

# Seventh Annual

**Undergraduate Research and Creative Achievement Day  
April 30, 2003**

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## Schedule of Events

9:30 a.m. - 9:45 a.m.	<b>Welcome</b> Provost Arthur T. Johnson Room 767, Albin O. Kuhn Library & Gallery
9:45 a.m. - 1:45 p.m.	<b>Concurrent Sessions</b>  Oral Presentations, Room 767, Albin O. Kuhn Library & Gallery Oral Presentations, Library Gallery (noon-1:35 p.m. only) Poster Sessions, 7th Floor, Albin O. Kuhn Library & Gallery Musical Performances, Room 767, Albin O. Kuhn Library & Gallery Fine Arts Exhibits, 7th Floor, Albin O. Kuhn Library & Gallery, University Center Ballroom, Fine Arts Building Corridor & Studio
10:00 a.m. - 11:00 a.m.	<b>Fine Arts Students' Guided Tour of Exhibits</b> Meet in Library Lobby in Front of Elevators
2:00 p.m. - 3:00 p.m.	<b>Formal Program, Library Gallery</b>  <b>Remarks by:</b> Provost Arthur T. Johnson President Freeman A. Hrabowski, III  <b>Special Guest Speaker:</b> Dr. Shirley Strum Kenny President, Stony Brook University  <b>Introduction of the 2003-2004 Undergraduate Research Award Recipients</b> Diane M. Lee, Vice Provost for Undergraduate Education
3:00 p.m. - 4:00 p.m.	<b>Reception</b> Seventh Floor, Albin O. Kuhn Library & Gallery
4:00 p.m. - 5:00 p.m.	<b>Fine Arts Students' Guided Tour of Exhibits (Repeated)</b> Meet in Library Lobby in Front of Elevators

## Shirley Strum Kenny

Shirley Strum Kenny, President of the State University of New York at Stony Brook, has combined a teaching and research career with administrative leadership. Dr. Kenny is widely recognized for her initiatives to build bridges between the academic and business communities and has also been active in business and education collaborations on workforce issues.

Dr. Kenny taught at the University of Texas, Gallaudet College, the Catholic University of America, the University of Delaware and the University of Maryland. While at Maryland, she served as Chair of the Department of English and Provost of Arts and Humanities. She became President of Queens College in 1985 and President of Stony Brook in 1994. She is the first woman to be named to the Stony Brook presidency.

During her nine years at Queens College, Dr. Kenny initiated many new programs, including the Business and Liberal Arts Program, the Journalism Program, the Asian American Center, the Louis Armstrong House and Archives Project, the Michael Harrington Center, and the Center for the New American Workforce. At Stony Brook she developed Brookhaven Science Associates to manage Brookhaven National Laboratory. She has overseen a major campus building program, significant growth in research funding and development, and entrance into Division I athletics.

One of Dr. Kenny's major concerns is the improvement of undergraduate education. In order to achieve this goal she established the Boyer Commission on Educating Undergraduates in the Research University to create a new model of undergraduate education for major research universities. Funded by the Carnegie Foundation for the Advancement of Teaching, the Commission in 1998 published *Reinventing Undergraduate Education: A Blueprint for American Research Universities*.

She serves as a member of the Boards of Directors of the JP Morgan Chase Metropolitan Advisory Board, Goodwill Industries of Greater New York, the Long Island Association, and the Institute for Student Achievement. She is also the chair of the Board of Directors of the Brookhaven Science Associates, which oversees the Brookhaven National Laboratory. In addition, she has previously served as vice chair of the Maryland Humanities Council, chair of the Folger Shakespeare Library Institute Central Executive Committee, steering committee member of the executive board of the American Society for Eighteenth Century Studies, board member of the American Handel Society, chair of the Association of American Colleges and Universities (AAC&U), and board member of the Carnegie Foundation for the Advancement of Teaching.

She has published five books and numerous articles on Restoration and eighteenth-century British drama. Her two-volume scholarly edition of *The Works of George Farquhar* was published by Oxford University Press.

Dr. Kenny received a bachelor of journalism and a B.A. in English from the University of Texas; M.A. from the University of Minnesota; Ph.D. from the University of Chicago; and honorary doctorates from the University of Rochester, Chonnam National University and Dongguk University in Korea. She has been honored as Outstanding Woman at the University of Maryland, Outstanding Alumnus at the University of Chicago, Outstanding Alumnus of the College of Communications at the University of Texas, and Distinguished Alumnus at the University of Texas. She is married to Robert W. Kenny, and they have five children and three grandchildren.

April 2003

April 30, 2003

Dear Participants and Visitors:

I am pleased to welcome you to UMBC's seventh annual Undergraduate Research & Creative Achievement Day. This year we showcase perhaps the most ambitious of our celebrations - our creative arts students' visions have outgrown the confines of the seventh floor of the Library, and so we hope that you will note the multiple venues of the event and visit as many presentations and exhibits as you can.

A distinct honor of the 2003 celebration is the visit of Dr. Shirley Strum Kenny, President of SUNY Stony Brook, and one of the most respected national leaders in advancing undergraduate research. Among many accomplishments, Dr. Kenny chaired the 1998 Boyer Commission's examination of undergraduate education in research universities. As an outgrowth of the report of that Commission, Dr. Kenny established the Reinvention Center at SUNY Stony Brook. The Reinvention Center's conferences, studies, roundtables, symposia, and website are providing a vital and active network among higher education leaders in undergraduate research. We welcome Dr. Kenny to UMBC and look forward to her remarks.

A special note to our participants, especially to those who will be graduating next month. Stay in touch! Let us know of the continuation of your research as graduate students and as professionals. We are proud and confident that the research and creative achievement that you recount, exhibit, and perform for us today will give you the foundation to be highly successful in future endeavors. Alumni who participated in this program in years past tell us that the experience has had lasting and meaningful value.

Thank you for being here today. We appreciate the support of the faculty who have mentored these students and of the family and friends who have given them support. We are proud of their accomplishments and look forward to this day of celebration.

Sincerely,

Arthur T. Johnson

Provost

## Presenters

Presenters are listed in alphabetical order by type of presentation. Some students are involved in joint projects, as described in the abstract section. The number in the right-hand column refers to the page on which the abstract is found. An asterisk notes that the student is a 2002-2003 Undergraduate Research Award Scholar. Two students are also noted (t) to have participated in the 2003 National Conference for Undergraduate Research.

### Oral Presentations

Allen, Kevin	Mathematics & Statistics
*Bronson, Samuel	History
* DeGuzman, Kristine	Social Work
Duffy, Jerrel, Jr.	Political Science
Higman, Kevin	Political Science
*Kridler, Nicholas	Mathematics & Statistics
*Kyrova, Lucie	History
Mathew, Lisa	American Studies & Information Systems
Miller, Erin	Political Science
Northrop, Caroline	American Studies
Parker, Chaye	Modern Languages & Linguistics
*Pohl, Aimee	History
Rund, Michael	American Studies
* Sallerson, Amber	Mathematics & Statistics
t*Schweitzer, Ilse	English
* Simmons, Audrey	Interdisciplinary Studies
t * Smyth, Maura	English
*Tofighi, Babak	Interdisciplinary Studies

### Poster Presentations

Adedji, Abimbola	Computer Science
Appelt, Chris	Mechanical Engineering
*Desi, Jonathan	Mathematics & Statistics
Eaton, Eric	Computer Science
*Farina, Nicole	Mechanical Engineering

*Fitzpatrick, Mary Megan	Biological Sciences
Fleischer, Corey	Mechanical Engineering
Hall, Ian	Biological Sciences
Hsu, Thomas	Biochemical Engineering
*Kaupp, Lauren	Chemistry
Kinde, Isaac	Biochemistry
*Lattrick, Chrysta	Chemistry & Biochemistry
Loeliger, Erin	Biochemistry
*Macura, Tomasz	Mathematics & Statistics
McAllen, John	Structural Biochemistry
McCormick, Chad	Structural Biochemistry
Marinelli, Alex	Mechanical Engineering
Metzger, Christiana	Health Administration & Policy
Pallone, Karis	Health Administration & Policy
* Petenbrink, Eric	History
* Phelan, Timothy	Biological Science
Reppert, Todd	Mechanical Engineering
Richman, Chad	Mechanical Engineering
Taylor, Yogita	Structural Biochemistry
Trappler, Michelle	Interdisciplinary Studies
Vandenhuerk, Laura	Psychology
Wells, Chris	Biological Sciences
* Williams, Matthew	Biological Sciences

#### **Musical Performances**

Blanchard, Patricia	Music
Cunningham, Megan	Music
Holter, Colin	Music
Horner, Kimberly	Studio Art & Cognitive Science
Kloetzli, Liesel	Mathematics
Marshall, David	Music



