar complex. Horseshoe Cove and Goat Rock are both wave-cut, erosional shore zone landforms controlled by mass wasting and gravity processes, but differ in terms of breaking wave energy. We initiated our study by collecting baseline beach profile information at the study sites in Fall 2005. Subsequent beach profile data were collected from these locations at least once a year. Beach profiles include the location of berms, dunes, and other prominent beach features. Profiles were created with traditional surveying tools and the total station. Results of these surveys indicate significant intra- and inter-annual variations in the shape of the beach, the location of dunes, and the presence of vegetation. However, the shape and location of the sea cliff remains relatively constant year to year, suggesting that the majority of coastal erosion may occur during significant episodic events rather than during yearly changes. Studies such as these will provide a basis for understanding the response of beaches in this area to different stresses, allowing prediction of types of events with drastic effects upon the structure of the beaches in the area.

Faculty Mentors: Laura K. Rademacher and Tessa Hill (UC Davis)
Sources and Timing of Water Quality Impairments to the Lower Calaveras River

Steven Giovannoni

Many waterways in California’s Central Valley have water quality impairments resulting from urban and agricultural impacts, and the Lower Calaveras River (LCR) is no exception. The goal of this study is to identify the sources of these impairments to the watershed through measurement of water quality parameters at multiple locations along the LCR during both the wet and dry seasons. The LCR begins at the outlet for New Hogan Dam (NHD) near Valley Springs and flows west to Bellota where it is divided into the Old Calaveras and Mormon Slough. The LCR provides drinking and irrigation water to the City of Stockton and surrounding communities as well as Calaveras County. The LCR is also a habitat for steelhead salmon and rainbow trout.

Samples were collected during a number of longitudinal surveys – two during extended dry periods and the remaining immediately following major precipitation events in 2006 and 2007. Field measurements of temperature, conductivity, pH, and turbidity were collected at 10 monitoring sites. In addition, samples were collected for E. coli, total coliform, and standard geochemical analysis.

Results indicate there is a positive correlation between turbidity and bacteria levels. In addition, nitrate concentrations positively correlate to E. Coli in the tributaries to the LCR. These correlations suggest bacteria may originate from the same source as the turbidity and/or nitrate. Cosgrove Creek, a tributary leading into the LCR immediately downstream of NHD, exhibits the highest levels of bacteria. In addition, two smaller tributaries also contributed significant levels of bacteria to the LCR. Livestock around the upper reaches of Cosgrove and urban runoff around the lower reach of Cosgrove are possible sources of bacteria entering Cosgrove. Leaky septic tanks and agriculture runoff are possible sources for bacteria entering the smaller tributaries.

Faculty Mentor: Laura K. Rademacher
Torricelli's playground: draining inclined cylinders and other variations on the theme

Matthew Lundy

Torricelli's Law is used in ODE courses to illustrate separable equations. Using the law, one finds the time it takes to drain a container of liquid through a pinhole. A typical textbook exercise is to compute the draining time of a tank in the shape of a cylinder or a sphere. We decided to explore Torricelli's Law in more depth and stumbled across interesting variations:

[Inclined cylinder] Find draining time \( T \) of a cylinder making angle \( \theta \) with the vertical. We found \( T(\theta) \) explicitly and plotted its graph for various length-to-radius ratios. There exists an optimal angle \( \theta^* \) which minimizes the draining time and it is always strictly between 0 and 90 degrees.

[Gravity determination] Suppose one has \( N \) cylinders of fixed volume \( V \) and variable length \( L_i \); the vertical draining times (through identical holes \( a \) ) are \( T_i \). For each \( T_i \) one can compute acceleration due to gravity as

\[
 g = \frac{2V^2}{a^2 T_i^2 L_i}
\]

How accurately can \( g \) be determined in this way? We have recently acquired five one gallon cylinders in order to find out.

[Optimal draining geometry] A fixed volume of liquid can be drained in infinitesimal time if the tank is a “capillary.” If one fixes the height, the draining time is reduced to zero by shaping the tank as a wide “martini glass.” Suppose the tank is convex? It seems that in this case the optimal draining time should be positive. We are currently trying to prove that using convex optimization.

Faculty Mentor: Aleksei Beltukov
Poster # 24

Going with the flow: the correct mathematical model for a tank with a vertical slit

Colin King

Computation of draining times of tanks usually involves Torricelli’s Law which stipulates that velocity of the efflux is that of an object falling from the height of the water level. If the cross sectional area of the tank is a constant $A$ and the size of the aperture is $a$, the corresponding ODE is:

$$A \frac{dz}{dt} = -a \sqrt{2gz}.$$ 

The draining time $T$ for initial water height $z_0$ is

$$T = \frac{\sqrt{2Agz_0}}{a\sqrt{g}}.$$ 

Suppose the tank has a horizontal slit of thickness $\delta$ in its side. The use of Torricelli’s Law in this case leads to a curious paradox: the draining time becomes infinite! The goal of this project is to establish whether this paradox has any physical basis. We have investigated the draining both theoretically and experimentally. Our experiment with a 3 ft long pipe draining through a vertical slit produced mixed results. On one hand, good agreement with Torricelli’s Law is found in the beginning of the process. On the other hand, the tank does seem to drain in finite time but that time is unclear due to noise. We are now building a taller tank which should yield cleaner data. Theoretically, we tried to resolve the infinity by using steady-state Bernoulli’s equation in place of Torricelli’s Law. This produced finite draining times only for certain initial conditions which means that the acceleration of liquid inside the tank cannot be ignored.

Faculty Mentor: Aleksei Beltukov
Poster # 25

Mathematics of titration

Sombo Koo

Abstractly, titration is the measurement of a chemical system's response to changes in its state variables. Thus, from the purely mathematical perspective, titration data is a sample of values of a function that maps system's parameters into observed quantities. Understanding that function allows one to draw various conclusions about chemical composition of the system. We studied a particular type of acid-base titration which is widely used in chemical education and industry. Our titration data was comprised of measurements of pH of a mixture of acids as a function of added volume of another acid or base. The primary goal of the project was to understand and quantify the information contained in pH curves. In particular, we wanted to see if pH curves uniquely determined chemical composition of acid mixtures as suggested by various sources. Our findings seem to contradict the conventional wisdom that software, such as Excel, can be effectively used to fit chemical composition to collected titration data. We have shown mathematically that different acid mixtures can produce identical titration data sets. Further, even when the acids in the mixture are known, finding their concentrations from pH recordings is nearly impossible because the resulting linear system of equations is extremely ill-conditioned.

