

2005-2006 Undergraduate Research Award Scholars
Statements of specific Aim(s), Purpose, or Goal(s)

Mark E. Allhouse, Psychology

“Individual Differences in Endogenous Pain Control: The Effects of Adrenocortical Function and Catastrophizing”

Faculty Mentor: Dr. Lynanne McGuire, Psychology Department

Tentative Graduation Date: Spring 2006

Pain, the most common presenting medical complaint and a significant risk factor for morbidity and mortality in many diseases, is a critical national and international health problem. The limited existing laboratory studies of endogenous pain control process have not examined the influence of adrenocortical function of in vivo pain-related catastrophizing. Given that large individual differences in endogenous pain control proves exist, greater endogenous pain control predicts less clinical pain and greater physical health, and the broad relevance of these processes to multiple diseases, a more comprehensive approach is needed to understand individual differences in these responses. The proposed study will use standard laboratory procedures (i.e., Diffuse Noxious Inhibitory Controls or DNIC) to assess endogenous pain control. DNIC effects will be demonstrated by assessing responses to a phrasic painful stimulus, cold water pain on the left hand. The magnitude of reduction of painful responses to the pressure pain stimulus during concurrent administration of cold water pain to a different body site indicated the effectiveness of endogenous pain control. The specific goals in the study include the following:

Aim 1: To determine whether adrenocortical function predicts the magnitude of endogenous pain control.

Aim 2: To examine whether pain related catastrophizing predicts the magnitude of endogenous pain modulation.

Ramya Ambikapathi, Environmental Science

“Decay of Organic Matter in Eastern Deciduous Forests: Impact of Invasive Tree Species.”

Faculty Advisor: Dr. Christopher Swan, Geography and Environmental Systems Department

Tentative Graduation Date: May 2007

Most production by plants in the temperate zone of North America ends up as fallen detritus (e.g., leaf litter on the forest floor). Decay of this leaf litter is an important ecosystem process whereby nutrients are released back into the soil completing critical nutrient cycles. Decay is facilitated both soil invertebrates and microbial communities of bacteria and fungi. However, there is also significant evidence that leaf litter species can impart control on how fast this detritus degrades. Since Tree of Heaven (TOH) leaf litter quickly degrades, the litter layer in stands of these species is absent, leaving bare soil and a significantly reduced invertebrate population size. My research focuses on how leaf litter from native species (Tulip Popular, White Oak), that can potentially blow to stands of TOH from adjacent native forest, degrades under these unnatural conditions.

Joseph Castellano, Biochemistry and Molecular Biology

“Analysis of the Effect on the Mutation of the Chloride Binding Site on Constitutive Activation in Mammalian visual cone Opsins”

Faculty Mentor: Dr. Phyllis Robinson, Department of Biological Sciences

Tentative Graduation Date: Spring 2006

The aim of this project is to analyze the effect of mutating the chloride-binding site in the human visual green cone opsin in order to analyze the effect on constitutive activation of the G protein transducin. The work will aid in characterizing the role of the chloride-binding site in mediating salt-bridge interactions in visual cone opsins, helping the scientific community further understand the nature of molecular interactions in visual pathways. If mutating the chloride-binding site via site directed mutagenesis of H181 to A181 is observed to cause this constitutive transducin activation, this work will further establish that more than one amino acid is involved in regulating the interaction of the salt-bridge with transducin in activation of the phototransduction cascade.