Reamy, Amber

Music

Seiple, Stewart

History

#### **Fine Arts Exhibits**

Ameen, Fatim

Visual Arts

\* Crump, Jason

Visual Arts

\* Handler, Zachary

Visual Arts

\* Kelm, Paul

Theatre

\* Kline, Wesley

Visual Arts

\* Perry, Jay

Visual Arts

\* Smith Chris

Visual Arts

Woodard, Jennifer

Visual Arts

## **The 2003 Provost's URCAD Committee**

**Diane Lee, Chair**

Vice Provost for Undergraduate Education  
Associate Professor of Education

**Guenet Abraham**

Assistant Professor, Visual Arts

**R. Scott Cost**

Research Assistant Professor, Computer Science and Electrical Engineering

**Nessly C. Craig**

Associate Professor, Biological Sciences

**Julie Fette**

Assistant Professor, Modern Languages & Linguistics

**Stephen M. Miller**

Assistant Professor, Biological Sciences

**Joseph Morin**

Assistant Professor, Music

**Beth Pennington**

Assistant to the Provost

**Bill Rosenberger**

Associate Professor, Mathematics & Statistics

**Anna Rubin**

Composer and Director, Linehan Artist Scholar Program

**Kathy Sutphin**

Coordinator of Special Projects  
Biological Sciences

**Tim Topoleski**

Professor, Mechanical Engineering

Victor Wexler

Associate Dean of Arts & Sciences  
Associate Professor, History

## Acknowledgements

The organizing committee would like to express its gratitude to the many people who helped make this day possible. First and foremost, we thank the student participants and faculty advisors whose talent and dedication inspire the entire event. Provost Art Johnson, whose support continues to make this event and other initiatives an annual testimony to UMBC's commitment to undergraduate research, deserves our special appreciation. We are grateful for the continuous support of Marilyn Demorest, Vice Provost for Faculty Affairs, Antonio Moreira, Vice Provost for Academic Affairs, and Jill Randles, Assistant Vice Provost for Undergraduate Education. Provost's Office staff members Linda Hatmaker, Sue McMillian, Susan Mocko, Barbara Smith, Jose Barata and Beth Wells have provided essential administrative support to this event, as have student assistants Katya Trubitsyna and Kendra Mitchell.

Each year we are indebted to the faculty advisors, whose support of the participating students is essential and yet often unsung. The tremendous effort made by members of the Undergraduate Research Awards Committee to screen applications and identify many of the talented students featured in each year's event should be acknowledged. We thank the members of last year's URA committee, whose reviews have contributed to selecting today's participants: Thomas Armstrong, Jere Cohen, Robert Deluty, Thomas Field, Vin Grabill, Doug Hamby, Brad Humphreys, Preminda Jacob, Marjoleine Kars, Lisa Kelly, Willie LaCouse-Smith, Claudia Lawrence-Webb, Gavin Watson, Lynn Watson, and Victor Wexler.

We are especially honored that President Shirley Strum Kenny graciously accepted President Hrabowski's invitation to visit our campus on this special day and to share her thoughts with us about undergraduate research. We appreciate the assistance of her staff at Stony Brook University and of UMBC's Karen Wensch and Greg Simmons for helping to plan her visit.

For their assistance in moderating the oral presentations, we thank Professors Anne Sarah Rubin (History), James McKusick (English and Director of the Honors College), Matthias Gobbert (Mathematics & Statistics), Linda Dusman (Music), Thomas Field (Modern Languages and Linguistics and Director of the Center for the Humanities) and Mark Street (Visual Arts).

Our gratitude is always owed to Larry Wilt, Linda Durkos, Tom Beck, and Cynthia Wayne for their annual efforts to facilitate our use of the Albin O. Kuhn Library. Among the many individuals who have assisted in the publicity and planning for this event are Lisa Akchin, Sandra Dzija, Sara Sommerville, Kristin Brings, Sharon Rhodes, Michelle Healy, Charlie Melichar, Eleanor Lewis, Miriam Tillman, Dave Daniel, Daletha McRae, Dianne McElroy, Kim Leisey, Helen Garland, Joe Regier, Kevin Johns, Laura Matteoni, Jarrett Merz, Maureen McCormick, Lee Tydings, Bobbie Shahpazian, Ramona Arthur, Julie Bondzie, Symmes Gardner, and Christian Valiente.

Special recognition and thanks are in order this year for committee member Kathy Sutphin for her talents and many hours in developing the new URCAD website and to Tim Ford for the graphic design now featured on our program, website, and banners.

We are grateful for key additional support provided by Tim Sparklin (seeing that all projects have followed guidelines of the Institutional Review Board [IRS]) and Eric Lampe and staff (providing required transcripts for URA applications). Support for student participation at the 2003 National Conference for

Undergraduate Research was provided by the Honors College, Department of English, and SGA President Phil Shockley.

This event has marked the annual debut of our undergraduate research journal, UMBC Review. We salute student editors Eric Petenbrink and Ilse Schweitzer, designer Naoko Matsuzono, faculty advisor Marjoleine Kars, and faculty consultant Franc Nunoo-Quarcoo for their long hours and hard work on this fourth edition.

We appreciate the support and cooperation of the Graduate School and Graduate Student Association in promoting this event and the achievements of their undergraduate colleagues.

Rita Webster and the staff of Wood Food Service have worked hard to provide an enjoyable reception, and Brian Shipley and the Student Workforce staff provide unseen but essential support to this event. The help of Audio-Visual Services will be especially evident this year, and we thank Steve Anderson and his staff for their invaluable assistance. With multiple venues, guest parking, and new banners, signage was more critical than ever - thanks to Rick Stanford and Mike Ohelers for their great help.

Members of the President's staff, Craig Weidemann, Doug Pear, (once again) Karen Wensch, Kathy Raab, Sue Bosley, Andrea DeSantis, and Susan McGuire, "sooner or later" always provide assistance for this event. They have facilitated the participation of President Freeman Hrabowski, whose spirited leadership continually inspires our celebration of student achievement.

A heartfelt word of appreciation goes to the family and friends who, with loyal pride and ceaseless support, come to hear their special presenter each and every year. Your encouragement is often unacknowledged, though not unnoticed or unappreciated.

Lengthy though our list, we can never include the entire cast of individuals who help with this event. To all who have assisted in any way (even as the day progresses), we are most grateful.

## ORAL PRESENTATIONS

### Mathematics & Statistics

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A Parallel Matrix-Free Implementation of the Conjugate Gradient Method for the Poisson Equation

#### Kevin P. Allen

Advisor: Professor Dr. Matthias K. Gobbert

The conjugate gradient method is applied to a large, sparse, highly structured linear system of equations obtained from a finite difference discretization of the Poisson equation. This prototype problem is used to analyze the performance of the parallel linear solver on a cluster of workstations. The matrix-free implementation of the matrix-vector product is shown to be optimal with respect to both memory usage and performance. The parallel implementation of the method can give excellent performance on a Beowulf cluster, a group of commodity workstations connected by a dedicated communication network. The optimal number of processors depending on the quality of the interconnect hardware. When only an Ethernet interconnect is available, best performance is limited to up to 4 or 5 processors, since the conjugate gradient method necessarily involves several communications per iteration. Using a high performance Myrinet interconnect, excellent speedup is possible for at least up to 32 processors. This justifies the use of the method as the computational kernel for the time-stepping in the numerical solution of a system of reaction-diffusion equations.

### History

The Creoles of Russian-America: A Study of the Identity of the Children of Russian Fathers and Native Aleut Mothers, from Contact to the Sale of Alaska in 1867

#### Samuel E. Bronson

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Advisor: Professor Marjoleine Kars

By the middle of the eighteenth-century, Siberian trappers, *promyshlenniki*, began exploring the Aleutian Islands between Russia and Alaska. The subsequent exploitation and oppression of the Aleut Natives resulted in a population of illegitimate mixed-blood children, or Creoles. To date, few scholars have studied the lives of the Creoles of Russian-America, let alone how they perceived and conceptualized their mixed-race identities. I use an investigation of the policies and practices of the Russian-American colonies, the journals of various explorers, ethnographies, and church records to discuss the identity of the Creoles of Russian-America between the 1780s and 1867. I argue that, while factors such as changes in Russian policies and actions over time, education, distance from the capital, opportunities for advancement, church influence, and the roles of Russian fathers caused a variety of deviations from the norm, the majority of the Creoles saw themselves as having a distinct identity, separate from both the Russians and the full-blood Aleuts with whom they lived.

OASDI: Saving the Plan for the Future

**Kristine S. DeGuzman**

Advisor: Professor Dr. Claudia Lawrence-Webb

Old-Age Survivors Disability Insurance (OASDI) is a non-need based social insurance program for workers who have contributed to the program and for their surviving spouses and/or children. As projected, this major public pension plan in the United States is threatened with the inability to meet its obligations over the next 75 years. Thus, there is the possibility of depletion by the year 2038. A comparative policy analysis was conducted in Bristol, England to compare equivalent United Kingdom policies to OASDI, and obtain ways to save the plan for the future. The policies further examined in England were Attendance Allowance and Disability Living Allowance, both comparable to OASDI. The research completed utilizing a literature review, which included scholarly journals, local and federal documents, pamphlets, and books. In addition, interviews and agency visits with experts knowledgeable in these policies were conducted. Results include common themes and a comparison between United States and United Kingdom disability benefits. The Findings from the study will add to the debate of improving health care services to the elderly.

**Political Science**

"NGO's, MNC's and the State: A New Equilibrium Between International and Domestic Politics"

**Jerrel J. Duffy Jr.**[Back](#)

Advisor: Professor Dr. Cynthia A. Hody

Realist theory examines international politics through holistic state action. As globalization increased, nongovernmental organizations (NGOs) and multinational corporations (MNCs) grew in power, and realist theory became less applicable. In order to appreciate the dynamics of state action one must examine the intricacies of domestic politics. Given the ever increasing influence NGOs and MNCs have on the world stage, these actors have also increased their importance in the domestic sphere of politics. Realist theory postulates that in times of force state action will be consistent and the holistic state view is appropriate. Empirical data discount this argument, as military actions by states have been impeded by the actions of NGOs and MNCs.

