

# **Undergraduate Researchers 2011 – 2012**

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**Aleeza Abbasi**  
**Biological Sciences**

**“Genetic Analysis of Translational Accuracy using the *LacZ* Reporter System in HeLa Cells”**

The central dogma of molecular biology states that DNA is “transcribed” into RNA, which is then “translated” into protein. Proteins are made by linking together a series of units called amino acids; errors can occur when the information in the RNA is misinterpreted leading to the incorporation of the wrong amino acid. This phenomenon, termed “misreading” is our laboratory’s main interest. A small RNA called a transfer RNA (tRNA) is responsible for decoding the RNA. Our laboratory has developed an enzyme-based reporter system to measure misreading rates. The *lacZ* gene encoding the enzyme beta-galactosidase was mutated to produce an enzyme lacking significant activity. Misreading of the mutant gene can restore activity. The rate of misreading is equal to the ratio of the mutant enzyme activity to wild type activity. In bacteria, misreading occurs at a rate of about 1 in 1000 to 1 in 10,000. This research seeks to determine what the error rate is in human cells using this system. We propose to insert the *lacZ* gene from bacterial plasmids into plasmids that can be used in HeLa cells, which are immortal human tissue culture cells. A similar method of misreading analysis will be applied to the human cells’ beta-galactosidase activity in order to understand errors in cell machinery during the process of protein production.

**Why do you think research is important in an undergraduate education?**

I believe that research is an integral part of learning because you can apply what you learn in the classroom to real life situations. You can gain hands on experiences in any field through research. In addition, you learn many important skills, including critical thinking and communication.

**When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

I learned about undergraduate Research at UMBC through my friends and peers. At Pre-Medical Society meetings and information sessions, I heard about the wonderful and educational experiences that students had while doing research, and I could not wait to get involved!

**How did you learn about the Undergraduate Research Awards program at UMBC?**

I heard about the program when Ms. McGlynn spoke during a Pre-Medical Society meeting. She explained the award and the application process.

**Was the application difficult? Did your mentor help you with the application?**

Although the application took some time, it was very straightforward. My mentor, Dr. Farabaugh, worked with me to edit the abstract and proposal.

**What methods are you using to conduct your research?**

I use Polymerase Chain Reaction (PCR), cell transformation, plasmid preparation and DNA isolation techniques.

**What preparation did you have for conducting this research?**

I have worked in Dr. Farabaugh’s lab since the summer of my freshman year. The graduate student I work with trained me in basic lab skills. She taught me about the purpose of her project, and I was given the opportunity to work alongside her. My new project involves similar techniques and background information.

**What is your advice to other students about getting involved in research?**

I would encourage others to talk to their professors after class and ask questions. Many UMBC professors conduct research, and they often hire undergraduate students to work in their laboratories. It is easy to get involved with on campus research if you know your professors well. That way, you may be able to ask them if they have any available positions in their labs.

### **What are your careers goals?**

I hope to gain acceptance in medical school in the near future to pursue an M.D.

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### **Chinwendu Amazu**

#### **Biochemistry and Molecular Biology**

#### **"Towards Paratransgenesis: Selection of Bacteria that are Vertically Transmitted by Mosquito Vectors"**

The paratransgenic approach that is using engineered symbiotic bacteria as vehicle to deliver anti-malaria "effector molecules" to interfere with parasite development in the mosquito midgut has been considered as a promising strategy to fight malaria disease. A bacterium that is well adapted to the mosquito midgut and can efficiently be transmitted to the next generation is a strong foundation in introducing recombinant bacteria into field mosquito populations. Recently, a bacterium *Asaia* sp. strain SF2.1 was reported to be well colonized in female *Anopheles stephensi*, and possibly able to be transmitted vertically from female mosquito to larval progeny. However, preliminary experiments suggested that *Asaia* sp. SF2.1 survival from mother to offspring or from larval to adult were poor. To select for bacteria that are well adapted to the *An. gambiae*, a major vector of human malaria in Africa, we performed experiments to test the survivability, recolonization, vertical and/or transstadial transmissions of *Asaia* sp. SF2.1 in *An. gambiae*. In addition, we also selected for other local symbiotic bacteria that were transmitted vertically or transstadially in the *An. gambiae*. The hypothesis stated that *Asaia* sp. SF2.1 can colonize and survive in the midgut, and can be transmitted transstadially, from midgut to ovary and vertically in *An. gambiae*. To identify if *Asaia* sp. SF2.1 was present in the mosquito or in the mosquito's midgut/ovary; we used RFP-targeted *Asaia* sp. SF2.1 (Ab-RFP) and fed it to *An. gambiae* at different periods of their life span. After different time intervals, we dissected and homogenized either the whole mosquito, midgut or ovary, plated and incubated for two days. We have demonstrated that Ab-RFP stably maintained in the midgut for the adult life span of *An. gambiae*. All the dissected female adults harbored fluorescent *Asaia* Ab-RFP in 24 h after the mosquito was fed Ab-RFP. To select for *Asaia* and other bacteria that vertically transmitted from mother to offspring, we isolated bacteria that colonized in ovary and larval progeny. We found *Asaia* sp. and *Serratia* sp. were able to traverse the midgut to colonize in the ovaries, suggesting that they could be transmitted vertically from mother to offspring. Although, a large amount of reintroduced *Asaia* Ab-RFP outcompeted local *Asaia*, *Serratia* sp. became the most dominant bacterium in the ovary four days after the mosquito fed on bloodmeal. These findings show that both *Serratia* sp. and *Asaia* sp. are excellent candidates for paratransgenic control of malaria.

### **Where are you doing research this summer?**

I am at the Johns Hopkins University Bloomberg School of Public Health in the Johns Hopkins Malaria Research Institute.