Faculty Mentor: Aleksei Beltukov

Poster # 26

An Evaluation of the High-P Instruction Sequence With and Without Extinction on Noncompliant Behavior of Children

Joshua Jessel and Katie Kestner

Child noncompliance is a concern in classroom settings, where disruptions may lead to a less effective learning environment and may also interfere with social interactions with teachers, peers, and parents. Recent research has focused on the treatment of noncompliant behavior using a procedure referred to as the high probability instruction sequence (high-p). During the high-p sequence a series of three instructions with which the child is likely to comply are presented immediately prior to the target instruction, with which the child is unlikely to comply. The effectiveness of this procedure has been conceptualized using the analogy of behavior momentum, suggesting that once behavior is initiated and reinforced, the behavior tends to persist in the face of a challenge (Nevin, 1996). The purpose of the current study is to determine if increases in compliance can be attributed to the high-p sequence itself, or whether certain components of the procedure are responsible for increasing compliance. The high-p treatment will be compared to the presentation of preferred stimuli independent of behavior at a similar rate to the presentation during the high-p sequence. Both procedures will also be evaluated with and without extinction components. Our results should help determine which treatment components are necessary for an effective intervention for compliance and will in also provide a basis for evaluating the theory of behavior momentum.

Faculty Mentor: Matthew Normand
Poster # 27

Towards a New Model: Appropriate Leadership Styles Depending on Individual's Participation Level and the Presence of Organizational Stressors

Nicholas Granger

This paper is the revision of a flawed model of leadership in which an organization is assessed using the Emotional Intelligence skills of Goldman to determine to what degree is individual participation encouraged or discouraged and to what degree is the organization under stress. From this assessment, a recommendation of possible, appropriate leadership styles is made. Finally consideration is given to determining whether or not a leader has been *successful*. Future avenues for research are also discussed.

Faculty Mentor: Joanna Royce-Davis

Poster # 28

How do you Measure Saving the World?!

Domenica Peterson

Social Entrepreneurship (SE), the concept of applying business practices and entrepreneurial thinking to solve the world's social problems, is a rapidly developing field. SE has the potential to help millions of people across the globe get out of poverty, get educated, and get decent health care. It has put hope in the minds of thousands of individuals who have gone out and started their own SE organizations. Many development programs in the past have been very unsuccessful (such as international foreign aid programs or loans from the IMF, for example) because they establish dependency of the poor on aid. SE offers a good alternative because it helps individuals to help themselves as opposed to creating dependency, for example a micro loan in Bangladesh that allows a woman to start her own business and finally feed her children. Unfortunately, without good assessment techniques, the field of SE is in danger of being unsupported because of the lack of qualitative and quantitative measurement of outcomes. What the field of SE needs, and this research project looks at, are some universal agreements on standards and measurement methods in order to determine significant positive social impact. Research findings thus far show that current measurement of impact is largely anecdotal. A few organizations measure social impact in a quantitative way by comparing specific indicators before and after the entry of an organization, high school attendance rates for example. My conclusion is that good quantitative as well as qualitative measurement and evaluation must be adopted on a wide scale in order for social entrepreneurs to do legitimate work. Organizations need to look at demographic statistics before and after they do their work as well as get feedback from the population they are serving in order to determine whether they are actually making a difference and not just claiming results.

Faculty Mentor: David Keefe
Poster # 29

American Idle- The Case for Dock Electrification

Dana Simas

Ocean-going vessels are one of the largest sources of air pollution and which also happen to be the most virtually unregulated. The United States Clean Air Task Force estimates the federal, state, and local governments as well as insurance companies and private individuals spend over $330 billion a year in air pollution related health issues. If business continues as usual, it is projected that the costs will soar over $460 billion a year.

Currently, ocean-vessels run their auxiliary engines while docked to maintain their “hotelling” needs such as electricity and refrigeration. This idling of ocean vessels is the largest contributor to childhood asthma and elderly respiratory problems in port cities. It is also a large contributor to climate change as these vessels constantly emit greenhouse gases while idle.

The process of cold-ironing allows for ocean-vessels to literally plug-in to a shore side generator that is attached to the port’s power grid and turn off all main and auxiliary engines. This reduces all current idling emissions down 98%, the other 2% is the amount of pollution that is emitted during the plug-in and plug-out process.

A federal cold-ironing mandate would allow the United States to take a step towards improving air quality and overall health in port cities, implement a self-sustaining policy (versus alternative fuel which would still require reliance on other countries), and regain credibility from the global community regarding the America’s sincerity in halting climate change.

Faculty Mentor: Dari Sylvester
Senior Engineering Design Presentations
Bioengineering

Making Ethanol from Garbage: Genetically Modifying Yeast
Bradley Dunham and Luke Pettross

Yeast has been used by humans for thousands of years to produce ethanol during fermentations. The same holds true today — we still love our beer — only now we have begun using the products of fermentation for fueling our cars as well. Corn ethanol has been in the news recently, and there is controversy surrounding the sudden diversion of our corn supply, and the effect this has had on parts of our economy.

Alternative methods are being pursued to use agricultural waste for ethanol production. Instead of using the corn itself, we could use the parts of the plant that we would otherwise throw away. The problem: it is impossible for yeast to consume cellulose, the structural part of the plant that would provide the bulk of the ethanol. One solution to this has been to introduce enzymes that break down cellulose into glucose, the yeast’s normal food source. Unfortunately, enzymes are costly, making the large-scale production of ethanol prohibitively expensive.

We are taking this idea one step further: we propose to create a genetically-modified yeast that can make enzymes to break down cellulose into ethanol. Such yeast will make their own enzymes, in the required amounts, and at the appropriate times, thus eliminating the need to purchase costly enzymes.

While the project has yet to be completed, we have accomplished several things so far: we came up with a two-enzyme system that will efficiently metabolize cellulose into glucose; we found an organism that naturally uses this system, and is therefore a good source of genetic material; we have successfully isolated one of the necessary genes and are in the process of inserting it into yeast. When completed, we will evaluate our transgenic yeast for feasibility as a basis for commercial corn ethanol production.

Faculty Mentor: George Carman

An Impedance Probe for Biodiesel Process Monitoring
Brandon Garbus, Kennedy Nguyen, Sophon Nhong, Robert Arauz

Biodiesel manufacturing is an inexpensive process, but an economical alternative for standards testing is necessary to further its growth. Capacitive sensors are very common and are currently in use for the measurement of water concentration in oil.

The feasibility of using impedance to quantitatively measure the progress of the biodiesel reaction during its manufacturing process is demonstrated with the use of a capacitive probe. Two types of probes are investigated. The first probe is a simple concentric cylinder construction which requires steady fluid movement through a small surface area. The second probe is an adaptation of a fringing field capacitor. The independent stable components of biodiesel, as well as a sample of biodiesel, were used for calibration.

Real time biodiesel monitoring data was obtained using these probes for different mixtures with excess water and limited catalyst. Reproducibility of this data was explored. We discuss the use of such probes to determine the current state of the biodiesel reaction.