MNCs possess influence over NGOs and their home state. Likewise, the reverse is true, and the state has influence over both groups. MNCs and NGOs both have influences over other states and their corresponding actors. The simplistic realist view of a holistic state is now irrelevant in the globalized world stage. In order to fully understand political phenomena one must examine the intricacies of the interactions of all three political actors: NGOs, MNCs, and the state.

## Political Science

Why Not Simply Call Neutrality Fallacy?

**Kevin M. Higman**

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Advisor: Professor Cynthia Hody

Although neutrality is a policy claimed by some states during war, in real world politics, this is not the case. Along with the United States, no European state was able to remain neutral in World War I or World War II. This research shows that neutrality as a policy does not exist in wartime. World War I and World War II were the first total wars the world had ever seen and though some states attempted to remain neutral, they were unable to do so due to the fully encompassing nature of these two great wars. Three countries, the United States of America, Switzerland, and Sweden, are the emphasis of this research study in an attempt to illustrate that regardless of a country's status as it relates to neutrality, such a stance was moot in these wars and states could not in fact remain neutral. The United States, an obvious case of non-neutrality, it seemed fitting to include because even before it entered the wars, the United States was clearly not acting as neutral. Switzerland and Sweden are European states that are typically synonymous with neutrality, but through this research it is argued that neither country remained neutral.

## Mathematics & Statistics

Numerical Simulation of Coupled Fluid Flow and Mechanical Deformation Models

**Nicholas M. Kridler**

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Advisor: Professor Susan Minkoff

In structurally weak geologic formations, production of fluids from oil reservoirs may cause subsidence of the soil. To numerically simulate fluid flow in such regions, we have developed a loosely-coupled one-dimensional computer code that performs both flow calculations and mechanical deformation in staggered-in-time fashion. The elliptic partial differential equation describing deformation and the parabolic pde for flow are solved using the finite element method. Pore pressures from flow act as loads on mechanics, and stress and strain output from mechanics produces dynamically-modified reservoir properties for flow (porosity and permeability). We validate the coupled code against a test problem with known solution – the Terzaghi consolidation problem. In this problem, a thin column of mud is assumed to be impermeable on all sides but the top. A load (book for instance) is placed on top of the column, and fluids drain from the top. The goal of the research is analysis of adaptive time stepping schemes to minimize the number of mechanics steps taken while still producing accurate flow results. The first time-stepping method we implemented involves a comparison of solutions at 1/2 and full time steps. Other time-stepping strategies will be compared and analyzed for this problem.

## History

### Native American Women and Adoption in Seventeenth-Century New France

**Lucie Kyrova**

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Advisor: Professor Marjoleine Kars

In several North American Indian cultures, war captives were either tortured and killed or adopted into the victorious tribe to replace dead tribal members. This practice was common especially among the Iroquois, Huron, and Algonquin tribes in the Great Lakes region of Canada. The entrance of Europeans into North America intensified this practice as mortality increased among the Natives as a result of virgin soil epidemics and warfare. In some cases the assimilation of the male adoptees was so complete that they willingly went to war against the tribes of their origin. Historians have focused their research of native adoption largely on male adoptees and on European captives. In my research, I have come across a number of cases in the mid-seventeenth century, of native women strenuously resisting adoption. In my paper I bring a gendered dimension to the study of intertribal adoption by arguing that the reaction of these women to their captivity and adoption seems to parallel their well-documented adverse reactions to Christianity and to the Jesuits' efforts to convert them.

## American Studies and Information Systems

### South Asian Women in Film: Social Constructions and the New Self

**Lisa S. Mathew**

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Advisor: Professor Michael J. Hummel

A new wave of films has recently been made by South Asian-American directors in an attempt to depict the lives of this ethnic group and show how South Asians in the United States are dealing with a flow between cultures and identities. This 'new self that is created, is hybrid and fluid by nature, and occurs along the borders of these different cultures. By examining how South Asian women are represented in these films through content analysis and cultural analysis, and considering their place within the context of this cultural borderland, we can better understand how this concept of the 'new self emerges. Exploring the representation of South Asian women in film is important because we can understand how many of our social constructions help label rigid gender roles and categorize certain ethnicities.



## Political Science

Military Tribunals: What Happened to Due Process?

**Erin C. Miller**

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Advisor: Professor Dr. Carol Barner-Barry

This research topic addresses the potential use of current day military tribunals in terms of their historical background and development. The research examines the constitutional and international limitations placed upon the President's authority to establish these tribunals. In addition, there will be an in depth examination of President Bush's November 13, 2001 Military Order authorizing the foundation of military tribunals. A detailed comparison between the procedures of civil courts, courts-martial, and military tribunals will follow, addressing the different levels of due process afforded. Additionally, there will be an exploration into the historical uses of military tribunals, their conception, and relevant case law addressing Presidential use. The results of this research indicate the need for expanding public awareness concerning the potential dangers this may mean in terms of the diminishing the jurisdiction of the Supreme Court and the liberties afforded to individuals facing prosecution. Most importantly, this research indicates an increase in differential treatment between native-born United States citizens and resident aliens.

## American Studies

Punk Rock Manifestations in Cyberspace: Production, Consumption, Authenticity

**Caroline T. Northrop**

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Advisor: Professor Patrice McDermott

For two and a half decades the punk rock scene has maintained itself as a subculture of resistance in response to hegemonic middle-class values and expectations. With the growing presence of the new communication technologies (and the increasing pressure on the American population to use them), punk resistance--manifested in alternative styles of appearance, anti-corporate consumption, music production (particularly live music gigs), political activism, and a commitment to the "do-it-yourself" (DIY) ethic--has been divided with respect to punk participation in cyberspace. On the one hand, the largely corporate World Wide Web is rejected as a bourgeois tool representative of the class privilege that many punks seek to cast off. At the same time, the decentralized, democratic and even anarchic qualities of cyberspace foster a punk-friendly atmosphere: e-lists and message boards host active conversations about politics, the punk ethos, and upcoming shows or record releases, while punk websites offer music (including mp3 sharing), alternative literature, clothing, and information about bands and local scenes. By investigating these chat venues and websites, and through interviews with local punks, my research explores the numerous ways punks accommodate and appropriate the WWW, the extent to which the punk movement may change cyberculture (and vice versa), and finally, whether it is truly possible for the punk ethos, so strongly rooted in real-life interactions, to successfully thrive online.

## Modern Languages & Linguistics

Anti-American Sentiment in the French Press at the Turn of the Millennium

**Chaye E. Parker**

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Advisor: Professor Julie Fette

In 2002, there was the War on Terror. But also, there was the War of Words. Wielding pens and word processors rather than guns, French journalists and intellectuals waged a war against American hegemony in the pages of the French dailies. Originally written in the French language, this study of contemporary anti-American sentiment reveals a pattern of French discontent that dates back to the Eighteenth Century. Fifty articles reflecting French perceptions of American foreign policy, America's role as a superpower, American imperialism and the importance of September 11 were analyzed from the three major daily newspapers in France, *Le Monde*, *Liberation* and *Le Figaro*, dating from 1999 to 2002. My analysis of these articles reveals a pattern of overt and covert anti-Americanism the roots of which, I argue, are a French cultural need to counter the United States as a consolation for glory lost, and the perpetuation of the age-old rivalry between France and the US over which country possesses humanistic values more universal than the other. The results from my study could offer new ways for those on this side of the Atlantic to better understand the current Franco-American differences over Iraq.

## History

Denver's Communist Party Women in the Age of McCarthyism: An Oral History"

**Aimee A. Pohl**

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Advisor: Professor Kriste Lindenmeyer

Interviews with three women who were members of the Denver, Colorado branch of the Communist Party, USA during the 1950s reveal the personal side of an unpopular political commitment. Their reflections about what drew them to the Party, the role of women in the Party, and the investigations of the House UnAmerican Activities Committee describe aspects of the political and social culture of the period from a different perspective. Their memories of difficult decisions, secrecy, imprisonment, sexism, and betrayal question recent scholarship on the U. S. Communist Party and its membership. As opposed to several different studies which have alternately portrayed the American Communist Party in the 1950s as, among other things, the vanguard of feminism, a violent threat to the nation, or a collection of Soviet controlled dupes, this Oral History uncovers a group of American women struggling with complex political issues and personal decisions in a time of fear and suspicion. In addition to conclusions about the nature of radical women's political engagement in the mid twentieth century, this research also provides new primary source material for students and scholars of Women's and Cold War history.

## American Studies

Feeding the Hungry: A Critical Look at Food Assistance Programs in Maryland"

**Michael Rund**

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Dr. Kathy Bryan, Lecturer, Department of American Studies

In my project I will be looking at the food assistance programs available in Maryland from a critical perspective. I will be examining the inner workings of these programs from the perspective of a participant as well as from society as a whole. My project draws on the work of Michael Katz, Frances F. Piven, Richard Cloward, Jane Poppendieck and the policy analysts at the February 2003 Food Assistance Research Conference which I attended. This research covers the issues of poverty, welfare and food assistance programs from both a cultural and technical perspective. To conduct my analysis I will create simulations of several "typical" welfare recipients and will follow what their path would have been through the various food assistance programs. Drawing on Katz's research on the cultural constructions of poverty in America I will be examining how these constructions relate to the structure of food assistance programs and the impact of those constructions on the effectiveness of the programs in meeting the needs of the simulated families.