### **What is your project?**

I am working on Malaria, seeing if we can use bacteria already stabilized in the mosquito to secrete effector cells that will stop parasite transmission within the mosquito. I am working specifically with *Asaia bogorensis*, a bacteria, to see if it can become well-adapted and be passed on to future progeny in the mosquito vector, *Anopheles gambiae*.

### **How did you find out about research opportunities for Summer 2011?**

I found out through searching universities and institutes that dealt with research summer programs. Also, Meyerhoff Scholars Program, which I am in, helped me search for summer research opportunities.

### **When did you start looking for a position? How many places did you apply?**

I started looking for a position in October of last year. I applied to 17 institutions.

### **Was this your first research experience? What background did you have before starting this summer research?**

This was my first summer research experience, but in my senior year of high school, I worked and interned at United States Department of Agriculture.

**Are there other undergraduates involved in the same research this summer? Who do you work with directly each day?**

Yes there are other undergraduates in this summer program. I work directly with one of the post-doctoral fellows in my lab.

**What did you gain from this experience?**

I learned that research is an ocean, filled with different parts and things that you can focus on. It is vast but it is also a place where you don't look at the time often and time goes by very quickly. I gained a great deal of lab experience that I will take on with me to my future lab positions. I now have more networking opportunities and I am a better presentation speaker. This experience has also supported my educational and career goals in a positive way.

**Where are you living while you do this summer research?**

I am living at UMBC.

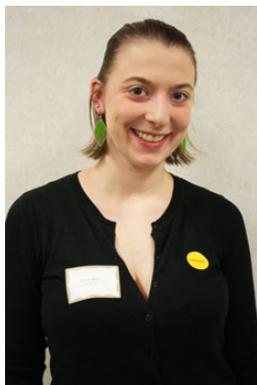
**What is your advice to other UMBC students about summer research?**

Summer research is an awesome opportunity that can open up doors for you, sharpen your mind and technical skills, and can also allow you to delve into topics that are truly important in this world and in our future.

**Can you tell us your major and your plans for the future?**

I am a Biochemistry and Molecular Biology major. I am graduating from UMBC in 2014, and I plan to attain my MD/PhD at an accredited institution.

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**Jessica Ruth Baker**  
Theatre

**“Designing and Performing a Solo Show”**

Within the last half-century, well-known actresses such as Anna Deavere Smith and Lily Tomlin pioneered the genre of the one-woman show. However, it is still uncommon for actors to ever undertake such a show, and these plays have taken the backseat to more elaborate and populous productions. To understand this world of solo shows, I will design and perform a previously published one-woman show. In producing this show, I will showcase the skills and talents that I have learned in the Department of Theatre in both my acting work and my set and costume design. Additionally, I want to explore the challenge of performing a solo show and understand the difference between that and working with a group. A

historical aspect I want to research as well is the history of the one-woman show, and the reason that it has risen in the theatrical realm as a form of performance in the last twenty years.

**How did you learn about the URA program at UMBC?**

I first learned about the URA program at UMBC during my sophomore year. I was serving as Secretary for the Theatre Council of Majors when Janet McGlynn came to a meeting to introduce us to the world of the URA and URCAD, hoping to inspire some of us to participate. The next year, I plan to put together a project to present at URCAD. When I saw the caliber of research occurring with the URA funding, I decided to apply for a URA myself.

**Did you know other theatre students who had applied for this?**

I've only heard of one or two theatre scholars in the past, who may not have even done the URA and just done URCAD, I'm not sure. I know Shaun Vain successfully applied for a URA last year to present at this past URCAD in April, and his work was seriously awesome.

### **What kind of research do theatre students do?**

From what I've seen, the most common way a URA scholar uses his or her money is to take part in a workshop series or join some classes, usually in a city well-known for its theatre training. They then bring back the knowledge gained and create original work influenced by this training. They often also offer a workshop for peers and the community to learn from them. This is usually pretty helpful to all students involved, as there are a lot of different kinds of theatre trainings out there, and it is difficult to sample them all.

### **How did you decide on the project you proposed? How did you find a mentor?**

Originally, I had wanted to do a solo production as a capstone project for myself, because I wanted to find some meaningful way to finish off my five years at UMBC. Then my adviser, Lynn Watson, with whom I have worked on many projects extensively, suggested that I use the URA as an opportunity to expand the production and make it even better. Professor Watson agreed to be my mentor in this project because she has a lot of experience with actors putting on solo shows, and also she was the one who suggested I make it a URA in the first place. I rely on her for an immense amount of guidance, and will continue to do so as this project continues.

### **Was the application difficult? Did your faculty mentor help you?**

I did not find the application too difficult - the hardest part was truly pinpointing exactly what I wanted to do! Professor Watson did assist me throughout the application process, proofreading it several times before I submitted it. She also counseled me on how much I would need to budget for each part of my project.

### **How much time do you put into your project?**

So far, I am still in the planning stages, so I've still only put a few hours into it. During the month of August, however, is when I'm going to start stepping up the project, including meeting with some collaborators who will support me in the production (building costumes and sets, running the actual performances, etc.).

### **Would you suggest that other theatre students pursue funded research through URA?**

I would absolutely suggest that other theatre students pursue research using a URA. The support system is phenomenal, and I always think it's incredible when artists can get funding to do the things they love, and to get even better at it. I also believe that, although both Jessie Poole and I are URA scholars this year, the theatre department is still woefully underrepresented, and I would love to see more of us take advantage of this awesome program.

### **What are your plans for after UMBC?**

After UMBC, I will continue pursuing work as a professional actor, as well as break into the costume and scenic design field of professional theatre. One day, I hope to go to graduate school and achieve my doctorate, but for now, I just want to do what I'm good at, and what I love, as much as I can.