Koriand'r Conyers, Biology

“Analysis of Hsp70A Distribution at a Key Stage in *Volvox* Embryogenesis”

Faculty Mentor: Dr. Stephen Miller, Biological Sciences Department

Tentative Graduation date: Spring 2006

The goal of this work is to generate a transgenic strain of green alga *Volvox carteri* that express a version of Hsp70A protein that can be visualized with living cells, and then use it to determine how the distribution of the protein changes key stages of development. Hsp70A is required in *V. carteri* for special cell divisions called asymmetric divisions that reproduce large and small daughter cells. Asymmetric divisions occur only at the top half of *V. carteri* embryos, beginning at the 32-64 cell stage, and produce large cells there that go on to become reproductive cells called gonidia; only small cells are produced in the bottom half of the embryo, and all of these cells become non-reproductive cells called somatic cells. Hsp70A is equally distributed throughout the embryo through the 16-cell stage of embryogenesis, but sometime between the 16 and the 32 cell stages it becomes much more abundant in the top of the embryo. The two best hypotheses to explain this phenomenon are that 1) Hsp70A protein is preferentially distributed into the anterior of cells during transition from the 16 cells stage to the 32-cell stage, such that the posterior cells receive less of it from the dividing cell, or the 2) tHsp70A protein is equally distributed during that cell division, but is rapidly destroyed in the posterior half of the embryo. The goal of this work is to distinguish between these 2 mechanisms, or possibly to uncover an alternate mechanism.

Jenifer Dobbins, Dance

“Study and Re-Interpretation of Limon Dance Technique”

Faculty Mentor: Professor Doug Hamby, Dance Department

Tentative Graduation Date: Spring 2006

To create an original choreographic work and teach a master class for the UMBC Dance Department that confers the principles of dance technique, performance quality, and dance composition methods unique to the Limon Dance Company.

Kirsten Ederer, English

“The Portrayal of Women in William Blake’s Prophetic Poetry”

Faculty Mentor: Dr. James McKusick, Director of the Honors College, Professor of English

Tentative Graduation Date: Spring 2006

The goal of this research is to produce a thesis paper which will explore the development and portrayal of female characters in William Blake’s poetry through textual analysis. By analyzing how and why Blake’s female characters change, this research will seek to understand the conflict in gender ideology which is expressed within Blake’s mythology.

Christina Finn, Music

“The Art of Auditioning”

Faculty Mentor: Professor David Smith, Music Department

Tentative Graduation Date: Spring 2007

With the Undergraduate Research Award, I plan to continue conducting my personal investigation in the field of classical (operatic) vocal studies. This time, my project will not only involve the continual learning of my art form, but also geared towards the business side of the career of the opera singer, as I research auditioning: methods, expectations, how to prepare for auditions for an opera company, and other aspects of the art of auditioning. While participating in a different highly-acclaimed program this coming summer, at the International Lyric Academy in Rome, I will receive top-notch instruction from the best vocal instructors and performers in the world, continue to study and grow vocally and in my knowledge of opera (with private lessons and coachings and by participating in full opera performances and solo concerts), and garner as much information as possible about the opera business from that faculty of the school. With the skills and knowledge that I learn, I prepare for and actually audition for apprentice programs at three major American opera companies in the fall (St. Louis, Des Moines, and Opera North), share my knowledge (as well as a song or two) with the UMBC community at URCAD, and use my research to help my career (as well as share my research with other aspiring to the same profession).

Jack Hamlett, Chemistry

“The Development of the Non-Pedal Steel Guitar”

Faculty Mentor: Dr. Joseph Morin, Music Department

Tentative Graduation Date: Fall 2005

The objective of this project is the investigation of the development of the non-pedal steel guitar in Country and Western music since 1925. This project intends to pursue the following goals: (1) produce a paper detailing the historical development of the non-pedal steel guitar in Country and Western music since 1925, (2) prepare a compact disc anthology including significant original recordings and new recordings illustrating the playing styles and tunings utilized in the development of the non-pedal steel, and (3) produce a published work combining the paper and the CD anthology to advance the knowledge of the development of this instrument.