Faculty Mentors: George Carman
Apparatus for Automated Testing of Dental Files

Victoria Ong, Pheng Thao, Scott Zubrzycki

Nickel-Titanium (NiTi) files are widely used during endodontic root canal procedures. NiTi files possess unique properties that increase the difficulty of visually determining the fatigue and consequently the failure of the files by the dentist during the root canal procedure. Our BENG 195 Senior Design project, performed under the sponsorship of the American Dental Association¹, seeks to improve upon existing methods for testing rotary NiTi endodontic files. An Endodontic File Fatigue Tester (EFFT) was designed to allow for the continuous filing of an Artificial Dental Canal (ADC) until breakage occurred. The EFFT provides for precision testing of the files over a range of angles (30°, 45°, and 60°) while being bent to various radii of curvature (2mm and 5mm). The ADC’s were composed of Aluminum Alloy 6061 and Copper Alloy 101. Preliminary observations suggest that the lifetime of endofiles decreases as the angle and radii of curvature increases.


Faculty Mentors: George Carman

Civil Engineering

Thornton Road Widening Project

Tara Dougherty, Mary Kissinger, Michael Stanwick, Justin Peterson

With the growing population of Stockton, California the roadways are becoming too small to carry the amount of traffic needing to travel. DKPS Engineers have proposed to help with this issue by widening Thornton Road from Eight Mile Road to Devries Road. The project will include a geotechnical report, traffic study, and plans for grading, drainage, underground utilities, beautification and a pump station design for sanitary sewer. This team however will not be designing any structural aspect of the pump station, the traffic control plan nor the development surrounding the project site.

The project will be done according to City of Stockton Standards and Specifications. This road widening is in the city’s master plan for 2035. Our mentor and main contact is an employee of the City of Stockton. Any city standard or design question he is able to answer in order to provide the most accurate information. Other consulting firms were also contacted including BKF Engineers in Pleasanton, CA and Fehr and Peers in Walnut Creek, CA.

Currently farmland surrounds the roadway, but there is a development in the master plan to be built by 2035. Each of the water and sanitary sewer lines has to be sized according to the future development’s needs using the City of Stockton’s Master Water Plan.

The presentation will include PowerPoint slides of pictures, processes and conclusions. A set of plans will be available to display along with a full aerial printout of the roadway.

Faculty Mentor: Gary Litton
Shisasari Community Fresh Water Protection Project

Stacy Costello, Jennifer Shore, Jason Balatti, Brad Ingels

Approximately 6,000 children die everyday of preventable water-borne illnesses. The technology needed to prevent these illnesses is not readily available in many developing areas, leaving that region’s inhabitants particularly vulnerable. One such community is Shisasari, in Western Kenya, where water-related problems not only cause health and safety detriments, but also have negative social implications. For this reason, it is necessary that water system improvements be designed to improve quality of life in the Shisasari Community.

The project team established a seven-step approach to project completion:

1. Conduct background research of Kenyan culture, construction logistics, and applicable regulations.
2. Develop alternatives to solve engineering problems facing the community.
3. Finalize alternatives based on feasibility analysis.
4. Complete design of the selected alternatives in water collection, storage, treatment, and conveyance.
5. Conduct life-cycle cost analysis of design components.
6. Create an implementation plan, including construction management and an educational brochure discussing benefits of safe drinking water.
7. Research grants and other potential fundraising efforts for project implementation.

It has been determined the optimal design consists of a spring box for source protection, prefabricated tanks for storage, chlorination for treatment, and a solar pump to initiate conveyance.

The final project presentation consists of greater insight to the struggles faced by the Shisasari community, as well as detailed methodology and analysis of each project component. The definitive aim of the presentation is to communicate the importance of this project and show how it will ultimately improve the quality of life of the Shisasari community.

Faculty Mentor: Gary Litton

Lakeview Residential Design

Gabriel Rivas, Randy Maroukel, Jose Torres and Emmanuel Salcedo

A 5,000 square foot two story home is to be built in the City of South Lake Tahoe. It will be located at the Tahoe Keys Marina Community on Danube Drive. The project will meet South Lake Tahoe Environmental Regulations and City Standards. Scope of Work will encompass the structural design, foundation design, sewage pipe design, pump design and all drafting. Other components considered are cost analysis, sustainability, and constructability.

Faculty Mentor: Gary Litton
Jose Hernandez Park and Community Center

Jose P. Hernandez, Allen King, Miguel Macias, Emily Byers

The new park located in north Stockton, CA will serve the surrounding community and more specifically the large apartment complex which is located next to the park.

The park will include a play area, picnic area, two basketball court, baseball/softball field, four tennis courts, bike path and parking area. The engineering portion for the park will include finish grading, designing the drainage and a retention pond, tying into the existing sanitary sewer, storm drain, and water lines, and the design of the electrical for all of the lights on site. Finally, a parking lot to meet the needs of the sports facilities as well as one to meet the needs of the community center will be required.

The community center will consist of three main areas and two sets of men’s and women’s restrooms. The three main areas are the gym, a grand ballroom, and the smallest area will include offices. The community center will be a structural steel building with open web steel joist's (OWSJ) at the roof. Included in our report will be an economic analysis of two lateral force resisting system’s (LFRS). The two LFRS compared will be steel braced-frame and concrete shear wall.

In order to commence our design we first gathered information from various sources. We had two mentors, Ben Neely, P.E. and Dr. Hector Estrada, who helped us with the park and the community center, respectively. Also, Victor Machado from the Parks and Recreation helped us to obtain information specific to park design.

Faculty Mentor: Gary Litton

XYZ Tractor Company New Site Development and Administration Design

Alfonso Borja Jr., Vincent Ladiao, Trong Huynh, Thoa Huynh

The XYZ Tractor Company is considering relocating their facility to a new location, 1234 Scraper Way, French camp, CA 95201. The proposed project will include the grading plan for a 35 acre site, a 15,000 SF administrative building design, and have an associated storm water detention system. The administration building will be designed using steel members and trusses. The building will be properly designed to withstand loading, such as wind, seismic, rain, dead, and live loads, using specifications according to the International Building Code 2008. The storm water detention system will include underground storage and pipes that meet the requirements according to San Joaquin County. The water runoff will be determined using the rational method (Water Resources application for determining runoff). A cost analysis will be performed using standard construction estimating guidelines and references.