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**Kelin Brace**  
**Biochemistry and Molecular Biology**

#### **“Synthesis of C-nucleosides and Their Biological Implications”**

Modified nucleosides have been intensely studied for their ability to alter normal biological functioning, and are increasingly being considered as important medicinal candidates. In particular, the deazapurines have been investigated because of their antimicrobial, antiviral, and anticancer potential. These particular analogues show promise because their structure is similar to that of the natural nucleosides, and their carbon-carbon glycosidic bond is impervious to hydrolytic and enzymatic cleavage, which is a serious problem for many nucleoside drugs. A number of C-7 substituted pyrrolo[3,2-d]pyrimidines (also

known as 9-deazapurines) have also shown inhibitory activity against purine nucleoside phosphorylase (PNP), an enzyme that is known to destroy many nucleoside drugs before they can reach their target. This finding is significant because this suggests these compounds could then be co-administered with nucleoside drugs, thereby blocking PNP and allowing the drug to carry out its therapeutic duties. The focus of this investigation will be to synthesize several 9-deazapurine analogues as potential inhibitors of PNP. Their synthesis will be accomplished through the use of various carbon-carbon organometallic coupling reactions and other functional group transformations. Once the compounds are synthesized and characterized, their medicinal properties will be assessed through the use of biological screening to be carried out by our research group's collaborators. The results of this study will provide new insight into the biological importance for the 9-deazapurine scaffold as potential drug candidates.

**When and how did you find out that you could do independent research work as a UMBC undergraduate?**

Before coming to UMBC, I had heard on several different occasions that undergraduate research was very big on campus. As a Meyerhoff scholar, I was encouraged to find a mentor and carry out my own research.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

I had one of my teachers my as a mentor, and I requested to work with her because I enjoyed her in class and found her research interesting. We chose a project for me that would fit well into the lab's current work while still giving me enough independence to work on my own.

**How much time will you put into this research work?**

Over the summer I am working around 30 hours a week on my project, and during the school year around 10-15 hours per week.

**What academic background did you have before you started on this research?**

Before starting my research I had taken the chemistry classes needed to have a basic understanding of our research. However, in my more advanced courses I am constantly learning things that apply to the research I am doing now.

**How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

My mentor suggested I apply for the URA. The application was not difficult, but my mentor did help me condense the scope of the whole project to the short application.

**What is your advice to other students about getting involved in research?**

The teachers at UMBC are very passionate about their research. If you are honestly interested in what they are doing, most people will be very happy to talk to you and maybe even let you join their lab.

**What are your career goals?**

I would like to pursue an MD/PhD degree upon graduation.

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**Christina Briscoe**  
**Interdisciplinary Studies**

**“Adolescent Mothers In a Quilombo Community: Praia Grande, Brazil”**

This exploratory, ethnographic study addressed the characteristics and meanings of adolescent motherhood in Praia Grande in Bahia, Brazil. Praia Grande is a quilombo, or community descended from escaped slaves in an isolated location. The participants were the twenty women of the 161 Praia Grande women between the ages of twelve to twenty who had at least one child (11 percent). Results derived from participant

observation, Programa da Saúde da Família (Family Health Program) documents, surveys, a life history and interviews. During this research, lack of employment opportunities, importance of the family support, and confusion about birth control emerged as central themes. In addition, infrastructural inadequacies, from lack of public sanitation or police to timely medical care to the practical inaccessibility of education, were commonly mentioned by these young women as impediments to achieving desires for themselves and their children, pointing to the structural violence experienced in the quilombo population. The study highlights the need to assess cultural contexts of adolescent motherhood before implementing public policies for quilombo reproductive health programs.

### **When and how did you learn that you could do research abroad as a UMBC undergraduate?**

After my sophomore year, I went to Peru to take a class in medical Spanish and indigenous medicine in Cusco, Peru. When I returned, I knew I wanted to go back to South America to pursue studies in medical anthropology with the marginalized groups there in order to better understand them.

With this goal in mind, I went to Dr. Brian Souders, the director of the UMBC Study Abroad office, to see if UMBC could help me make it a reality. Sure enough, he was aware of a study-abroad program that included a heavy focus in hands-on research in my area of research interest (Brazil: Public Health, Race, and Human Rights) Dr. Souders helped me to apply and enroll. The director of the program in Brazil was even a physician-anthropologist, who helped to orient my research.

### **How did you decide on your research project and methods?**

I went to Brazil with the intention of studying HIV/AIDS and the universal health care system. However, in the first days of the program, the director mentioned quilombos. Before arriving in Brazil, I had never heard the word before. But as she began to describe the origins of the isolated groups of the escaped slaves' descendants, my interest was automatically piqued. Two weeks later, when the program took us to quilombo communities on the island Ilha de Maré, I fell in love with the people and the place. Moreover, the inequalities and structural violence that I saw there inspired me to use the research as a catalyst to increase the understanding and awareness of others back in the United States of quilombos and the difficulties they continue to face.

The topic of my research, adolescent motherhood, was chosen after I read the description of one of the graduate student researchers working on the island, Jovânia de Silva. She was working to construct an ethnographic account of the experiences of pregnant adolescent women. However, I wondered about the characteristics and experiences of adolescent mothers themselves on the island.

### **Who were they? What did they think about motherhood?**

My methodology was chosen after deliberations with the community health worker. She was absolutely fundamental to everything I did there: finding the documents of the island families to have a full count of the adolescent mothers there, earning the trust of the women to do interviews, aiding in the creation of surveys, guiding the life history, and baking the cake for the group meeting of the mothers. Her advice and deep knowledge of the community dynamics guided the methods I used and my ability to carry them out.