Emily Hauver, Art History and Photography

“The Photography of Jaromir Stephany: A History, Analysis and Retrospective”

Faculty Mentor: Dr. Preminda Jacob, Visual Arts Department

Tentative Graduation Date: June 2006

I have several goals for my research project, The Photography of Jaromir Stephany. First, I want to conduct and record interviews with photographer Jaromir Stephany, to document the immensely rich oral history of an accomplished and well-connected artist. I will also conduct research to aid in an analysis of the work of Mr. Stephany, addressing such issues as stylistic changes and developments while also examining the artist's place in the history of American photography. Lastly, I will curate a small exhibit of Mr. Stephany's artwork based on the aforementioned research and analysis.

Brian Krummel, Mathematics

“The Analysis of Curvatures of Discrete Surfaces with Boundary”

Faculty Mentor: Dr. John Zweck, Mathematics Department

Tentative Graduation Date: Spring 2006

The purpose of my project is to develop a theory for computing the curvature of surfaces with boundaries. A computer stores information about the shape of a surface by storing a finite collection of points on the surface. Then the computer algorithms work with a surface called a triangulated mesh which approximates the original surface and is formed as a union of triangles whose vertices are the points stored in the computer. To compute the curvature of a surface with a computer, it is desirable to have a notion of curvature for triangulated meshes and to know how well the curvature of a triangulated mesh approximates that curvature of the original surface. There currently exists a rich theory concerning the curvature of triangulated meshes; however, this theory assumes that the surfaces involved do not have a boundary. When working with surfaces with boundaries, researchers typically ignore data on the boundary; however this practice is not theoretically sound. My goal is to generalize the existing theory of the curvatures of triangulated meshes to the case of surfaces with boundaries. In particular, I intend to formulate a concrete theory that can be understood and used by other researchers. I will also determine an error estimate for how well the curvature of triangulated meshes with boundary approximates the curvature of the original surface with boundary.

Katie Laskowski, Biology

“Does Host Specificity of Parasitoid Wasps Influence the Evolution of Breeding Phenologies?”

Faculty Mentor: Dr. Jeff Leips, Biological Sciences Department

Tentative Graduation Date: Spring 2006

The purpose of my research is to investigate the factors causing differences in the breeding phenologies of two species of parasitoid wasps, *Leptopilina sp.* and *Aspilota sp.* I will test two hypotheses. The first hypothesis is that each species of wasps specializes on a specific host species and the breeding phenologies of the wasps follow that of the optimal host species. I will also test the hypothesis that the different phenologies are caused by competitive exclusion of one wasp over the other.

Due to the ease of manipulating the system, the parasitoid-frit fly relationship is an excellent system for studying predator-prey interactions. This work will provide insight into the importance of both prey and predator distribution and abundance in any community.

Jacqueline Little, INDS: Women’s Studies

“An Intimate Relationship: Women and Body Hair”

Faculty Mentor: Dr. Jodi Kelber-Kaye, Women’s Studies

Tentative Graduation Date: Spring 2006

I intend to complete a research paper and final film project that discuss the history, theory, and relationship between women (age 18-26) and body hair. The final video will serve both to document my interviews with young women concerning their relationship with their body hair, and provide a more accessible medium by which to present my research. The intent of the film is to give the female viewers a means by which to relate their individual experiences to those of other women, and to supplement their own understandings of a woman’s relationship with body hair with the multiple and diverse viewpoints of their peers. Finally the video, by virtue of its medium, will attempt to “connect” with the viewer in any way that a traditional research paper is incapable of. In my research I will consider the removal of women’s body hair with respect to financial costs, influences of marketing, beauty standards, ethnicity, racial makeup, and background. The research will integrate women’s experiences and feminist theories while providing a historical framework from which to evaluate and discuss women’s choices regarding body hair within the schemata of beauty standards and how those standards define femininity. Analysis will focus on the cyclical nature by which marketing and culture influence choices and how, in turn those choices influence particular products, norms, and societal expectations. The research will further demonstrate the advantageous partnership of theory and women’s experiences.