## Mathematics and Statistics

Flow of an incompressible viscous fluid through a porous medium with periodic microstructure

**Amber B. Sallerson**

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Advisor: Professor Rouben Rostamian

The purpose of the work is to calculate the permeability of a porous medium from first principles. To do this, the flow of an incompressible viscous fluid through a porous medium with periodic microstructure is analyzed. The fluid flow is modeled as a stationary problem using the Stoke's Equations. The microstructure is handled via homogenization. The corresponding unit cell problem can be solved numerically using FEMLAB, a commercial software package for solving partial differential equations with the method of finite elements. The numerical computations lead to the characterization of the permeability tensor as a function of the porous medium's void ratio. When the unit cell problem possesses certain symmetries we show that the corresponding permeability tensor is a multiple of identity, therefore the material is isotropic. The numerical calculations confirm the theoretical results. The analysis of permeability of porous media has applications in oil well exploration, gel chromatography, soil mechanics, and biomechanics.

## English

King Arthur the Tyrant and the Scottish Call for Freedom

**Ilse A. Schweitzer**

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Advisor: Professor Gail Orgelfinger

This project explored the Scottish contribution to Arthurian literature through three 15th-century texts: *Golagros and Gawane*, *The Awntyrs off Arthure*, and *Lancelot of the Laik*. Criticisms of Arthur, stated or implied, derive in part from the source material, but also suggest the poets' occupation with freedom and national identity, issues with which the Scots have struggled for hundreds of years. At times, the similarities between historical descriptions of encroaching rulers and fictional descriptions of Arthur suggest that the character of King Arthur the Tyrant is based upon aggressive foreign kings. Moreover, that portrait is influenced by Scottish ambivalence about adopting Arthur as a hero or as a tyrant. Examination of the language of these Arthurian romances, as well as themes and language of contemporaneous non-Arthurian sources, including John Barbour's *The Bruce* and Blind Hary's *The Wallace*, clarifies that historical figures such as Edward I of England and James III of Scotland were not the primary impetus for the composition of these poems. Instead, the consciousness and prevalence of the theme of freedom versus thralldom proves at the heart of these romances.

## Interdisciplinary Studies

The Ellicott City Colored School- Restored: A Memorial to African American Education in Howard County, Maryland

**Audrey L. Simmons**

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Advisor: Professor Ann C. Frankowski, Department of Sociology & Anthropology

The Ellicott City Colored School - Restored was originally built in 1879 in Ellicott City, Maryland. It was one of the first schools funded by Howard County for children of African descent. The focus of my research is on the conditions endured by Blacks as they struggled to achieve educational equality. For this project, I explored the history of the school and interviewed those involved in the restoration project, investigating the commonalities that motivated them in their efforts to pursue this challenge. I have also produced a scale model of the restoration. In addition, I have interviewed former students and residents of Howard County, conducted oral histories, and assembled artifacts, such as old school books, slate boards, and pencil boxes. As background, I researched records and reports maintained by the Howard County Historical Society, the Maryland Historical Society, and the Howard County Branch of the NAACP, as well as numerous texts and dissertations on various aspects of the black experience. My intention is to incorporate the results of my research into exhibits to be displayed at the schoolhouse when it opens as a museum and genealogical center in the summer of 2003.

## English

### Outer Spaces and Extra-linguistic Places: The Poetry of Edwin Morgan

**Maura J. Smyth**

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Advisor: Professor Christoph Irmscher

Little known outside the borders of Scotland, the poetry of Edwin Morgan (1920- ) defies literary conventions of genre, subject matter, and poetic language. His work, spanning over five decades, challenges the linear models literary critics usually apply to a poet's career as progressing from the early works to the maturity of later years. Using the breadth of the universe for inspiration, Morgan's poetry is constantly spinning in new directions; he is the master of numerous styles of poetry and even the inventor of a few. Over the years, he has looked to American, Brazilian, and Russian poets for inspiration, has collaborated with a British pop band, has expressed an interest in modern science, and has embraced voyages to outer space as well as his hometown of Glasgow. Morgan uses the page as the verbal playground on which he tests the presumed intrinsic meaning of the words we trust to explain the world around us and the language we rely on to communicate with each other. Morgan undermines simple grammatical structure, initial impressions, and assumed definitions to reveal life and the human individual in their unmediated, intangible fullness.

## Interdisciplinary Studies

### Diabetes Prevention in Baltimore's Underserved Spanish-Speaking Immigrant Population

**Babak Tofighi**

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Advisor: Professor Kevin Eckert, Department of Sociology and Anthropology

Community-based health interventions have often focused on addressing specific acute health outcomes rather than encompassing the much broader socio-economic, political, and environmental inequities especially evident in neglected and underserved communities. As a result, a health intervention is being designed that integrates the active involvement of community members, academics, and neighborhood-based professionals in all relevant aspects of the health intervention design and implementation. Such an integrative framework gives each of the collaborating partners an opportunity to present their needs and expertise in order to create the most effective intervention model. Using a 12-session class that will empower participants from Baltimore's underserved Spanish-Speaking immigrant population in managing and preventing diabetes, the intervention will serve as a pilot program to assess the needs and conditions of the community in order to sustain the continuing availability of more effective prevention programs. Thus, this paper will discuss some of the key concepts and pilot-programs used to develop the intervention, the manner in which the interdisciplinary collaborative process was created and has functioned up till now, challenges encountered during this process and solutions developed in response, as well as prospects for the future course of the program in improving the health of this population.

## POSTER PRESENTATIONS

### Information Systems

Instant Messaging: Error Tolerance and Perception

**Abimbola A. Adedeji**

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Advisor: Professor Jeffrey D. Campbell

This study examined the perception of errors during Instant Messaging (1M) between pairs of people engaged in a problem-solving task. Thirty-two participants completed a survey including questions about spelling, grammar and vocabulary errors before they proofread a transcript of the messages. These measures of the participant's perception of errors were compared to an expert's analysis of the transcripts. A statistically significant result is that a person is much more likely to perceive errors that they themselves made than errors made by another person. This has important implications for the design of the user interface for 1M. In the future, 1M could include input via speech or hand writing recognition that have much higher error rates than typing. With such alternative inputs, it will be necessary to include features that correct, or at least identify, errors before they are sent so that the user would not be overly self-conscious about their error rate.

### Mathematics and Statistics

A Numerical Study of Nucleation in Stochastic Cahn-Morral Systems

**Jonathan P. Desi**

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Advisor: Professor Thomas Wanner

In metal alloys, there is a phenomena that occurs in which impurities in multi-component alloys nucleate over time. In order to better understand this phenomena, we study the mathematical system called Cahn-Morral. The Cahn-Morral system is a model for several phase separation phenomena in mUlti-component alloys. In this paper we study the nucleation of impurities in a stochastic version of these models using numerical simulations. By running many specific simulations of the model, we can obtain much information about the nucleation in multi-component alloys. More specifically, we examine the time it takes for the first impurities to nucleate, the position of this first nuclei, and their concentrations. Through further analysis and more simulations, we can see how changes in composition or certain variables affect the results. Using some statistical analysis of the obtained information, we see how these results relate to the deterministic version of the model. Through this study, we will get a better understanding of this phenomena and its behavior.

## Computer Science and Electrical Engineering

### A Multi-Tier Architecture for Video Communication Systems

**Eric R. Eaton**

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Advisor: Professor Padma Mundur

Current architectures for video communication, peer-to-peer and client-server models, have qualities undesirable for supporting video communication systems. Peer-to-peer architectures do not preserve client privacy and client-server architectures place heavy "per conference" loads on the servers along with having long end-to-end delays between communicating clients. We propose a multi-tier architecture for video communications that preserves client privacy, reduces server load, and reduces the end-to-end communication delay. Between the clients and the server for a domain, the multi-tier architecture adds a hierarchy of middle-tiers that can manage a communication once assigned to do so by the server. This distributes the communications load among the servers and middle-tiers while still preserving client privacy and allowing policy enforcement by the servers. We demonstrate the improvements of the multi-tier architecture over the client-server model by comparing these architectures in a video communications system simulated using the ns-2 network simulator.

## Mechanical Engineering

### Dynamic Cell Seeding of Collagen Scaffolds

**Nicole A. Farina**

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Advisor: Professor Charles D. Eggleton

Tissue engineering involves the seeding of porous, biodegradable scaffolds with donor cells. A problem that arises in this process is the difficulty of controlling the distribution of cells being implanted in the scaffolds. The objective of this study is to develop a technique for dynamic seeding of bone cells. The effectiveness of the proposed technique for cell delivery was evaluated through several tests. First, polystyrene beads similar to bone cells were seeded into a typical artificial collagen scaffold used in tissue engineering. The scaffold was fixed in alcohol and then paraffinized. The bead implanted scaffolds were next sectioned for microscopic analysis. This procedure was repeated again with human osteoblast-like cells, MG-63s. Both sets of slides were analyzed and the number of cells or beads was counted on each section giving the spatial distribution of beads or cells within the scaffold. Cell survivability was determined through a DNA analysis of embedded scaffolds. Several scaffolds were seeded and then either frozen or incubated. After a period of approximately three weeks, the TRIzol reagent method (Life technologies, Rockville, MD) was used to extract cellular DNA that was analyzed using a spectrophotometer. The analysis proved that the cells survived the proposed seeding process.