Faculty Mentor: Gary Litton
Ruiru Bridge Design

Kaben Kramer, Robert Hansen, Chad Parsons, Troy Tisthammer

Nestled at the base of the Great Rift Valley escarpment in Kenya, the Ruiru community is fenced in by several streams, which during the rainy season can become quite hazardous. The result of these hazards has been the annual loss of various livestock, and tragically two human lives as well. The approach taken by KBD, Inc. was to begin gathering project site information from a completed feasibility report and to collaborate with professionals, professors, and local contacts to understand the project scope. The challenges faced due to this approach were many including severely slow response from Kenyan contacts, the omission of certain critical data including design codes and stone characteristic information, and the coordination of a project site which can only be imagined and not seen. Solutions to these challenges presented themselves by reverting to historically “tried-and-true” engineering techniques, using US design codes, and contacting multiple resources to ensure data was gathered. In the few cases where data was consistently unavailable, such as with the hydrologic analysis, executive decisions were made by the design team based on available information. As a result, our project team has successfully designed a seventy-foot, single-lane, Roman-arch stone bridge which will equip the local residents with not only the economic and educational freedoms taken for granted in other communities, but it will also allow further economic expansion as stone houses will be able to be built on and tractors will be able to be used on the farmland. The bridge uses three arches: one main, central arch with an eight-foot radius and two, smaller arches with a three-foot radius. The base weight of the bridge is 235,000 kilograms and can support a load of three fifteen-ton trucks. The watershed of our project area is estimated to be 5.36 mi² with a 500-year, 24-hour design storm producing 350 cfs flow. The total project cost is estimated to be $65,000 with a construction timeline of 53 days. The environmental impacts of this project are zero impact, and the economic restrictions will be removed allowing positive growth in the area. In conclusion, our design project has met and exceeded both project criteria and stakeholder desires.

Faculty Mentor: Gary Litton

Land Rover Wonderland

Matt Vinson, Jaime Kamenicky, Ricardo Salcedo, Randolph Noriega

Toyger Engineering is designing a new Land Rover Dealership that will be located within the city of Stockton. The dealership will be designed on an eight acre parcel bounded by commercial and residential development. Toyger Engineering will be designing all civil and land development aspects which will encompass the site layout, grading plan, pipe network, pavement design, and all utility layouts. The grading plan will include bioswales to provide on-site water treatment, and result in a more sustainable design. Toyger Engineering will also be designing a 4,000 square foot parts center. The building will have a steel frame and the building's lateral resistance will be provided by cross bracing. A test track will be incorporated in the design that will include a simulated mountain terrain and a splash basin. A pump will be designed to circulate water into the splash basin and runoff will be treated by a bioswale. All aspects of this project will be presented with detailed plans and calculations that will comply with all applicable city and county codes. Toyger Engineering will be incorporating innovative methods to minimize costs and mitigate negative environmental impacts commonly associated with commercial developments of this nature.

Faculty Mentor: Gary Litton
WERC Engineering, Inc. Presents Windrun Development’s Master Infrastructure Plan

Clay Slocum, Michelle Hawley, Sarah Maher, Scott Collins

Approximately 1700 acres of farmland, located off Hammer Lane near I-5, will be set aside to be transformed into an upscale mixed housing and commercial development. A dry levee will separate the remaining farmland from the development, and it will meet a 500-year flood criteria. A land use plan has been provided to WERC Engineering, Inc., to develop approximately 200 of the 750 acres now. WERC Engineering will design an infrastructure master plan for the development’s storm, sewer and water needs and also provide adequate flood protection measures. There will be an extended detention basin in the area to control the storm water run-off, provide water quality measures, and provide an aesthetically pleasing environment for the surrounding homeowners and businesses. The existing levees surrounding the development must be built up to a 500-year flood protection level. Furthermore, WERC Engineering will apply to have the Federal Emergency Management Association (FEMA) flood maps changed so that homeowners and businesses can purchase cheaper flood insurance and have sufficient protection. The storm drainage master plan will include master grading for residential and commercial super-pads, road design, storm drain pipes and pumping stations. The sanitary sewer design will include the pipe layout of a sewer system and how it will connect to the existing city line. A hydraulic study, soils report, topography map and boundary data have been provided to WERC from other consulting engineers and have been verified and deemed as reliable data.

Faculty Mentor: Gary Litton

Lone Tree Village: Develop from within

Ryan Hansen, Chris Deorksen, Greg Felter, Travis Ford

Lone Tree Village is a 335 acre site that will be transformed into a mixed use development encompassing residential, commercial, and industrial uses. A development of this nature is built to encompass all of the different types of land use and to allow for the neighborhood to flourish from within.

Our group was driven by the possibility of improving the quality of life for future neighborhoods in the San Joaquin County. Small details like the integrated trail plan will allow residents to walk throughout the neighborhood to locations such as the elementary school, commercial sites, or downtown Lone Tree Village. Most of the trail is adjacent to our Bioretention swale filtration system which serves as our main storm water pollution treatment and also provides a scenic route for outdoor patrons.

Storm water pollution prevention was a main concern for the project because of the effect development will have on the surrounding habitat. All water run off is planned to be diverted back into South Littlejohns Creek which eventually leads back in to the San Joaquin Delta. It was important that we designed a storm drain system that would allow water treatment and detention through biological solutions before being released back into nature.

Lone Tree Village was designed with the combination of modern civil engineering methods and new ideas of sustainability in order to provide a community that is both functional and appealing for its owners.

Faculty Mentor: Gary Litton
Walk Hard: Designing a Pedometer

Kevin Petros, Richmond Hollen, Ben Pemberton, and Thomas Smith

A pedometer is a device used to count the number of steps in order to estimate the distance that one walks or runs. A step is defined by the group as one-directional acceleration. In other words, a step is counted if the user picks up his/her foot and sets it back down. The group will not distinguish between a walking step and a jump. The pedometer to be designed must be able to count and archive steps. The steps will be displayed on a personal computer along with an estimated distance based on a hard-coded average step distance.

The pedometer design will be based off of the University Tool stick Starter Kit with the C8051F020 microcontroller, a two-axis accelerometer, and a LCD. The final project will be encased and have the ability to attach to the hip of the user. Testing of the prototype was conducted through the use of a team member in order to set the threshold of the accelerometer which is being used to count the number of steps.

Software was written in the C programming language and the SDCC compiler was used to compile and link the code. All hardware schematics were produced in AutoCad and the assembly of the project was conducted using a perforated board, battery case to distribute power, and wire wrap. The final project is able to successfully count steps and display the time, steps, and distance to a LCD.

Faculty Mentor: Cherian Matthews

Pedometer Design: Not just a walk in the park

Sean Ceballos-McGee, Jason Ladiao, Ravi Mohan, Urmil Dave

The senior design project that we have been working on has proved to be an arduous task. Designing a functional pedometer from scratch is a difficult task that requires attention to detail. When designing the project, we started off with significant amounts of research. Two members focused on the software portion of the project, and the other two focused on the hardware. As such, we ended up with two huge piles of paper--one pile with significant amounts of declarations and variables; the other a copious stack of data sheets. We are an ambitious group, and decided on process flows and what functionality we wanted out of our system.

We designed a pedometer that would take into account time, number of steps, and distance traveled. We obtained most of our information from faculty on campus, supplemented with our own independent Internet research. We also used lab manuals from previous courses as examples (for instance our Microcontrollers course lab notes were used to set up the timer, and initialize our ADC and LCD). We also used some of our old Circuit's lab notes in order to design circuits that would perform voltage division, voltage regulation, and capacitive filtering.