Theresa Lopez, Philosophy, Biology

“Act-Focused Ethical Theory and its Application to the Treatment of Animals”

Faculty Mentor: Dr. Susan Dwyer, Philosophy Department

Tentative Graduation Date: Winter 2005

To address the question of the moral status of animals by researching what we know about animal intelligence and using that data together with a pluralistic ethical theory to form conclusions about the treatment of animals. My hypothesis is that traditional ethical theories are inadequate to the task of assessing the moral status of animals, in particular, in light of growing knowledge about animal intelligence. In my research, I hope to verify the truth about this hypothesis and propose an application of a pluralistic ethical theory; one that combines different aspects of traditional theoretical approaches to form a moderate and comprehensive theory. Support for the complexity of animal intelligence will be drawn from psychological and biological sources. Using this information, an account of what considerations humans ought to take with regard to animals will be developed under the pluralistic ethical theory formulation developed by Thomas Nagel. Following the application of Nagel’s theory to the case of animals will be a discussion of the implications of this view. I think a new ethical evaluation of the moral status of animals is important given the various ways humans interact with animals today, for example in medical research, agriculture, and entertainment. The development of this theory will, I hope, shed light on how we may judge when it is permissible to use animals for human purposes and what factors we ought to consider in making such judgments.

Matthew Metzger, Theatre

“New Approaches to Acting Techniques”

Faculty Mentor: Professor Wendy Salkind, Theatre

Tentative Graduation Date: Fall 2007

As a participant in the BFA Acting program here at UMBC, I am always searching for ways to further my knowledge of acting training, which is my primary goal in pursuing this research. I hope to apply training in specific advanced performance techniques to my work, which I will learn at one of two summer programs: American Conservatory Theatre (ACT), San Francisco or The Chautauqua Theatre Company, Chautauqua, New York. In either of these training programs, I will be exposed to acting techniques not offered in my study at UMBC. The program at Chautauqua offers training in mask work, which is working with facemasks to develop characters, and I have never had the pleasure of working with masks before. At the American Conservatory Theatre they offer clowning, which allows one to become physically free and to work with a sense of play, which is so important to actors. These programs will allow me to learn new things about my craft that I will be able to share with my fellow students and professors.

Asynith Palmer, English, French

“Faulkner’s French Appeal: An Investigation of William Faulkner’s Popularity in France during the 1930’s through the 1950’s”

Faculty Mentor: Dr. Christoph Irmsher, English, American Studies

Tentative Graduation Date: Spring 2006

I will write a 40 to 60 page analytic paper that examines William Faulkner’s popularity among French writer and philosophers in the 1930’s through the 1950’s. I will explore the reasons why the French were drawn to Faulkner’s work, while at the same time he lacked appeal in his own country and the rest of Europe. In addition, I will research who Faulkner appealed to in France and when and why he attracted this readership. I will also explore the possibility that Faulkner was re-engineered by translations; for examples, was the Faulkner translated into French the same Faulkner of his American Stories?

My paper will provide historical, social, and philosophical explanations for the positive reception of Faulkner’s novels and short stories in France. I will investigate similar histories and perspectives of both France and the American South, such as a shared “remembrance of things past;” a sense of loss, defeat, and being unable to move forward; a dismay over dismantled social structures after their wars; and an unease with the changes wrought by the modern era. In addition I will look at the impact of racism, domination, and marginalization on both colonized and colonizer (French Imperialism, e.g. Algeria) and its parallels with Southern black/white relations in Faulkner. I will also examine how Faulkner’s themes of memory, time, action, and inaction intrigued French Philosophers like Sartre.

Amarilis Sarango, Visual and Performing Arts

“Reflection”

Faculty Mentor: Vin Grabill, Visual Arts

Tentative Graduation Date: Spring 2006

My goal is to create a video/film collage that will reflect my artistic visions of combining several disciplines of the arts. It will be a development of my senior capstone project which will reflect the creative aspects of my interest in combining the fields of Film/Video, Graphic Design, and Dance under the Visual and Performing Arts- Interdisciplinary Studies Program. After extensive research and experimentation, the final product will be screened by a vast audience.