## Biological Sciences

### Detection of Chemical Agents in Soil Using Protein Profiling

**Mary M. Fitzpatrick, Tammy R. Henry**

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Advisor: Professor Brian P. Bradley  
(U.S. Army, Edgewood Chemical and Biological Center, MD)

Proteomics, or the study of global protein expression, allows the protein profiles of organisms exposed to hazardous chemicals to be compared to profiles of control organisms. Proteomics also seems to be a useful method in the detection of chemical agents in soil. Proteins were examined in earthworms exposed to nerve agents, Vx and Be, for twenty-four hours or thirteen days in Sassafras sandy loam soil type. The proteins were then separated and visualized using two-dimensional gel electrophoresis. Image analysis software, PDQuest (Bio-Rad), was used to produce a composite image from the gels for each treatment. When the images were compared, noteworthy differences were found in the protein expression signatures (PES) between chemicals and the control by subtracting the control profile from the treatment profile. The signature of each chemical changed over time as well. The signatures obtained can lead to the identification of key proteins that are specific to chemical stressors or exposure lengths. In turn, these proteins could be used in the development of biosensors.

## Biological Sciences

### Sensory Deficits in Laboratory Animals

**Ian Hall and Chris Wells**

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Advisor: Professor Frank Hanson

In order to decrease the use of harmful pesticides in the agricultural war against herbivorous insects, scientists are attempting to discover alternate means of crop protection. To develop new strategies, a greater understanding of the insect-plant interaction is required. Our laboratory contributes to this effort by studying the physiology of a "model insect" -- the tobacco hornworm caterpillar-- focusing primarily on the insect's taste system. Over the past two years, a large number of taste organ defects have been noted in our experimental culture. A portion of our research is focused on the possibility that new security precautions in the postal system, such as irradiation of egg shipments, are the sources of these defects. Experiments have shown, however, that the defects are more likely developmental than genetic mutations, and electron microscopy has been used to view normal and abnormal taste organs at high resolution. Our concern is that these defects modify the animal's taste system and, therefore, feeding behavior as well. The tobacco hornworm's mouthparts are bilaterally symmetric. There are two of each functional type of taste receptor organ, one on each side of the head. The three functional types studied are the maxillary styloconicum, the maxillary palp, and the epipharynx. We hypothesized that the duplicate receptor organs are redundant, each receptor transmits the same information to the central nervous system. Thus, an animal missing one particular taste receptor will behave in the same manner as an animal with a complete set because the defective animal still has the complementary organ. Results to date show that this hypothesis is true for some types of taste receptors, but not all. Further studies using different feeding stimuli (both deterrents and stimulants), as well as animals with more than one sensory defect will be required to fully understand this phenomenon.



## Chemical and Biochemical Engineering

Biosensors for Glucose from Genetically Engineered *E. coli* Binding Proteins

**Thomas C. Hsu**

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Advisor: Professor Leah Tolosa

Blood glucose monitoring is an important aspect of diabetes care. Reliable testing and frequent monitoring of blood glucose in combination with a healthy lifestyle can prevent long-term adverse health consequences. We are proposing the development of a novel glucose biosensor for the optical measurement of glucose in complex samples such as blood or cell culture media. The biosensor is based on the *Escherichia coli* glucose binding protein. Protein engineering techniques such as site-directed mutagenesis will be used to introduce the mutation. In addition, molecular biological techniques will be used to multiply the mutated protein in the transformed host cell. By incorporating a single cysteine mutation on the protein chain, a fluorescent tag could be imbedded. Previously established chemical reactions will be used to covalently bind the fluorescent dye to the cysteine mutation. The dye on the protein will serve as a reporter of glucose concentration of the sample. The fluorescence of these conjugates was shown to be dependent upon glucose concentration, and had been proven useful as a glucose sensor.

## Chemistry and Biochemistry

In Vitro Reactivity of Copper (II) with A $\beta$ <sub>1-40</sub>

**Lauren Johanna Kaupp**, Veronika A. Szalai

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Advisor: Professor Veronika A. Szalai

Amyloid proteins condense to form the fibrils and plaques associated with Alzheimer's disease. While research is revealing the overall structure of the amyloid fibrils, little is known about how transition metals affect fibrillar structure. Transition metals may play several roles in the formation and toxicity of amyloid fibrils, including effects on the formation rate, structure, and generation of reactive species. Reactive species synthesized from the reaction of transition metals with amyloid proteins may damage neural tissue. If we can understand the aggregation process, we may be able to develop therapeutic agents to prevent it, thus inhibiting neurological damage. We have confirmed that the A $\beta$  peptide, the major constituent of amyloid fibrils, aggregates in the presence of Cu(II) and that copper ions may be incorporated into the fibril architecture. Spectroscopic analysis of fibrils generated in the presence of Cu(n) indicate that only a small fraction of copper is present as Cu(II), implying a change in the oxidation state or environment of copper. A significant fraction of the Cu(n) added initially remains in the fibrillar supernatant, but it does not account for the full quantity of added Cu(II). Currently, we are investigating the binding of Cu(n) to the A $\beta$  peptide using tyrosine fluorescence.

## Chemistry and Biochemistry

### Creating a Gene 32' T4 Bacteriophage

**Chrysa M. Latrick** and Richard L. Karpel  
Advisor: Professor Richard L. Karpel

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Gene 32 protein (gp32) is a single stranded DNA binding protein (SSB) produced by T4 phage. During replication, gp32 binds cooperatively to the single stranded DNA of the replication fork, protecting it from damage, and keeping the replication fork open. When gp32 binds, it is known to do so in a cooperative manner that requires a sequence of amino acids, Lys-Arg-Lys-Ser-Thr (the LAST motif) located in the N-terminal domain of the protein. One of our objectives is to determine the site of interaction for this N-domain sequence. To this end, we are creating a system to easily test in vivo the effects of novel mutations to gp32. This phage will no longer possess the gene for gp32, but rather will be supplied in trans via a complementation plasmid. To create the gene 32' phage, an insertion/segregation plasmid will also be constructed that will recombine with the phage, inserting a void sequence. Efforts are being taken to construct these plasmids.

## Chemistry and Biochemistry

### Antiviral Inhibition of the HIV-1 Capsid Protein

**Erin M Loeliger** and **Isaac A. Kinde**  
Advisor: Professor Michael F. Summers

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Human immunodeficiency virus (HIV) is a major global threat and inhibition of this virus could save tens of millions of lives. It has been shown in previous experiments that, as the newly-formed virion matures, the capsid proteins condense into a conical core that encapsulates the virion's RNA. This process is essential for survival in all retroviruses, and therefore serves as a potential target for inhibiting the virion. Two compounds have been identified that bind to the N-terminal domain of the HIV-1 capsid protein. The first compound, N-(3-chloro-4-methylphenyl)-N'-[2-[(5-(dimethylamino)-methyl)-2-furyl]-methyl]sulfanylmethyl urea (CAP-1), is non-toxic, and is shown to inhibit capsid assembly in vitro and virus infectivity in vivo. CAP-1 does not have an effect on viral entry, reverse transcription, integration, proteolytic processing or virus production; these findings suggest that CAP-1 is operating under a novel mechanism. The second compound, 1-(4-(N-methylacetamido)-phenyl)-3-(4-methyl-3-nitrophenyl)urea (CAP-2), has a higher affinity for binding to the capsid protein, showing more prominent inhibition of the capsid protein in vitro. This compound, however, is toxic to cells and in vivo data could not be collected. CAP-1 and CAP-2 both have potential to be effective drugs, and this data lays the foundation for the development of a new class of "assembly inhibitors" for the treatment of AIDS.

## Mathematics and Statistics

System for Checking the Logical Consistency of Free-Text High Resolution Computed Tomography Reports

**Tomasz J. Macura**

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Advisor: Professor Jacob Kogan

Radiologists use different imaging modalities to gain insight to the patients' internal organs. To share this knowledge with patients and other physicians, radiologists dictate the medical implications of what they see in the images into an audio-recording device. Medical transcriptionists listen to the audio recording and make a verbatim written account of the radiologist's spoken words. Sometimes, the doctor's spoken words are unclear. In those situations, the medical transcriptionists may misunderstand what the doctor said and incorrectly transcribe the doctor's words. In the best cases, the incorrect words make medically absurd sentences. In the worst cases, the doctors' intentions are changed in gross ways. We are developing a computer system that will be able to detect and alert users to logical inconsistencies in free-text High Resolution Computed Tomography reports. Our system uses natural language processing to parse the documents to understand the premises (findings) the doctor is using to suggest the conclusion (diagnosis). The doctor's findings and diagnosis are matched with a Knowledge Base—a distillation of current medical textbooks in the field) by the Logical Engine. The Logical Engine reports how well the doctor's recommendations correspond with what the medical textbooks suggests.