Currently, we are working on bringing together the hardware and software. We are able to display values of steps on the LCD, meaning that our accelerometer and associated code are working in sync. We are currently working on the RS232 implementation and the construction of the physical product. We hope to have our working model complete within the next week.

Faculty Mentor: Cherian Matthews
Medical-grade Digital Weight Scale

Blake Gentry, Leochris Ramos, Jason Giang, Hoan Cai

The project identification is to design a digital weight scale that has the capability to archive and export the data to a PC. Our current plan for the digital weighing scale is to use an existing commercial scale and replace the electronics with our own. We have decided to utilize a medical-grade scale which was donated to our group ($400 value). This device uses a vibration type measuring device based on a piezoelectric driver and receiver instead of the low-end strain gauge design. We will need a microcontroller with some DSP functionality to perform signal analysis with the AC signal coming in from the piezoelectric receiver. We will also need another microcontroller for the LCD module and purchase an NXP LCD to display the weight. We have found that the piezoelectric design will be a more technical project for us to do as it will require more analysis with the input signal.

The existing electronics on the medical-grade scale are divided into two boards: a measurement board, located in the base, and a display/user interface board in the stand. We have divided the group's tasks into two groups with similar scopes. The first group will handle the development of the LCD as well as the hardware computer interface and data logging. The second group will be tasked with processing the piezoelectric signals and converting the measured signal into a weight reading.

Faculty Mentor: Cherian Matthews

We Don't Ship Elephants

Haitham Alabdulali, Emmanuel Eckardt, David Pitzer, Bunhay Phy.

The purpose of our design was to build a digital weighing machine capable of transporting data onto a computer and displaying the price of shipping of that object based on its weight. The project was divided into two categories, the actual digital weighing scale, which was done by reverse-engineering a given scale purchased from a local retailer, and the transportation of data onto a computer.

In preparing this abstract an unusable signal of roughly 1 millivolt from the digital weighing machine was successfully amplified to 1 volt which was well within the range of acceptable voltages that our micro-controller can process. In addition to successfully sending this signal to our micro-controller, we also managed to display the weight on an LCD screen.

We expect to give our audience members a demonstration of our project which would consist of asking people to come up and place objects to be weighed and give them a readout, using the LCD screen, of the cost of shipping this object based on a fixed cost table. The main motivating process of this project was to appreciate the concept of reversed-engineering. This aspect is a very powerful tool to have, especially in the military. When an enemy plane falls under the hands of allied forces, one can reverse engineer the plane to find its weaknesses and build towers/planes which are ready to attack it. Or more realistically speaking, you can reverse-engineer a company's product and steal their secret recipe, assuming of course you have no moral or ethical values.

Faculty Mentor: Cherian Matthews
Automated Biodiesel Generator

Janick Corpuz, Kelsey Kam, Benjamin Kessel, John Torres

The purpose of this senior project is to translate the labor intensive two stage biodiesel production process into an automated system. The user would put the required ingredients into storage tanks, activate the process through an interface, and produce biodiesel.

The production process will employ two stages with methanol and vegetable oil as the primary ingredients for producing biodiesel with glycerin as a by-product. The two stages include esterification and transesterification. Each of the steps documented will be translated into an automated system that will produce four to six gallons of biodiesel. This project involves tank design, valve, heater and pump selection, electronics, and programming.

Faculty Mentor: Kyle Watson

Hovercraft

Daniel Gowans, Chris Kerth, Alan Love, Russell Masuda

Traveling in a hovercraft provides a unique means of travel. Advanced hovercraft designs allow the user to traverse from land to water and back. When on land, the hovercraft is able to glide over surface obstacles by using an air cushion for support. The skirt around the perimeter of the hovercraft makes contact, deforms, and passes over obstacles. When a sufficiently even seal is made underneath the hovercraft there is very little friction due to forward motion. This concept allows a hovercraft weighing hundreds of pounds to be moved with minimal force. Calculations show that the 350 lb hovercraft designed for this project can be moved with as little as 6.1 lb of force.

Unlike automobiles or bikes, which have specific points of contact with the ground, the air cushion underneath the hovercraft allows it to distribute the weight of the hovercraft across its surface area. Since pressure is a function of force over area, the hovercraft is benefited by having a larger surface area, thus decreasing the lift pressure required. For the design constructed in this project the surface area is 32 square feet which results in a required lift pressure of only 11.4 lb/ft². This pressure is lower then the pressure found in a fully inflated car or bike tire and can be accomplished with minimal equipment. In this project the hovercraft is fully supported by the output of only four leaf blowers. Thrust is provided by an industrial fan mounted on the back of the hovercraft.

Faculty Mentor: Kyle Watson
Remotely Operated Underwater Vehicle

Manuel Pelaez, Eller Torres, Daniel Vizcaino

To design and fabricate a remote-controlled underwater vehicle capable of the following: diving and surfacing up to 12 feet, maneuvering via control of yaw and pitch, and obtaining underwater photographs and video.

Faculty Mentor: Kyle Watson and Chi Wook Lee

Soccer Ball Pitching Device

Adrian Hernandez, Ahmad Yateem

The main purpose of this project is to provide soccer players with a product that can be used as a training device. The design would allow players to practice free kicks and other training exercises. The device uses the concept of a baseball pitching machine where two rotating wheels allow a ball to be thrown to a distance. Furthermore, the ball can travel to different distances and locations on a soccer field by slowing down one of the wheels thus allowing the ball to curve once it exits the pitching device. The project uses a series of ramps inside a goal that the ball has to travel through before reaching the pitching device. This allows users to not waste time chasing the ball and to focus on free kicks and other training exercises. The product was tested and proved successful. Products that have the same concept have a price of about $2000 while a budget of less that $500 was used to construct this prototype.

Faculty Mentor: Kyle Watson
Senior
Art & Design
Exhibition
Send Your Love and Spread the Word

Christina Chinn

All too often I encounter situations and scenarios that send the message that ‘one person cannot and will not make a difference.’ Not only is this discouraging, but it is also untrue. Graphic designers are blessed daily with opportunities to help make an impact in the world, whether it be small or large.

With inspiration from (RED)™ – a brand raising funds and awareness for African AIDS programs by working with iconic brands to produce (PRODUCT) RED™ branded merchandise – as well as Hallmark (PRODUCT) RED™ I have created a collection of greeting cards acting as an extension of Hallmark’s current line of (PRODUCT) RED™ cards. Using my own style of integrating graphical elements and earth-toned color palettes, I have fashioned soothing greeting cards suitable for a variety of different occasions; along with a special card that viewers may take with them. I have also designed a campaign of print collateral to further spread awareness about (RED)™, which includes an informational brochure and a magazine advertisement campaign.

It is my hope that the audience will take away a stronger awareness of the AIDS emergency at hand, and a sense of empowerment as they realize their potential to make a difference with an act as simple as purchasing a brand of merchandise.

[The author of this statement is not affiliated with (RED)™ or any of its partners.]