Vlad Seghete, Computer Engineering

“Solitary Waves in Birefringent Optical Fibers from a Dynamical Systems Perspective”

Faculty Mentor: Dr. Curtis Menyuk, Computer Science and Electrical Engineering Department

Tentative Graduation Date: Spring 2007

To study the existence and behavior of solitary waves in birefringent optical fibers, using the Coupled Nonlinear Schrödinger Equations to model the birefringent medium. The goal is to understand how solitary waves exist among oscillatory waves for several cases of birefringence, and to correlate numerical results with previous analytical results. If the existence of new types of solutions is observed, I will try and prove this analytically.

Rachele Sills, Music

“Further Investigation of Violin Playing”

Faculty Mentor: Dr. Airi Yoshioka, Music Department

Tentative Graduation Date: 2007

Music has a language all its own and this is why music is so important to me. It gives me a unique way to express myself. As a Violin Performance major, it is expected to improve your musicality and technique. Additionally, improving my technique will allow my performance to be more enjoyable to others. As an aspiring musician, attending summer music programs is necessary and expected to better oneself as a musician and a teacher. Last year my goals were grounded in improving myself as a teacher, but this year my goal includes all of that as well as improving myself as a leader. My goal is to attend a prestigious summer program for the purpose of enhancing my musical technique and to take what I have learned and incorporate it into my academic and musical life at UMBC I am applying to Aspen Music Festival (Colorado), Meadowmount School of Music (upstate New York), Encore School for Strings (Cleveland, Ohio), Musicorda (Massachusetts), Colorado College Summer Program (Colorado). Attendance at any one of these schools would help to further my education as a musician and will help to prepare me for graduate school. Also attending these schools will help to further my musical development as a musician and as a teacher.

Elena Spieker, Psychology

“A Controlled Evaluation of Dietary and Environmental Influences on Satiety in an Animal Model”

Faculty Mentor: Zoe Warwick, Psychology

Tentative Graduation Date: Spring 2006

The purpose of this research is to scientifically evaluate dietary and environmental influences on satiety using an animal model. The proposed studies are an extension of ongoing research I am currently conducting in Dr. Warwick’s lab. Findings to date, which have been submitted for presentation at URCAD 2005, demonstrate that fat calories produce less satiety (reduced desire to eat, or “fullness”) than carbohydrate calories, and environmental signal of impending calories enhances their satiating effect. Studies that would be funded by the URA would clarify the role of taste sensations and food volume on satiety. It is hoped that results from these studies will suggest dietary modification for individuals who wish to control or reduce their total food intake by enhancing satiety.

Steven Stone, Chemistry

“Synthesis of trans-bis-(1-imino-1-methoxyethane) dichloroplatinum (II), for use in Nucleic Acids-Protein Crosslinking”

Faculty Mentor: Dr. Daniele Fabris, Chemistry and Biochemistry Department

Tentative Graduation Date: Spring 2006

The goal of this project is to complete the synthesis of a series of platinum-imino ether complexes to be employed as structural probes in the investigation of protein-nucleic acid complexes. These compounds are crucial for the implementation of a novel strategy for structural investigation of biomolecules based on chemical probing and Electrospray Ionization Fourier Transform Mass Spectrometer (ESI-FTMS).

Linda Thompson, Chemistry

“Change Carbon Hybridization under Mechanical Stress”

Faculty Mentor: Dr. Lazlo Takacs, Physics

Tentative Graduation Date: Spring 2007

The aim of this project is to investigate the chemistry of the reaction which takes place when an organic solvent is subjected to mechanical impact. This includes identifying both the products of the reaction and which organic solvent forms the best hard coating on the surface of the milling apparatus, and investigating whether this method is safe and cost effective to be scaled up to a large operation.