## Chemistry and Biochemistry

Identification of a High Affinity Nucleocapsid Protein Binding Element within the Rous Sarcoma Virus Psi RNA Packaging Signal: Implications for Genome Recognition"

**Chad D. McCormick, John K. McAllen, Yogita I. Tailor** and Jing Zhou

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Advisor: Professor Michael F. Summers

Rous Sarcoma Virus (RSV) is a highly pathogenic retrovirus inducing connective tissue tumors in chickens. The RNA genome of RSV, not the host cell's RNA, is specifically packaged prior to budding of the retrovirus. Both the cis- and trans-acting elements mediating RSV genome packaging have been defined. The cis-element, the nucleocapsid (Ncp 12) domain of the Gag polyprotein, has two CCHC type zinc finger motifs. NC protein has been cloned, over-expressed, and purified using the GST fusion system. The trans-acting element, called  $\mu$ -Psi, includes 03 stem and three stem loops - SL-A, SL-B, and SL-C. Different RNA fragments - SL-A, SL-B, SL-C, SL-BC, SL-ABC, and  $\mu$ -Psi and its mutants have been prepared. Non-denaturing gel shift assays demonstrated that only the native and mutant constructs of  $\mu$ -Psi can bind NC tightly, while individual stem loops or multi-stem loops have relatively poor affinity to NC. The present results indicate that the loops are not important in NC interaction, as opposed to HIV-1 system; the 03 stem and the linker regions between 03 stem and SL-A, SL-C are critical in NC binding directly or by playing a structural role. The binding affinity between  $\mu$ -Psi constructs with NC is being studied using isothermal titration calorimetry.

## Health Administration and Policy Program

An Ethnographic Study on AHEAD's Growth Monitoring Program in the Meatu District of Tanzania

**Christiana B. Metzger**

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Advisor: Professor Joyce L. Riley

Research in Tanzania was supported by the McNair Summer Research Institute

The purpose of this project is to present an ethnographic study of the "community weighing activity" for children under-five used by Adventures in Health, Education, and Agricultural Development (AHEAD) as a growth assessment measure and component of their nutrition program. The nutrition program was established in 1981, to help reduce the high rates of child mortality in the Meatu District of Tanzania. While working as a participant observer, a detailed description of the weighing process was recorded. Additionally, data was collected through conducting an informal survey of program participants, interviewing expert informants, and collection of archival materials used by AHEAD to assess and educate program participants. This project also includes information on the magnitude of child mortality in Tanzania and the role proper nutrition programs play in reducing these rates.

## Sociology and Anthropology

Teen Birth Rates in the Hispanic Population: Understanding the Influence of Culture, Geography, and Measurement

**Karis A. Pallone**

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Advisor: Professor Jessica Kelley-Moore

The Hispanic teen birth rate is rising in the United States, while the teen birth rate for Black non-Hispanic and White non-Hispanic teens have been declining in recent years. However, it was only recently that Maryland began documenting its Latino population in its Census. Thus, it has been impossible to calculate the number of births to women of Hispanic origin until now. By using data from the Maryland Vital Statistics Administration, Hispanic teen birth rates were computed and analyzed in 2000. Overall, the Hispanic teen birth rate for Maryland was 63.9 births per 1,000 Hispanic 15 to 19 year old women, relative to the state-wide teen birth rate of 41.2 per 1,000. The Hispanic teen birth rate varied by region; Hispanic teen birth rates were lowest rural counties such as Allegany and in counties with a predominately white population such as Cecile. These Hispanic teen birth rates are strongly influenced by norms for early marriage, as well as poverty and access to resources. Additionally, since Hispanic persons can be of any race, these rates can look inflated relative to other racial and ethnic groups.

## History

Who But Hoover: The 1928 Presidential Election in Maryland

**Eric W. Petenbrink**

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Advisor: Professor John W. Jeffries

The presidential election of 1928 provides an interesting and important case study of the social and political climate of America in the 1920s, despite the overwhelming victory by Republican candidate Herbert Hoover. Hoover's Democratic challenger, Alfred Smith, represented the newer ethnic and urban America and its experiences, outlook and opposition to Prohibition. Furthermore, Smith was the first Catholic nominee for the presidency. This combination of factors made the campaign far more heated and interesting than the final outcome may initially suggest.

By investigating the 1928 election in Maryland, a border state with its own urban/rural dichotomy, one can gain a better grasp of issues of national importance on a smaller scale. Additionally, the use of primary documents, such as newspapers from around the state and local voting records, gives an indication of contemporary thought on the election and the nature of debate and conflict over the campaign's controversial issues. Finally, the 1928 election helps to shed light on the political climate of state politics in Maryland during this period. Thus, Hoover versus Smith presents the unique chance to examine the interaction of political and social history through statistical analysis of election returns and more traditional sources and historical narrative.

## Biological Sciences

Unusual Lymphocyte Population Found in NeuT and Stat6<sup>-/-</sup> NeuT Mice

**Timothy P. Phelan**, Samudra K. Dissanayake, Suzanne Ostrand-Rosenberg

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Advisor: Professor Suzanne Ostrand-Rosenberg

Previous studies showed that mice with a deleted Signal Transducer and Activator of Transcription-6 gene (Stat6<sup>-/-</sup> mice) have heightened immunity to a malignant and spontaneously metastatic BALB/c-derived 4T1 mammary carcinoma. We hypothesized that deletion of the Stat6 gene might also confer resistance to spontaneous mammary tumors arising from the activated rat HER-2/neu oncogene (neuT mice) and therefore intercrossed Stat6<sup>-/-</sup> with NeuT mice to obtain Stat6<sup>-/-</sup> NeuT mice. The resulting progeny were screened for her2/neu and Stat6<sup>-/-</sup> by PCR. Tumor onset in Stat6<sup>-/-</sup> NeuT mice is delayed relative to NeuT mice. The current study was undertaken to elucidate the mechanism for tumor resistance. Immune status was monitored following challenge with 4T1 mammary carcinoma. Splenocytes and lymph node lymphocytes were analyzed by flow cytometry for CD4 (helper T-cells), CD8 (cytotoxic T-cells), and B220 (B-cells). Lymphocytes were stimulated in vitro and ELISA assays were used to measure cytokine production (interleukin-2, a T-cell growth factor; interleukin-4, a TH-2 marker; and interferon- $\gamma$ , a TH-1 marker). Although no consistent differences were noted, unusually large cells were found in the spleens of NeuT and Stat6<sup>-/-</sup> NeuT mice. Additional experiments are required to characterize this unknown population.

## Mechanical Engineering

Society of Automotive Engineers: 2003 SAE Midwest Mini Baja® All-Terrain Vehicle

**Todd Reppert**, Chad Richman, Corey Fleischer, Chris Appelt, Alex Marinelli  
Advisor: Professor William Wood \*

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Society of Automotive Engineers (SAE) at UMBC challenges engineering students to apply classroom theory to design, manufacturing, and competition situations. Mini Baja® consists of regional competitions that simulate real-world engineering design projects with related challenges. Students are tasked to design and build an off-road vehicle that will be subjected to rigorous judging by industry professionals and to the severe punishment of off-road racing.

Quality Functional Deployment (QFD) was used to define the initial specifications for the car: a 'house' of quality was developed to translate customer needs into weighted engineering characteristics. Based on these methods, the team focused on reducing the weight of the vehicle (target: 350 lb) and its wheel base (target: 60"). Initial vehicle concepts were developed during brainstorming and concept development sessions. Feasible concepts were selected with the assistance of Pugh concept selection. Functional decomposition identified key subsystem interactions and defined load paths in the car. Decomposition suggested the partitioning of design activity into two main systems: rear suspension/drive train and front suspension/frame. Individual subsystem designs were integrated into a single system to form the final product. Prototype frames were produced to aid in the design process before final manufacture by GT A W (Gas Tungsten Arc Welding) and GMA W (Gas Metal Arc Welding) welding. Attachment points and shafts were machined using vertical mill and lathe machining techniques. The result is a vehicle weight of 340 lb with the wheelbase at 63 in. The vehicle is currently in the performance and testing stage of development in preparation for static judging and dynamic competitions in an international event held June 5-9. Multiple vehicle set-ups will be tested in order to determine the optimal configuration for competition events.

## Interdisciplinary Studies

Intake Regulation via Flavor-Density Pairing

**Michelle C. Trappler**

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Advisor: Professor Zoe S. Warwick, Department of Psychology

Learned associations between a foods' flavor and its caloric density can influence the amount eaten at a meal. Little evidence exists as to whether flavor-density pairings affect long term intake regulation. In the present study, the effect of eliminating flavor-density pairings was evaluated in rats consuming foods ranging from 2.3 to 0.575 kcal/ml. Two groups of rats were tested: one with consistent flavor-density pairings (CONSIST, n=5) and the other with no systematic pairings of food flavor and density (INCONSIST, n=4). At the end of 20 days, group CONSIST was heavier than INCONSIST. CONSIST, but not INCONSIST, showed signs of learning the flavor-density associations, as CONSIST infused more diet on LOW days compared to HIGH days. To maximize the probability of detecting an effect, the protocol has been modified for a second cohort of 11 rats. Since the current trend in human food supply is to reduce caloric density while maintaining flavor; the present study investigates the potential impact of this trend on intake regulation.

## Psychology

Parental Behaviors and Expectations of the child living with epilepsy

**Laura J. Vandenhuerk**, Professor Lisa C. Jordan

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Advisor: Professor Karen Freiberg

The purpose of this study was to assess the basic communication skills of parents who have children living with epilepsy. The research focused on parental expectations (belief/attitudes) about epilepsy, parents' reaction to the diagnosis of epilepsy in their children and the parents' willingness to openly communicate with their children about the disorder. The sample consisted of thirty parents that had children diagnosed with epilepsy. The results of this study suggested that children with epilepsy are going to each parent with different types of questions, i.e. going to their mothers with more social issue questions and their fathers with more expert type questions. The results of the study also show that all four subscales on the fixed-belief scale was positively and significantly correlated, indicating that parents with negative beliefs about epilepsy were more likely to restrict their family activities, believe that epilepsy stigmatized their children and reduced their children's activities. The most commonly reported concerns by the parents in the study, were that parents are still struggling with personal expectations and behaviors towards their children living with epilepsy. Finally, the findings of this study supports that parents are still in need of practical information on what epilepsy is and how to deal with it on a daily basis so that their children living with epilepsy could have a healthy normal life.