### **Who was your faculty mentor? How did you find him/her? What help did he/she give you?**

My first semester of freshman year, I took Dr. Bambi Chapin's Anthropology 211 course. Often after class, I found myself speaking with her about topics and readings of the class. When I decided to change my major from Biology to Interdisciplinary Studies, I asked her to be one of my two faculty advisers. Throughout my time at UMBC, she was a tremendous source of support and mentorship. Among other things, Dr. Chapin wrote me a countless number of letters of recommendation and mentored me through an independent study my senior year. The independent study familiarized me with the anthropological literature I needed to write about my Capstone and that I will use in my Fulbright research in 2012. I found my faculty mentor in Brazil (Dr. Climene de Camargo) through my study abroad director, who knew her personally and professionally through the Afro-Brazilian movement.

### **What was the most interesting or exciting thing that happened in your research? What about the most frustrating or disappointing?**

I think it's easiest to begin with the most frustrating. In the beginning of my research, I expected to have

many participants in my research. I had estimated 50 to 60 young women (community size was 1200). Everyone had hinted or directly stated to me that there were a large number of adolescent mothers in the community; yet, in my first weeks of research, I had only encountered fifteen. The problem was not their willingness to participate but the apparent lack of women under 20 years old with children. Given the study I had designed with my research mentor, which was primarily epidemiological in nature, I was worried that I would not be able to find the minimum of 30 research subjects necessary to do statistical analysis.

What became most interesting and exciting to me was how the study evolved to fit the reality of the community. Although I had originally constructed the epidemiological methodology in order to avoid communication errors in Portuguese, I quickly found myself having conversations with the young women without difficulty. As the study progressed and I verified through documentation that there were only 19 adolescent women in the community who fit the study criteria, these informal interviews and conversations became the basis of my research. In particular, the group encounter of the young mothers was particularly successful, as it brought out subjects from informal abortions to their views on public transportation.

Though the content and nature of the study results differed greatly from what I had originally hoped and expected, the ultimately ethnographic character of the study taught me much more than the simple enumeration of number of children and first menarche.

**When did you realize that you could apply for a Fulbright award to continue your research after graduating from UMBC? How did you learn about this?**

I learned about the Fulbright award from my faculty mentor, Dr. Bambi Chapin, in an advising encounter. During the time I spoke with her, I was struggling with my life-long dream of becoming a doctor in face of the realities of poverty that I had seen in Guatemala and Peru. She herself had won the award as a graduate student. She suggested that I apply to the program in order to explore some of the themes about poverty and marginalization around which my questions revolved in greater detail.

**Was the application difficult? How long did it take you?**

The application is not long, but it certainly involved. It requires only two two-page essays: one a personal statement and the other a proposal for research. I began to work on both statements in June 2010 in order to turn in by October. The most grueling part of the process for me was waiting from October until April to hear if I had been accepted!

**Did you have help from people at UMBC while you were applying? How did they help you?**

UMBC faculty and staff undoubtedly helped me a great deal. For example, in September, I was ready to desist from the process as a result of frustrations in trying to obtain a form from the university in Brazil. Dr. Souders helped me to think of another route to obtaining the necessary documentation and convinced me to “hang in” the process. In addition, a panel of UMBC professors interviewed me and turned my essays upside down. Their critical commentary and suggestions fundamentally changed and refined much of my grant proposal and personal statement.

**What does the Fulbright award mean? How does the Fulbright program support your research?**

The Fulbright Award is a research grant to conduct an overseas study for nine months to a year. While most of the research is done independently, the Fulbright supports visa, living, travelling, and study expenses in order to enable the student to conduct the project. Most of the academic work is done between the research adviser at the university and the student.

Equally important, Fulbright provides a community of scholars interested in the same region or country with whom it is possible to network and learn. The other Brazil 2012 scholars and I have already connected through Facebook (cliché I know); three of the other scholars are also studying aspects of the African diaspora communities and slavery in Brazil and have recommended some books for me to read!

### **How is your research going now?**

I graduated from UMBC in May 2011. During the summer, I have been taking time to spend time with my friends and family, who I had left a little on the wayside during my travels, volunteer work, and packed academic schedule. They have been infinitely supportive of all of my efforts, and I could not have accomplished anything without them. My research through the Fulbright begins in March 2012.

### **What will happen next for you?**

I am in the process of applying to M.D./Ph.D. programs, with the Ph.D. in anthropology. If accepted, I will begin the program in 2013 after my Fulbright grant ends.

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**Brian Brown**  
**Biochemistry and Molecular Biology**

### **“Synthesis of a Novel Set of Flexible Expanded Nucleoside Reverse Transcriptase Inhibitors”**

Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), and other RNA viruses pose a great danger to human health on both an individual and global level. Several current treatment options on the market have been designed to inhibit the polymerases these viruses use for replication, such as HIV’s reverse transcriptase (RT). By inhibiting the replication of the virus, the viral lifecycle is halted. However, many of these drugs have begun to fail due to the viruses developing drug resistance. The type of resistance focused on here is the development of point mutations in the active site of these target polymerases.

These mutations introduce steric and electronic hindrance, reducing the binding affinity, and subsequently the efficacy, of previously developed reverse transcriptase inhibitors. This allows the virus to overcome drug therapy and successfully transcribe its genome for viral replication. As a result, new compounds are desperately needed that can overcome resistance in viral polymerases with greater efficacy. It is our hypothesis that by combining the already known activity of previously established antivirals, such as 2'-methyl modified guanosine, with structural alterations found to be advantageous by our laboratory in the past we will be able to design, synthesize and characterize a series of nucleosides that will maintain activity against resistant viral strains.