Ian Tracy, Biology

“Defining Species Limits Through Color: Analysis of the Orchard Oriole Complex”

Faculty Mentor: Dr. Kevin Omland, Biological Sciences Department

Tentative Graduation Date: Fall 2005

My project focuses on using color to define species limits in the Orchard Oriole complex. This group is composed of the Orchard Oriole and the Fuertes's Oriole, which are genetically distinct and have geographically disparate breeding ranges. This is the first study to use quantitative color measurements to help define species boundaries.

Sabrina Walborn, Biology

“Isolation and Characterization of Mutations in the L17A and L17B Ribosomal Genes of *Saccharomyces cerevisiae*”

Faculty Mentor: Dr. Janice Zengal, Biological Sciences

Tentative Graduation Date: Spring 2007

In all organisms, the ribosome is the essential organelle that synthesizes proteins. This structure consists of two parts, a small and a large subunit, which come together to form the actual ribosome. The organelle's functions are mainly attributed to its ribosomal RNA, but there are proteins in key places of the structure that exhibit functional roles as well. The goal of this study is to examine the role of such a ribosomal protein, L17, whose tentacle lines a portion of the peptide exit tunnel in the ribosome of *Saccharomyces cerevisiae*. Two nearly identical genes, RPL17A and RPL17B, code for the L17 protein. The effect of mutations in these genes will be examined in regards to the corresponding protein's functionality, the ribosome's ability to synthesize proteins, and the organelle's resistance to the antibiotic Erythromycin.

S. Andrew Wilson, Computer Engineering

“Intelligent Ground Vehicle with Effective, Low Cost Obstacle Avoidance System”

Faculty Mentor: Dr. David Bourner, Computer Science and Electrical Engineering Department

Tentative Graduation Date: Fall 2005

To build an autonomous ground vehicle robot capable of navigating itself through an obstacle course primarily utilizing a low cost stereoscopic camera vision system. The ground vehicle will be entered in the 13th Annual “Intelligent Ground Vehicle Competition” hosted by Oakland University in June 2005. The ground vehicle will have to detect and avoid the following barriers: road construction barrels, 5- gallon paint buckets, pot holes, road marker lines.

Daniela Zangara, Visual Arts

“Late Bloomer: Exploring the Potential for Age Acceptance”

Faculty Mentor: Calla Thompson, Visual Arts

Tentative Graduation Date: Spring 2006

The purpose of this project is to encourage people to realize their own preconceived notions about aging. The efforts of American society to stop the natural aging process are nowhere more evident than in fashion photography. With this in mind, I will create a series of ‘fashion images’ – ten 16 inch x 20 inch digital photographic images. I will pull some of my inspiration from actual fashion ads; mimicking the poses, compositions, etc., but I will not use anyone under the age of 55 as a model. I will use traditional marketing strategies in my works, such as sex appeal, humor, and the “coolness factor”. Since, in modern society, individuals of this age rarely appear beyond ads for denture adhesives, I hope that my project will initiate a dialogue about why people find my images out-of -place. I would like my images to be active in promoting age acceptance.

Robert Zuzin, Music Composition

“Aesthetic Music Education for Elementary School Students”

Faculty Mentor: Dr. Airi Yoshioka, Music

Tentative Graduation Date: Fall 2006

To bring aesthetic education in the field of music to local elementary schools in Baltimore County. Over the course of one school year, 14 visits to the school will be planned with the aid of my mentor where children will be involved in music making activities that will further their knowledge of music beyond the abilities of their current resources. Students will be given the opportunity to connect with music and other art forms in a hands-on fashion that will give them a greater understanding and appreciation of music.

One topic to cover is the basic elements of music. Just as objects in nature are made of elements, music also has building blocks that make it complete, these being melody, harmony, rhythm, and timbre. I will develop a lesson plan that explores each of these through exercises that will expand the student's perception and understanding of the concepts concluding with a project involving a student composition of a piece of music with an awareness of each element. Composition is an important part of music education and it can be a valuable tool for understanding on many levels.