Faculty Mentor: Brett DeBoer

Before Your Time; Your Mother Should Have Known

Diana M DeLoach

Remember the idealistic time of the 1950s? Who exactly was this idealistic for? Even in today’s modern economics women are still portrayed as a working housewife. I want to explore some of the ideas of gender roles and the exploration of toying with the scene to show alternate idealistic roles for the genders. By using graphic design I plan to set up a situation that will question and even the shock the viewers perceptions of this idealistic period and the roles society has placed on individuals.

The pieces that I chose to make for the show include; a 1950’s Life & Time magazine, the Joy of Cooking cookbook, Wheaties Box, an advertisement for the Milk Women, and coasters & t-shirts that display my theme’s logo. All of these pieces have been selected due to their popular nature in the 1950s. By taking all these familiar household objects and switching the roles of gender either by illustration or limited amounts of text, I am able to make the viewer reconsider the roles of gender.

The idea for my work spawned from life experiences such as a single working mother who did it all, to me graduating and wanting to do it all too, even when I have the opportunity of becoming a mother & sharing these roles with my husband. I hope that after the viewers have seen my applications they will walk away with a broader viewpoint on gender roles, how they are changing, and what is to come.

Faculty Mentor: Brett DeBoer
A Lifetime

Jessica Erickson

My goal for this body of work was to capture multiple stages of the development of human life as a fetus. I have been interested the developmental process for several years and was compelled to research it for my own knowledge. Upon learning more about this amazing growth process, my fascination grew deeper and I wanted to share it with others; the best way came in the form of a brush.

In order to convey the power and emotion in my works, I use expressive strokes while maintaining a strong sense of realism. To achieve this level of realism is a great challenge, and I find my creative experience the most rewarding when I am technically challenged. It is important for me, as an artist, to be able to engage viewers in my work and make them intellectually and emotionally excited about what they are seeing. By choosing subject matter that displays the development of early stages of life, I am able to connect with all of my viewers on some level, because it is a process that we all have in common—no matter what our race, background, or social standing may be.

I am inspired more by powerful emotions in reaction to the things I experience. I start working from the background and work my way to the foreground. The brushstrokes start out very bold and rough, and then gradually become more refined. I am very aware of lighting in my works, because I believe that it is the key to creating a sense of life.

Faculty Mentor: Trent Burkett

Wait One Cotton Pick’n Minute

Andrea Gutierrez

My art is a reflection of my life past and present and the racial, social and economic prejudices that I have had to endure. I explore the idea of the “labels” and “stereotypes” that have been consciously and subconsciously placed on myself and other African Americans in the United States. I also address the concerns of racial identity and what it means to be black, poor and a woman in today’s society through specific art mediums including painting, sculpture, photography and printmaking. The process of how my art was created is an important aspect of my work. The message that I am conveying takes a more political stand that is inspired by the civil rights movement of the “60’s” and the constant concerns that are addressed today in the media on the “welfare” of the African American in the United States and the colonization of a race. I created posters with various stereotypes and t-shirts with bold labels that racially categorizes each individual and causes them to own the label that might otherwise not be see, During my exploration I publicly displayed my posters and conducted interviews in the “ghettos” of Stockton, Sacramento, Oakland and Los Angeles. It is my hope that the viewers of this work Black and White, provide input on racial inequality.

Faculty Mentor: Trent Burkett
Time to Wonder: Ethical Design Crimes

Kellyn Loehr

Graphic designers have, at their hands, the tools to communicate, to educate, inform and persuade large numbers of people through their manipulation of image and text. What is our social responsibility as graphic designers? Are we aware of the influence we wield as professional communicators in the new age of global messaging? And once we do, where lies our responsibility, our opportunity, our ethics, our balance? Should designers rethink their role in the world and their effect on it? My goal in this series is to create an awareness of the effect graphic advertisements have on consumers by juxtaposing illustrations, graphic marks and styles, photographs, and expressive line and shape in a collage-like fashion, as well as using dynamic typography and diagonal lines to create a sense of tension and conflict. The purpose of this series is not to tell people what to do, but to make designers aware of their influence on consumers, and for consumers to know how they are being influenced by design to purchase products. Through this series, I hope to shed light on the balance between our powers of persuasion and ethical responsibility as designers, as well as our vulnerability as consumers to be persuaded. Why is it ok to advertise tobacco overseas even though they know the health risks? Is it ok to disguise the negative sides of a product by making them look positive, or by only showing one side of it? Is it wrong to design for a fast food restaurant that targets children considering the catastrophic consequences on both our economic and physical well being? While working on this project I learned that I do not want to be an irresponsible designer that influences things that I do not believe in, and how easy it is to side step ethics of safety, health, the environment, and politics, for a business, or to make a profit.

Faculty Mentor: Brett DeBoer

"Time to Discover" the Stockton Miracle Mile

Shali Nguyen

With marketing, advertising, and graphic design (my three interests and studies here at Pacific), I have designed a project that brings it all together in one visual presentation. Working with the Miracle Mile Improvement District, my promotions group and I have been challenged which a task to tell college students about the Miracle Mile. To do this, we have created two components: (1) an event advertised at the University of the Pacific that will be held at Valley Brew Restaurant on the Miracle Mile to kick off the campaign, and (2) creating promotional materials including but not limited to: directory map, brochure book, 3-piece advertising campaign.

"Time to Discover" is a campaign about not only visiting the Miracle Mile but learning about it, too. Those exposed to the campaign will find that the Miracle Mile has so much more to offer and that just driving by is no longer an option. Creating this campaign has even put my group members and I through our own discovery process where we've found little boutiques, restaurants, and shops we did not know existed prior to the project.

At the Senior Art Show, “It’s Our Time,” you will see all of the visual components I have created with the graphic design skills I’ve gained from Pacific for the Miracle Mile advertising campaign which instills marketing principles from target audience to different appeal approaches for the reasoning on why each piece has been created.

Faculty Mentor: Brett DeBoer
Biomorphographs

John J. Pratt

In my paintings I have always enjoyed letting the paint move, drip, or mix on the canvas and I wanted to find a way to incorporate that interaction of materials into my photography. Prior to my work this semester I never experimented with abstract/minimalist photography. I altered my picture taking methods in order to force the imagery I created to reflect this genre of photography that I hadn’t previously explored. All the prints in this series were created without the use of a traditional camera. Instead, I utilized water, food coloring, salt, soap, plastic wrap, and a flatbed scanner to create high resolution scans of the interactions between these materials. In a sense, I altered the flatbed scanner’s purpose to use it like a large format camera. The resulting imagery took on the abstract/minimalist aesthetic that I originally intended, but also appeared captivatingly organic and became the body of work, “Biomorphographs.” The prints have been printed on translucent clear film, mounted on tracing paper, placed on windows, and backlit to appear like enlargements of slides under the microscope. Since all the imagery was randomly created with minimal control over the materials, the viewer is given more control over the interpretation of what they see in each print.