### **When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

Luckily, I knew about the opportunities afforded to undergraduate students in research at UMBC even before I started as a freshman. The Meyerhoff program helped to really drive home the importance and the benefit of starting research at the undergraduate level.

### **How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

I looked to professors whose courses I had taken for possible lab positions. After taking Orgo I with Dr. Seley-Radtke in the Fall of my sophomore year, I knew I wanted to get involved with organic chemistry research in some capacity. Fortunately, Dr. Seley-Radtke had an open position in the lab and was willing to bring me in halfway through my organic chemistry sequence. From there, the work has grown on me exponentially! Every research project will have you floating in the doldrums at some point or another; that’s just the nature of science. But even when I’m met with challenges in Dr. Seley-Radtke’s lab, I don’t get discouraged or feel like giving up; instead, it just drives me to work even harder.

### **How much time will you put into this research/creative work?**

It varies from week to week, since some parts of my project require more attention than others, but on average I plan to put in 10 to 12 hours per week during the academic year and upwards of 40 during breaks. I got a head start on my project over the Winter break, so that helped me to maximize my time doing meaningful research during the semester instead of just learning the ropes.

### **What academic background did you have before you started on this research?**

Because I entered a drug design lab after only completing one course in organic chemistry, I felt like I was stepping into some pretty new territory. However, because the course I just took appealed to me so much, every time I was met in the lab with new, confusing information to digest, I treated (and continue to treat) it as a learning opportunity. Now that I have finished the introductory organic chemistry sequence, I am able to better understand some of the finer details behind my project, and as I take more courses, my confidence in my ability as a researcher ought to increase as well.

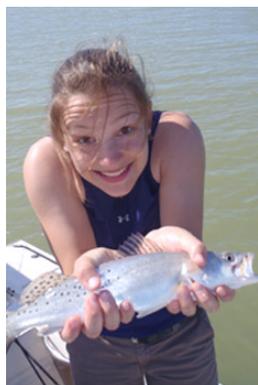
### **What is your advice to other students about getting involved in research?**

Start looking now! Put down your remote, go to your department's website, and look through the faculty pages for a professor whose work grabs your attention. Focus not only on doing well academically, but also on making connections with professors. The opportunities afforded to me have mostly all come about as a result of networking. If someone can put a face to your name and remembers you as a strong student who is truly passionate about getting started in research, you are that much more likely to receive an offer from a professor to do undergraduate research.

### **What are your career goals?**

As I am gaining more experience in both the classroom and the laboratory, I am starting to really narrow down and refine what I see myself doing professionally. At the present moment, I am interested in the interface between the synthesis of novel drugs to combat HIV, etc. and the efficacy of those drugs against viruses in the human body. This still leaves a huge range of potential careers spanning basic research and clinical research. With time, I hope to discover where I feel most comfortable in that continuum, but in the meantime, I am enjoying my time in Dr. Seley-Radtke's lab making sense of the raw chemistry behind the big picture.

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**Kate Brundrett**  
**Geography and Environmental Systems**

#### **Community Ecology**

#### **How did you learn that you could be involved in research as an undergraduate?**

I had several friends and acquaintances who were doing research as undergraduates, and I was even part of one friend's URCAD project my junior year.

#### **Did you know right away what you wanted to do? How did you find your current research position?**

When it comes to research, I am interested in just about everything ecology-related. In planning for graduate school, some professors have suggested that I "narrow down" my endless list of interests. I had no idea that this project was going on, but I had been tirelessly applying to extremely competitive internships all over the country. Dr. Swan was one of my go-to professors when I needed a letter of recommendation, so he heard a lot about my big goals in life. When an opening presented itself in his lab, he remembered my interests and my academic performance and offered me the position.

#### **What did you already know about your research topic and techniques before you started? How did you learn everything you needed to know?**

I knew very little about my research topic or techniques. Luckily, a lab technician was there to help me. He taught me all of the zooplankton and phytoplankton sampling protocols. Later on, a graduate student in the lab and I hit the books to learn how to identify zooplankton. And this summer I will be traveling to Indiana to meet an expert in the field; he will hopefully help us to work out the final kinks.

**How many hours each week do you work on this project? What do you do during that time? Where do you do the research?**

This summer I am working between 30 and 40 hours each week on this project and other miscellaneous projects. Sometimes I work in the field at places like Patapsco State Park, and other times I work at the TRC or in the basement of Sondheim. Since the collecting portion of this study is over, I have lately been getting around to identifying the hundreds of zooplankton samples that are preserved in the lab.

**What is the most difficult thing you have encountered in your research?**

Zooplankton identification is surprisingly difficult, but I get a little bit of a rush from it. When you find something you've never seen before, you often spend hours viewing it under the microscope and reading through some dense literature in hopes of being able to identify it. You end up asking yourself, how many tiny hairs are on this one tiny claw on this tiny individual? Everything is so small; and these miniscule creatures don't look like any animal you might normally see from day to day. It requires some getting used to.

**What is the most interesting or unexpected thing you have encountered in your research?**

In short, one portion of the research focuses on if/how zooplankton communities respond to road de-icer runoff. To me, this is just one small part of the bigger picture: The things humans take for granted (like salting roads in winter) can lead to such a huge impact on every level of life; a novel environment with novel community dynamics. Essentially, humans are creating a new ecosystem- an urban ecosystem. On a lighter note, it is absolutely amazing to be able to look under the microscope at a drop of water, only to find that there are countless numbers of living things thriving there! (A great quote by Antoni van Leeuwenhoek, "...no more pleasant sight has met my eye than this, of so many thousands of living creatures in one small drop of water.")