## Biological Sciences

Do Rhodopsins and Color Opsins Share a Similar Electrostatic Interaction?

**Matthew C. Williams**

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Advisor: Professor Phyllis R. Robinson

In the dark, the visual pigment rhodopsin is maintained in an inactive state either by the presence of the chromophore 11-cis retinal, or by an electrostatic interaction between the lysine at position 296 in the seventh transmembrane helix and the glutamic acid at position 113 in the third transmembrane helix when the chromophore is absent. This comparative study investigates whether the UV opsin from budgerigar (*Melopsittacus undulates*) uses a mechanism of inactivation analogous to the Lys-296 - Glu113 interaction in rhodopsin. The wild-type UV opsin gene was mutated using site-directed mutagenesis (Quickchange Tm) at the site of the analogous positively charged lysine so that the mutant codes for a neutral glycine. Wildtype and mutated UV opsins were expressed in a heterologous expression system and then analyzed for their ability to activate the G-protein transducin without the chromophore. The mutated UV opsin activated five times more transducin per second on average than did the wild-type UV opsin. This experiment suggests that the mutagenesis has disrupted an inactivating electrostatic interaction on the UV opsin analogous to the one found in rhodopsin.

## MUSICAL PERFORMANCES

### UMBC Department of Music Collegium musicum: Baroque Ensemble No.1

**Megan Cunningham**, soprano  
**Amber Reamy**, oboe  
**Kimberly Horner**, harpsichord  
Advisor: Professor Joseph C. Morin

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#### ABSTRACT

Meine Seele hört im Sehen  
*George Frederick Handel (1685-1769)*

Das zitternde Glänzen  
*George Frederick Handel*

The music of George Frederick Handel, along with that of his contemporary, Johann Sebastian Bach, represents the pinnacle of musical achievement during the Baroque era. Many of Handel's works, such as his oratorio *The Messiah* (1741), one of the best known pieces of Baroque music, are constant reminders of his compositional talent and mastery. Less known are his two German hymns for soprano, oboe and continuo, which we perform this morning. They belong to a collection of nine arias composed between 1724-27, that were composed to texts written by the poet Barthold Heinrich Brockes and published in his *Irdisches Vergnügen in Gatt* in 1721. These pieces hail from a time when Handel's career as a composer of Italian opera in London had reached its zenith, and the finely etched vocal and oboe melodies reveal the attractive style which was then at Handel's full command. These arias, which are in da capo form (ABA), display the careful coordination between the mood of the music and that of the text between the contrasting A and B sections of the piece. We know little of Handel's motivation for composing these works; but like the larger church cantatas of Johann Sebastian Bach, Handel's songs were perhaps intended to be sung during Lutheran services, though their texts are more general in a sacred sense than designed to reference specific feasts during the Lutheran liturgical year.

#### Texts

Meine Seele hört im Sehen  
*George Frederick Handel*

My soul hears in seeing how to exalt the creator, everything rejoices, everything laughs. Only listen, the blossoming spring splendor is the language of nature, which speaks with us clearly by its sight everywhere.

Das zitternde Glänzen  
*George Frederick Handel*

The trembling brilliance of the playing waves silvers the bank, bespeckling the beach. The rushing flows, the gushing sources fertilize, enrich, refresh the country and announce the quality of the wonderful creator in a thousand delightful events.

*Translation Joseph C. Morin*



### **Artistic Statement:**

The UMBC Collegium Musicum is an undergraduate vocal and instrumental ensemble that specializes in the intensive study of Baroque music. Within the framework of this small ensemble, students must simultaneously polish their musicianship skills and carry out research into the unique techniques and styles of each piece. The small size of the ensemble provides an intimate environment in which students can learn from each other and sharpen their individual skills, as well as receive direct feedback from expert faculty members. The musical pursuits of this ensemble are more than simply a musical performance; in order to succeed we attempt to the best of our abilities to recreate or 'reenact' the performance of this music as it took place some 300 years ago. In order to succeed students must research many musical aspects that are not indicated in the original musical scores: tempi, aspects of articulation, vocal ornamentation, phrasing, dynamic range, fingerings for the keyboard, characteristics of pronunciation, and resolution of the figured bass are but a few of the essential details that must be considered for a successful performance.

Even simple issues, such as how does the oboist best blend her part with the singer's melody, require careful consideration. All of these elements are fully examined, analyzed and fleshed out in the process of rehearsal. It is a time of experimentation, where students attempt to bring old practices back to life. A satisfying performance is achieved only through the success at negotiating the complex interplay among many elements. At times, the challenge for the ensemble is finding an equilibrium between the research, with the options it presents for performance, and performance of the piece itself. When this is accomplished, it is the most gratifying of artist experiences. Through this process the ensemble is able to bring Baroque chamber music back to life. This experience is quite rare among undergraduate institutions and is one of the most unusual and exciting parts of the UMBC Music Program.

### **UMBC Department of Music Collegium musicum: Baroque Ensemble No.2**

**David Marshall**, tenor  
**Stewart Seiple**, recorder  
**Liesel Kloetzli**, harpsichord  
**Patricia Blanchard**, cello  
Advisor: Professor Joseph C. Morin

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### **ABSTRACT**

Cantata, *Clori mia, clori bella* (for tenor, recorder, and continuo)  
*Alessandro Scarlatti (1660-1725)*

Alessandro Scarlatti is considered one of the most talented and prolific Italian composers of vocal music during the high Baroque, having created over 600 cantatas in addition to 115 operas, 200 Masses, and numerous other vocal compositions. Considered the crowning achievement in the long history of the genre, his cantatas are hallmarked by their economy of size, motivic construction, and by the careful attention given to the coordination of melody with the sentiments of the text. As with most of his cantatas, *Clori mia, clori bella* is a lyrical text of unrequited love that takes the Greek mythological figure Chloris, daughter of Amphion, as the object of the imaginary protagonist's desire. Although the recitatives and arias are generally short, each form brings forth an expressive presentation of the text through subtle use of chromatic inflection and at times striking dramatic declamation of the text.

## Translation

**Recit.**

*Oh Clori, beautiful Clori, ah, no more mille; Clori, whom I loved so and who tells me now how she despises me. Oh, how I loved you so. Gentle waters of the Tebro tell her with your whispers that my tears increase your waves.*

**Aria:**

*You clear waves, who softly pour lovely tears of silver between the shores, I beg you, be not silent, should you be moved to tears. Take my tears between the waves to bear witness to my suffering.*

**Recit.**

*Yes, gentle waves, tell her that on your shores, whence my bitter pain has led me, my heart speaks upon my lips: My lips, oh Clori, conquered by oppressive pail1, conceal their suffering. Yet alas my heart speaks to you, and you feel it not.*

**Aria:**

*Now eloquent, my heart speaks to tell you of its torment, and sighing, you know, it speaks of peace.*

*Translation Joseph C. Morin*

### Artistic Statement:

The UMBC Collegium Musicum, a small musical ensemble at UMBC, provides students with the opportunity to explore Baroque music. The repertoire of cantatas, which forms part of the focus of the collegium, requires considerable study and research in order to bring these works back to life in an appropriate musical manner. One simply does not "play and sing" these pieces of music, but recreates them using methods of vocal production and styles of instrumental technique that replicate practices of performance used in the eighteenth century. Much of the basic information that one finds in modern musical scores is absent by convention from their eighteenth-century counterparts. Thus, the kinds of research that must be carried out to perform this repertoire range across every feature of the music, from dynamics, phrasing, articulation, and tempi that should be applied, to the particular temperament appropriate to the harpsichord. The vocalists as well not only grapple with foreign-language texts, but also with aspects of old pronunciation and expression. By working in this intimate ensemble, students collectively are able to research, rehearse, and achieve artistically satisfying performances of the Baroque period. Given all the demands that must be met, the performers in the ensemble become co-creators rather than simply interpreters. As such Baroque music is created anew with each performance. The music of the high Baroque represents a specialized repertoire with its own sets of performance and interpretational challenges. This performance thus demonstrates those challenges and their mastery by students in the Department of Music at UMBC.

## Music

Variations: Go Rin No Sho, Cello Performance

**Colin K. Holter**

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Advisor: Professor Linda Dusman

Years ago, in my studies of kenjutsu (Japanese fencing), I was instructed to read Go Rin No Sho, a classic sword-fighting text by Miyamoto Musashi whose title translates to A Book of Five Rings. The text, which was written in 1645, explicates a number of sword maneuvers that the reader should practice and ultimately master. However, each maneuver can be interpreted abstractly and put to use in any kind of conflict, not just a duel.

The first time I read Go Rin No Sho, I found it almost impossible to understand. Even after numerous re-readings I didn't feel that I had really absorbed Musashi's teachings. In practice duels, then, I was faced with two opponents-I fought not only my actual human adversary but also my inability to grasp and apply the content of Go Rin No Sho.

This piece of music grew out of that frustration. Each movement is based on a particular maneuver described in the text and reflects the frustration of a young American kenjutsu student trying (and failing) to perform that maneuver.