Faculty Mentor: Jennifer Little

How to Paint a Pot

John J. Pratt

One of the more advantageous aspects of my college career has been the opportunity to explore new and unfamiliar media. I believe that I have become a well-rounded and more open-minded artist because of these chances to experiment with new techniques and different materials. Previously it was my practice to create large confrontational paintings that carried with them what I believed to be profound and important messages about inalienable human truths. It was only after accepting the working method of a potter and incorporating these understandings into my paintings that I learned I could communicate similarly deep and philosophical messages to the viewer on a much more modest and subdued scale.

I chose to paint the form of a bowl because of the nature and symbolism of this particular type of tangible object. A bowl is one of the first and last objects a person uses during the day, greeting one in the morning at breakfast and overhearing how one’s day was at dinner. When one is sick, a bowl of soup is always there for comfort. An empty bowl, as with every one of us, has so much potential. What one puts in a bowl is what one gets out, acting as a karmic metaphor.

By adapting the process, materials, and tools of a potter and combining them with my skills as a painter I have allowed my paintings to escape their place on the wall and enter the realm of the object.

Faculty Mentor: Lucinda Kasser
**Internship at Vinothèque Wine Cellars**

John J. Pratt

This semester I had the opportunity to intern at Vinothèque Wine Cellars. I was originally hired to streamline their photographic database and to take commercial photographs of their products, which included cabinets, cooling units, doors, and miscellaneous replacement parts. Since being hired, I have been able to reorganize their previously disordered photo database of nearly 600 photographs and learned through trial and error more ways to take photographs of large products, some much larger than a refrigerator. The working environment was a full functioning warehouse where the cabinets and cooling units were assembled by hand and shipped to customers around the world. The area in which I worked changed almost daily. I was constantly weaving power cords around objects, or squeezing strobe lights between cabinets to get appropriate light for picture taking. These surroundings may seem undesirable, but in the end actually made me a more resourceful photographer. During my internship I have also expanded my responsibilities to include creating PowerPoint presentations, using audio and video equipment to create virtual tours and voiceovers, as well as had the change to work with the web designer for the company’s website. Through completing this internship I have gained a great deal of real world experience in the workplace.

**Faculty Mentor:** Jennifer Little

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**Once Upon a Time**

Rachael Rajala

In the time that I have been an artist I have never come across a style of art I love more than manga. It was for this reason that I chose to create a series of manga-style illustrations for my senior show. I chose "Once Upon A Time" as the theme for my series of works because all of the works I created for this show are rooted in fantasy. I chose to work in the traditional style of manga, using ink to create my paintings. In the time I have been working this style, I have been troubled by the simple fact that I am an American working in a style of art known for its Japanese origin. I want to disprove the notion that my origin restricts me from creating art in the style I have come to love. Art is many things, but the last thing it should ever be about is limitations. By taking on the challenge of creating professional manga illustrations for my senior show, I wanted to prove to myself that I can really do this. Of course I want others to approve of my work as well, but it bothers me the most that I doubt my ability to create the art I love based upon nothing more than where I was born. I doubted myself when I started this assignment, but after creating my own original illustrations, I feel that I am much closer to accepting myself as a true manga artist.

**Faculty Mentor:** Trent Burkett
Mass Media Mirage

Arlie Righos

For my senior project I wish to present an ongoing problem that I have experienced throughout my life. It is the effect of media on the American public. In this decade you cannot go anywhere without seeing a myriad of advertisements. The purpose of advertisements is to inform potential customers about products and services, and how to obtain and use these products and services. As a result, there is usually a male or female model. Sometimes these models are thin and tall, sometimes muscular, and did I mention beautiful? So, if these images of models are real...why do we not see them in real life? Why is this unattainable image becoming an inspiration to the American public? How could people or potential customers look if they used the advertised product? If the average female consumer sees an advertisement, like an old Revlon Ad with Cindy Crawford’s for thick lushes lashes that scream out SEXY! Now wouldn’t she make you want to buy that same mascara, for that same look? If you answer yes, then Revlon company is doing their job right.

As a result, since I answer the question yes, I have decided to make people publicly aware of our mass media evoking this figment of the artist imagination. As a Graphic Designer, I have been enlightened by the use of Adobe Photoshop, Illustrator, and all the little support tools they have to offer a creative artist looking to sell their Mass Media Mirage.

Faculty Mentor: Brett DeBoer

Boob Tube Cops

Alexandra Youngblood

Reality crime-based programs have been popular since the early days of television and continue today. I chose this theme because there is a great deal of interpretation as to how law enforcement affects societal norms. It has been argued that the stories told about crime have tremendous potential to reinforce a moral community’s internal solidarity. “The media’s portrayal of law enforcement and citizens tells public audiences about such things as "good and evil," heroes and villains, "morality," and it is the appropriate societal responses to crime and social problems (Surrette, 1998 p. 34).” I am fascinated by written examinations of media’s treatment to crime and how it has influenced its audiences. The presentation of crime, deviants, and police may influence how audiences view themselves and their society. “Audience members may have little or no first hand experience with crime and the police. Such, audiences may perceive the reality programming as an accurate reflection of police, crime, and criminals in society (Eschholz et al., 2002).”

The subjects of the paintings are taken from images of characters in popular police television programs. In a formal and objective painterly method, I intended for the work to appear comical and animated. As my personal aesthetic, droll artwork is where I find inspiration. My chief influences are from the artists of the San Francisco Funk Art movement. This movement originated from the counterculture revolution of the sixties when new art forms and means of expression were characterized by rebellion. I find the works of Robert Arneson, an avant-garde funk artist, alluring because of his eclectic stylistic quality and contentious subject matter. His work is humorous yet it exhibits dark undertones. The audience is uncertain as to whether the work is comical or sober. I too want to create art that straddles the border between humor and the grotesque.

I want the audience to enjoy my paintings for its aesthetic quality and its content. The objective of my body of work is to merge fine art with macabre humor.

Faculty Mentor: Trent Burkett
Going Green for Selfish Reasons

Amanda Zobel

In recent years we have been bombarded with multiple “Going Green” campaigns. Even though it is a widespread idea, many people are not incorporating green living into their daily life. The message of my campaign will be different from the usual green campaigns because it will focus on benefits that conservation will have on your personal life as opposed to the negative effects that not conserving will have on the world.

In order to attract the attention of young adults and to encourage them to go green, I will create graphic design applications and other print media such as pamphlets, stickers, and posters. I will also create designs for t-shirts and shopper bags. These applications will provide information about helping the environment while using humor to gain the attention of those in their 20s. The target audience will be young adults because if they incorporate conservation into their lives now, they are more likely to pass these ideas on to their children.