**Will you continue working on this project after classes start in September?**

Yes, I will continue working on this project and others all throughout the school year.

**What would you say to other students about engaging in research as an undergraduate?**

Regarding actually coming across a research opportunity, it is well worth the time and effort. There is no harm in asking or applying or just putting yourself out there. Yes, it is discouraging to not get accepted to every position you look in to, but if you have a strong interest, keep with it. And most importantly, talk to your professors. They have some good insights and may even share your interests, which could lead to an opportunity in the future.

**What are your plans/goals for after UMBC?**

Graduate school is definitely in my future. Where I go heavily depends on the researchers/professors I meet through presenting my research later on. I plan on pursuing more research opportunities in aquatic ecology and community ecology. Plus, I am a fan of fishing and I would love to study ichthyology!

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**Caroline Brunschwyl**  
**Information Systems**

**“Investigating the Accessibility of Small Screen Devices”**

Social networking has become one of the most popular ways to interact with friends online. People share their thoughts and experiences with friends, play a plethora of games to keep them occupied, and upload hundreds of pictures from parties, travels, and get-togethers. Blind and low-vision individuals may not be able to see these colorful images taken by their peers, but they can still get a great experience out of social networking. Any webmaster can alter a web page to suit the needs of those with disabilities. It is particularly simple accommodating for the blind. In this research, I hope to come to understand how a user with low vision views a web page. I hope to learn about all the different types of technology used to aid in viewing a web page and what can be done to a web page to make it accessible to the blind.

This research is meant to identify the challenges experienced by blind screen-reader users when accessing social networking websites.

**When and how did you find out that you could do research as an undergraduate at UMBC?**

I found out about undergraduate research opportunities as a freshman in a First Year Seminar class. They made it sound like undergraduate research was encouraged here at UMBC. Near the close of my sophomore year, one of my professors asked to talk to me after class and suggested I help him with his research. That led me to my current research project, which I am completing over this summer (2011) before my junior year. Now that I am involved in research, I realize how easy it can be to find a mentor to do research under.

**What methods do you use in your research?**

My research started with reading and reviewing scholarly articles and composing an annotated bibliography on the works. This process helped me keep track of all the articles I read, led me to find new, similar articles, and gave me all the background information I could possibly need to aid me in my research. Now, taking what I have learned, I have composed a list of interview questions to ask willing participants who have to do with my area of research. I plan on interviewing 15 blind or low-vision users of assistive technology with social networking sites.

**How much did you know about how to conduct this research when you first started?**

When I first started, I had very little knowledge of the subject. All I really knew was that low-vision computer users had to use special technology to help them access the internet or read anything on a computer. I have a friend whose mother is legally blind, and I have seen her use her machine to blow up words so only one letter fits on the screen at a time. Then it flips the letters upside-down so she can better distinguish what character it is, and this is how she reads online. Now I know there are other alternatives to just making words much larger.

**Who/what helped you learn what you needed to know to carry out your project?**

My mentor (Dr. Kuber in Information Systems) walked me through every step of this project. He is pushing me hard to gather good information in a timely manner to benefit us both. If I have a question about anything, I e-mail my mentor or ask him in our weekly meetings. The specific work I am doing, however, is very straightforward. Reading papers and conducting interviews does not leave me with many questions about the process.

**Who do you work with on this project?**

I do all my work with my mentor, a faculty member. I have talked to other students doing research, one under the same mentor, just to see what other students are doing. All my work, aside from the interviews of course, is independently done.

**How much time do you put into the research every week?**

I took two classes while doing research this summer. The work was very manageable. Depending on what I am working on, the work load changes from week to week. When I was reading papers, I spent a lot more time per week, probably six to eight hours a week. When I was developing interview questions and putting them into a database, I worked one or two hours a week. Now that I will be conducting interviews, I will be spending more time working, closer to six to eight hours a week again.

**What was the most interesting about this research?**

When I was first pitched the idea of looking at how the blind use technology to access social networking sites, I thought it would get boring and tedious, all leading to the same information over and over. Once I started reading, I realized there are so many different types of technology out there that can be beneficial to sighted as well as non-sighted users. Not only is there technology to help the blind "see" web pages, there are even guidelines that make the page easier to "sense," so a blind user can get a feel for the layout. Layouts like these are more beneficial for sighted users as well. Websites designed for the blind can potentially be better for everyone!

**How does your research relate to the content of your classes in IS?**

Much of the research I conduct uses material learned in my classes. For example, I have all my interview

questions in a database. In IS300, Management Information Systems, we learned about how to make databases, create relationships between them, run queries, and perform data mining. All these skills will help me better analyze the data gathered from interviews. Also, IS 303, Human-Computer Interactions, is a great class that really got me interested in the subject. This class gave me all the background knowledge I needed to look at and interpret information through different mediums, as well as how to perform interviews and surveys to do my own data gathering.

### **What are your career goals/plans for after UMBC?**

While I am still at UMBC, I am looking to get into the combined Master's program to accelerate my education. This is another great program UMBC offers that I was not aware of until recently. With my education, my dream is to become a webmaster. I have been interested in HTML since elementary school and I have a knack for the coding. Since UMBC is such a good technical school, my dream may very well become a reality.

### **How does your research experience fit into these goals?**

My research is providing me with skills and background information in human-computer interactions. Skills like these, along with the knowledge of how to make a website fully accessible, will help me in creating better sites that are intuitive and easily navigable, whether you are using your eyes or a screen reader. I was not interested in getting my Master's degree so soon until I had started research in the Human-Computer Interaction field. Now I realize, by obtaining a master's, it will help give me an edge in future competition for my dream job.