## THEATRE EXHIBIT

### Theatre

LCD GOBO

**Paul A. Kelm**

Advisor: Professor Milton T. Cobb

One can reduce the number of theatrical lighting fixtures used for texture in a light design through the use of small, high-resolution LCD panels. Using an LCD panel instead of a steel gobo in a lighting fixture will greatly increase its texturing capabilities. The LCD panel is placed inside the lighting fixture with dichroic heat reflecting glass and small fans between it and the lamp. The glass/fan combination is necessary to lower the lighting fixtures temperature from 1500 Celsius to just above room temperature in order to keep the LCD panel from overheating. The images displayed on the LCD panel are controlled by two computers, which communicate using Ethernet. One master computer controlling up to sixteen slaves is placed in reach of an operator. Slave computers are controlled by the master, located at the lighting fixtures, and provide images to the LCD panels. The system is capable of cueing any or all sixteen lighting fixtures at once and gives complete flexibility of the pattern each lighting fixture can project and when it will project it.

## VISUAL ARTS EXHIBITS

### Visual Arts

Haruf

**Fatima I. Ameen**

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Advisor: Professor Guenet Abraham

Haruf is a typeface whose design is based on Hindi letters. The name "Haruf" is Urdu for "Alphabet". The general form of Hindi letters - the cross bar on top, the curves, and the uniformity of weight – have been modified and re-formed to create Roman letters. The uppercase letters do not have a bar on top. Instead, when used in a sentence, the bar comes just short of the uppercase letter, accentuating the curves and general shape. The lowercase letters are half the size of the uppercase. Most of the letterforms are the same, such as the upper and lowercase 'S'. However, the proportions have been adjusted to allow for a distinction between upper and lowercase.

The poster is designed to show the various letterforms as a pattern as opposed to letters. Because the letterforms have elegant curves and proportions, displaying certain letters in this mandala allows the viewer to see, as opposed to read, the letter. Respecting the origins of the letterforms, the mandala, an ancient Buddhist and Hindu creation used to show the various stages of enlightenment, is an ideal form for displaying these letters.

These letterforms were initially drawn and completed by hand using pencil and later fine black markers before being transferred to the computer to be refined. This exercise was to understand the process and decision a typographer makes when creating a typeface. The average reader does not notice how the typeface is used unless it is unreadable and badly designed. Well-designed type requires careful and thorough consideration to all details; balance; sensitivity of spacing and arrangement; characters have to be unified by not only consistent mathematical but visual properties, and the internal spaces within the letterforms as well as the space which surrounds them must be considered. It was important that the development was completed by hand, taking these issues into consideration aside from the style of the letterforms.

### Visual Arts

Typeface design

**Fatima I. Ameen & Jennifer Woodard**

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Advisor: Professor Guenet Abraham

The purpose of these projects was to create well designed typeface for use as display. These letterforms were initially drawn and completed by hand using pencil, and later fine black markers before being transferred to the computer to be refined. This exercise was to understand the process and decision a typographer makes when creating a typeface. The average reader does not notice the typeface used unless it is unreadable and badly designed. Well-designed type requires careful and thorough consideration to all details; balance; sensitivity of spacing and arrangement. Characters have to be unified by not only consistent mathematical but visual properties, and the internal spaces within the letterforms as well as the space which surrounds them must be considered among other properties. It

was important that the development was completed by hand taking these issues into consideration aside from the style of the letterforms. Each of us drew our influence from different cultures as well as periods of time.

## Visual Arts

Habaneros

**Jason R. Crump**

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Advisor: Professor Mark F. Street

"Habaneros" by Jason Crump is a personal documentary film that examines the experience of an American man who travels to Havana, Cuba to discover his family roots. Filmed in Cuba in January of 2003, "Habaneros" combines local music, voices and recorded sounds with archival footage and 1950's home movies of Havana. Following the traditions of 19th century literary travelogues and travel films of the 1950's, the film is a cinematic essay that critiques the modernist ideas of these forms. In the film the protagonist tries to capture a sense of identity and belonging, only to find melancholy and alienation. He is confronted by the differences between his idyllic preconceptions of Cuba and his actual experience. After returning home, he enjoys remembering his experiences much more than he enjoyed the actual trip. Months later he explores his exalted memories by writing an account of his days spent in Havana. "Habaneros" searches for insights into notions of identity, ancestry, and country by exploring the protagonist's memories of the people and places he experienced on his trip.

## Visual Arts

Sticks & Stones: Bullies, Brats and Bashers

**Zachary Handler**

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Advisor: Calla Thompson

You hope that the ridicule and absurd teasing are fiction; that somehow the constant name-calling never happened. This photographic body of work examines an alternate teenage universe where bully characters are frozen mid-gesture, dramatizing exaggerated rituals of adolescent torture. The mundane environments offset the costumes, which were designed to emphasize the absurdity of the bullies' actions. This strategy is furthered through their inflated facial expressions: they are simultaneously callous and clown-like. The cloning of the antagonists is meant to void their individuality, calling into question their sense of uniqueness and superiority. This work will be on view at The Chela Gallery in Baltimore City from May 12 to June 13. Viewers will be asked to wear a label that will temporarily cast them in the role of victim.

## Visual Arts

Nothing Will Have Taken Place But Place

**Wesley Kline**

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Advisor: Professor Mark Alice Durant

Nothing will have taken place but place is a project that centers on intersections of personal and social history in Sparrow's Point, Maryland. Utilizing a metaphoric and metonymic approach, the work has explored the idea of "place," referencing issues of labor (both historical and artistic), sites of historical erasure, and the elegiac and social function of light itself. My research has explored the semiotic function of photography as it relates to issues of class, and investigated the nature of narrative, and consequently, the nature of language and "meaning." The photographs become not only a sequence of images, but a type of visual "sentence," using the seemingly stable nature of language to destabilize the structure of narrative. The quality of language as an inherently mediated and mediating construct is echoed in the mediated and mediating nature of the images themselves. The multi-faceted project consists of sound and photographic installations and video performances.

## Visual Arts

Book of the Dead: Impermanence, Blight, and Renewal in Greater Baltimore

**Jay L. Perry**

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Advisor: Professor Timothy Nohe

Book of the Dead is a digital video installation considering the urban environment of Baltimore as a product of the interrelationships of self and community, loss and renewal, and time and space. The Tibetan Book of the Dead describes the concept of "bardo," a space a soul encounters between successive lives, through which cycles of birth, death, and renewal are perceived as a series of liminal gaps. The bardo may also be manifested in physical spaces; a house comes to reflect the lives of its inhabitants, dying and being reborn alongside generations of people who live there. Using this text as a beginning reference, the work explores the social and economic development of Baltimore housing in terms of the empty or "dead" spaces which permeate the city; an abandoned home becomes a space caught between "lives," or an emptiness between elements in a changing urban environment. Vacant homes have a profound effect on their surrounding neighborhood, as the power structures of urban housing come to be shaped as much by empty spaces- and their potential- as the buildings themselves. As Baltimore faces population loss and blight, a conception of urban space in terms of impermanence becomes crucial to the city's sustainability.

## Visual Arts

Art Noufaux

**Jennifer Woodard**

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Advisor: Professor Guenet Abraham

The design of typeface derives from the Art Nouveau style of the 1920's period, thus the derivation of the name. While respecting the elegant proportion common for the Art Nouveau typefaces, I added features to the type to further emphasize the negative space inside and outside of the letterforms.

## Visual Arts

Yantra

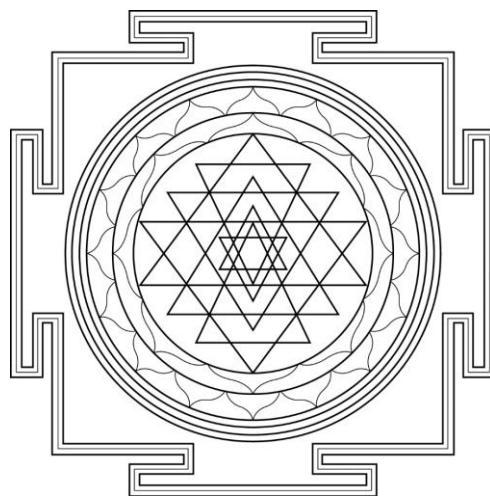
**Chris J. Smith**

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Advisor: Professor Vin Grabill

Yantra is a Sanskrit term describing two-dimensional, geometric drawings designed to represent/evoke particular deities or facilitate meditation in the Tantric tradition. This artwork's purpose is to represent the process of worship of the *Sri Yantra*, a yantra representing the interpenetration and unification of the male/female polarities within the totality of the universe as a whole. The process includes mantra (so und), yantra (the visual representation of that sound), and *murti*, or physical form-a guru, enlightened being, or, ideally, oneself.

The piece takes the viewer through this process, beginning with only sound (mantra) in the form of the *Gurupaduka panchakam* and *Kundalini Stavaha* chants in a dark room. A video depicting the development of a human baby-from single cell to functioning being- will be projected on the Plexiglas-covered walls of a fog-filled 8' x 8' steel cube. As the video continues, the Sri Yantra will begin to appear in the video, and the fog will gradually remove itself from the cube, revealing the Sri Yantra on the floor and ceiling as well as a meditating human figure (*murti*) seated in the center of the cube. As the video ends, the room will darken, and the process will repeat.



Sri Yantra