By using humor to encourage conservation, the campaign will avoid being seen as pretentious. The campaign will also include a website which will display tips for conservation, reasons conservation will benefit the viewer, and an online store. Through graphic design, I will create visually stimulating illustrations to form a fun and interesting campaign. In order to promote the spreading of this campaign, people will be encouraged to place the stickers in public places. All products will advertise the website which will provide more information about conservation.

Faculty Mentor: Brett DeBoer
Junior
Art & Design
Exhibition
The Collective Condition

Lauren Carter

These emotive sculptures are essentially interpretive portraits of myself. They are also metaphors for the empathetic aspect of humanity illustrated through abstract and anthropomorphic objects and imagery. As ambiguous shapes and forms conveying loneliness, the ceramic works engage the viewer conceptually without being too literal in meaning, which is reinforced by their biomorphic structure that allows for greater expressive potency. Furthermore, the use of organic materials such as clay and metal wire relate to the raw expression of loneliness in that they are as organic as emotions are to people.

I believe that the process of creation should transcend the work itself, which requires an improvisational method in order to capture feelings as closely as possible. Working with clay to illustrate how I feel has been liberating – even cathartic – and using non-referential forms to divulge emotions has become a practical solution that I hope to share with my audience.

Ultimately, I wish to encourage each viewer to recognize that we are all alike because we share common emotions and experiences. From this, I hope to inspire the viewers’ sense of empathy and prompt them to look beyond their circumstances and seek to build relationships with other people on the pretense that we are all human and all a part of a collective condition.

Faculty Mentor: Merrill Schleier

Nightmares and Dreamscapes: A Journey to Self Realization

Eliana Cetto

My current body of work concerns painted, large-scale self-portraits. These works are my way of communicating to the world my changing self as seen through my dreams. Due to my age and generation, I am caught in a continuous search for self-knowledge. I wish to explain my feelings through portraits, not a “realistic” visage, but a portrait of my unconscious. But how do I communicate something impermanent? If I don’t know who I am, how do I paint something that resides within me? In these ten paintings, I try to depict my psyche: my dreams and fantasies coming to life, creating a dialogue with how others see me, who I feel I am, and what lies beneath the exterior. With every painting accomplished, I have more of an understanding of my place in the world. The manner in which I depict myself with each painting communicates different mood. They enable me to understand my own personal emotions through these, introspective, dream-like images. I transform myself into something immaterial and unknown, something intangible and unseen. As the series progresses I begin to break away from the dark, oppressive and claustrophobic “real” world, represented in nightmarish cityscapes and find myself in a peaceful dream, progressing towards a tranquil serenity.

Faculty Mentor: Merrill Schleier
Ocean Environmental Degradation

Katherine Draeger

My current body of ecologically-minded works are inspired by my father’s love of the sea. As a child, I remember going sailing, kayaking, boogie boarding, rowing, fishing and swimming. Although my interest in the ocean was founded upon my father’s own love for it, that love has become something all my own. Recently, my interest has turned to human pollution of the ocean’s environment. The ocean is typically seen as a boundless natural source for fishing and transportation. However, the ocean is not as expendable as people to think. There are many man-made causes of ocean pollution, such as oil spills, sewage contamination, liquid and solid waste dumping, which are destroying the natural habitat and killing marine life. About seventy one percent of the earth is covered with oceans, but if we keep polluting and destroying them, there’s going to be nothing left.

I explore the ocean’s role in our lives and how we can control the pollutants that are detrimental to the animals that live there. I chose watercolor to illustrate this topic, because while watercolor is a flowing, delicate medium, I believe it also has the strength and power to portray environmental destruction. I believe that using human waste as a collaged element in these works also heightens the effect because the trash contains recognizable junk. It emphasizes where trash ends up when people litter. I hope that through my own work, I can promote more sensitivity to the ocean as a source of life, and raise awareness about the pollution and destruction of this ephemeral natural resource.

Faculty Mentor: Merrill Schleier

Studio Apartment Series: Student Edition

Susannah Pilcher

The ideas of this project came from a series of abstract drawings that kept repeating in my work. The bright colors and interesting patterns found in textile and wallpaper design are one of my main inspirations for the designs in my series. After reading about the Art Deco period, I began thinking of furniture and home decoration as a possibility for my work. I want to create things that are interesting, colorful, and unique additions to a home. I think of home items as versatile objects that can be used in various ways. My goal is to create a line of products that reflect the same design scheme and go well together in a variety of ways.

I am designing elements found in most people’s homes and setting up a mock living space to display them. My project includes many different objects and accessories of various materials such as wood, fabric, and glass. All the objects have dark painted backgrounds and are adorned with my design scheme of repeated patterns and abstract designs. I chose to use metallic paints for the accent colors to give the pieces a decorative flair. I believe this elevates them beyond the everyday household item to create one of a kind “luxury” items.

Instead of designing my own furniture, I have chosen to use acquired furniture and objects found at various thrift stores. I believe that in the wasteful society we live in, the recycling found in my work is appropriate and could serve to make a difference.

Faculty Mentor: Merrill Schleier
Unforgettable, Undeniable

Gina Polana

Although American society has evolved over the years, one part remains the same, the need for beauty. Ideas of beauty have changed throughout history, yet women remain in the race to keep up. In the twenty-first century, the media has established a better and faster way to distribute the idea of beauty. Through the use of television, posters, magazines, billboards, the internet and photograph, models display the unattainable beauty society expects.

Models are known for their long legs, golden tans, clear skin, Caucasian features and size zero waists. For the majority of women in the world, these qualities are far from natural. The media is blind to the natural beauty of women who are short or heavy set, or even have a different skin tones. Every woman has the ability to display their beauty. I want to display the beauty in each woman’s different characteristics. I select young women who range in height, shape, skin tone, and personal style. The majority of the women I use have no previous modeling experience. As a result, I have assisted them with body positions. I researched numerous fashion magazines and fashion photographers to further my knowledge of models. I hope to project the idea of universal feminine beauty in the fashion world. Even if the media wants to cake on the makeup and hair spray, all women can be dressed up to present the natural beauty image that they are looking for.

Faculty Mentor: Merrill Schleier

Stereotypes and Subversions

Brandi Young

My series of photographs focus on stereotypes of women. I feel women are often seen as weak, inferior to men both physically and mentally, and viewed as objects rather than human beings. I believe women are intelligent and strong-willed individuals, but many are unsure that they can express those qualities in today’s world. Though times are changing, I still see many stereotypes of women that are untrue and unfair. Yet many women conform to these stereotypes instead of trying to break free of them. I use a diptych format to display two images, the first is a stereotype, and the second is the subversion or anti stereotype. The scene in the first photograph, representing the stereotype, is composed of women and props that are stereotypical of ideal femininity, such as nail polish and makeup, or cleaning supplies and laundry. The subversion pictures are composed of the same women and props but with an added element that rejects the stereotype. These pieces are intended to promote discussion. Whether my viewers agree or disagree, my statement is acknowledged either way.

Faculty Mentor: Merrill Schleier