### **What would you tell other UMBC students about getting involved in research?**

Talk to your academic advisors and ask friends if they know any faculty members looking for research assistants. If you can get a mentor, do the research. Since you do it on your own time, it is really simple and low-stress. If you can do something more involved and more complicated, more power to you. Every research opportunity you come across will be one more thing to buff up your resume! In the IS department, I feel like there is never a lack of research to be done.

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**Joe Cornish**  
**Biological Sciences**

### **“Adaptive Learning Neural Networks for Binding Site Search in Genomic Sequences”**

Artificial neural networks (ANN) can be trained to become highly efficient pattern recognition systems capable of discerning non-linear features on complex backgrounds. For this reason, ANNs have been proposed frequently as suitable search tools for the identification of transcription factor (TF) binding sites in genomic sequences. Here we show that ANNs trained with the standard back-propagation algorithm have significantly lower search efficiency compared to standard weight matrix methods in TF binding site search. We observe that this is due to the ill-balanced nature of the search problem, which requires the identification of a small number of sites against a very large background. We propose a new algorithm, adaptive learning, based on a targeted sampling of the background during back-propagation learning. We validate this approach by cross-validation on an up-to-date collection of CRP sites from *Escherichia coli* against the original *E. coli* genome, a randomly generated genome and the genome of *Paenibacillus* sp. Our results demonstrate that adaptive learning of ANNs improves search efficiency for CRP against tested backgrounds. The general implications of these findings for machine learning approaches to binding site search are discussed here.

*This work was funded, in part, by UMBC UBM program National Science Foundation DBI 1031420 and the UMBC Department of Biological Sciences.*

**When did you start conducting research at UMBC? How did you find a mentor and project to work on?**

My first research experience was in the laboratory of Dr. Marie-Christine Daniel-Onuta in the Chemistry and Biochemistry department. I had been trying to find an undergraduate research opportunity and a TA I had at the time was a graduate student working in Dr. Daniel-Onuta's laboratory. The TA introduced me to the research projects in the laboratory and I became very interested and excited about the work. The TA suggested that I contact Dr Daniel-Onuta about summer research opportunities.

**What did you know about your field/project when you started? How did you learn what you needed to know?**

My first experience was in organic chemistry. When I entered into the lab I had just completed the first half of the organic chemistry sequence so I was still very inexperienced at the time. The majority of what I learned was from hands on experience working with another undergraduate in the lab and especially the graduate students and post-docs. In my current position, the laboratory of Dr. Ivan Erill, much of what I learned was again from hands on experience, especially with the critical guidance of Dr. Erill.

**Who do you work with on your project? Other undergraduates? Graduate students? Faculty?**

The project I presented at URCAD was part of an ongoing research project. While the initial work had been started by other graduate and undergraduate students, I began work on the project after they left. Currently I am working with Dr. Erill on the project. I would like to acknowledge the other undergraduates and graduate students working in the lab who have been helpful through conversations we have had during lab meetings and elsewhere.

**How did you decide to present at URCAD?**

The decision to present at URCAD was simple. Sharing the work you do is a critical part of the research process. It provides many opportunities to learn from others working in the same areas. Poster presentations also provide a great opportunity to learn and network as it gives you a chance to speak with people in person.

**Was the application difficult?**

The application process is one of the best I have experienced. The URCAD program is highly organized, and the requirements are very clear and concise. Applying is the easiest part of presenting at URCAD. Additionally things like the point-by-point checklists for abstracts and the pre-event sessions are helpful.

**How did you know what to put on your poster?**

This was not an easy task. While there is somewhat of a formula to follow when making posters it can be a challenge to optimize the material to properly portray the work. Additionally, Bioinformatics draws from many different areas and as such, will have audiences with different backgrounds. This is a very important consideration as you have to provide enough background on each topic with a relatively small poster space budget.

**Were you nervous about explaining your work to so many people? How did it go?**

I had presented before at a conference on this material so I had already worked out the "talk". I always enjoy URCAD as it gives me an opportunity to share my work with fellow undergraduates and undergraduate researchers.

**Will you work in the lab during the 2011-2012 school year? How much time will you put in? Do you get paid for this? Academic credit?**

I will be continuing research through the 2011-2012 year. Part of my time will be through the UBM program here at UMBC. This program, which is designed for mathematics and biology research cross training for undergraduates, has been a great experience and I am excited to continue my work through it. Additionally the UBM program provides a stipend and summer housing. I am also excited to continue working in Dr. Erill's lab.

**What are your goals for after UMBC?**

My goals are to pursue graduate education and to continue research. The field of synthetic biology is in it's

infancy and I am very interested in exploring the applications of work I have been a part of to synthetic biology.

### **Would you suggest to other undergraduates that they find a research project?**

Yes! My experience in undergraduate has done so much more for me than any course could. Research allows you to not only develop much deeper understandings of your science, but allow you to learn many career critical skills.

### **What else are you involved in at UMBC?**

I tried to maintain activity in some campus organizations but I have dedicated my time to research for the past few years. One of the most positive experiences outside of research was through the Shriver Center. I was a volunteer and then a Service Learning Intern for a program called MS Swim. I participated in this program for over a year.

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**Teklu Dawit**  
**Biological Sciences**

### **“Genetic Analysis of the Role of PHT4;6 in Regulating Innate Immunity of Arabidopsis”**

Successful control of plant diseases depends on a thorough understanding of the mechanisms of plant disease resistance. Previous studies by Dr. Lu’s laboratory determined that the loss of function mutant *pht4;6-2* enhances plant disease resistance, indicating that PHT4;6 may be a negative regulator of plant defense. To further investigate the role of PHT4;6, we took advantage of a unique Arabidopsis mutant, *acd6-1*, whose small size is inversely correlated with the plant’s defense level. We constructed a binary vector containing cloned PHT4;6 genomic DNA and transformed the *acd6* plants in order to increase PHT4;6 expression. Seeds from the transformed *acd6* plants will be placed on a 1/2 MS+Kanamycin selection plate in order to select the homozygous transgenic plants. In the future, after we obtain 10 different homozygous lines, we will infect these transgenic plants with *Pseudomonas syringae*, test these transgenic plants for their suppression of *acd6* conferred phenotypes, including plant size, and determine these plants’ levels of defense gene expression. If extra copies of PHT4;6 suppress *acd6* phenotypes, it can be determined that PHT4;6 is a negative regulator of plant defense.

### **When and how did you find out that you could do independent research work as a UMBC undergraduate?**

When I was applying to college, one of the schools that I chose to apply to was UMBC. While I was applying to UMBC, my father met with UMBC’s president, Dr. Freeman A. Hrabowski. Dr. Hrabowski told my father about the Meyerhoff Scholars Program and my father told me about the Program. I did some research into the Meyerhoff Scholars Program, which resulted in me learning about the research that was being done at UMBC. I applied for the Program and was accepted. The rest is history!

### **How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

Near the end of my freshman year, I decided to apply to the Pre-MARC Scholars Program. I found out about the Pre-MARC Scholars Program through the Meyerhoff Scholars Program. The Pre-MARC Scholars Program requires you to work on a research project with a research mentor. I had no research experience prior to attending UMBC. So, I decided to visit UMBC’s Department of Biological Sciences website and search for labs that interested me. I sent emails to the Principal Investigators of many different labs. I was granted interviews for two different labs. I was accepted into both labs. Having to decide between only two different labs made my decision easier for me. I chose to work in Dr. Hua Lu’s lab. Dr. Lu had chosen a project for me that would eventually allow me to work individually but at the same time, I would have the ability to ask my mentor, who is a graduate student, for help whenever I

needed it. I felt that Dr. Lu's lab would be a perfect fit for me. I am glad that I trusted my instincts!

### **How much time will you put into this research work?**

I plan to work eight to twelve hours a week on my research project.

### **What academic background did you have before you started on this research?**

My research lab focuses on plants. I did not have much knowledge about plants prior to working in Dr. Lu's lab. Most of what I knew about plants I learned in the Introductory Biology courses that I took prior to starting my research project. So, I have been learning something new about plants on a daily basis while working in my research lab. My previous summer research experiences have helped improve my technical lab skills, which resulted in me being able to start my research project sooner and spend more of my time learning about plants.

### **How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

I learned about the Undergraduate Research Award through my interactions with the P.I. of my lab and the Meyerhoff Scholars Program. The application was not difficult. The application was straightforward, however, the application was also time consuming. My mentor helped me throughout the whole application process.

### **What is your advice to other students about getting involved in research?**

I would tell other students to be patient. Conducting research will not always go smoothly. There will be days where everything you do works and there will be days where nothing you do works. The student must be determined to fight through any setbacks that he or she may encounter. I would also tell the students to take advantage of every opportunity that they are given. Finally, do not be afraid to ask your mentor or your P.I. questions. It is better to know that you are doing something correctly rather than think that you are doing something correctly.

### **What are your career goals?**

I plan to obtain an M.D./Ph.D. and to conduct biomedical research.

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**Krisztina Der**  
**Music Performance and Musicology**

### **“Arranging for Unconventional Ensembles”**

Given that unconventional ensembles represent a substantial performance mode in today's world of classical musicianship, knowledge and practical application of orchestral reduction and arrangement are extremely valuable skills for the aspiring professional musician. To this end, this research project seeks to study musical arrangements created for unconventional ensembles for the insights they provide into this artistic craft, and to put these techniques into practice by arranging Hungarian composer Zoltán Kodály's opera *Háry János* for a specific 'unconventional' ensemble of UMBC music majors. This study will include Stravinsky's reduction of his own work *Histoire du soldat*, the King's Singers' reduction and transcription of Rossini's *Il barbiere di Siviglia*, and Truman Harris' reduction and transcription of Verdi's *La forza del destino*. Additionally, by arranging Kodály's little-known opera, this project aims to fulfil the historical purpose of arrangements (or transcriptions) as one of the chief means to make known the music of notable composers where a literal performance cannot take place.

### **How did you find out that you could do research in your field as an undergraduate?**

I was oblivious to even the idea of conducting research in music, when I heard about the opportunity for undergraduate research at Welcome Week of my freshman year. Immediately, I began brainstorming ideas for a project. Later, I was able to talk to upperclassmen working on their own URA projects in music and became even more excited about the prospect of researching as an undergraduate!

### **What does it mean to do "research" in music?**

Research in music is wonderfully complex in that there are so many ways to approach it! Music has its historical, sociological aspects to be studied but also has mathematical and scientific (physical, psychological) qualities open for exploration. Moreover, perhaps most uniquely to this field, there is the practical performance realm of music. It is the culmination of these three things that makes music such a fascinating and beautiful field to study.

### **How did you decide on your research project?**

My goal, from the beginning of the URA application process, was to form a research topic, which resulted in some form of artistic expression. I had many ideas that I brought to my advisor, Dr. Joseph Morin, who helped me sift through them for diamonds in the rough. On the journey toward writing a solid proposal, I came to several dead-ends in my research. Eventually, Dr. Morin and I stumbled upon musical compositions, which could serve as models for a unique arranging project (performable material). Needless to say I was very excited and began work straight away!

### **What were you most excited about in regard to this project?**

My URA project had to do with taking music written for orchestra and arranging it for an unconventional group of five musicians – not a traditional ensemble (such as a piano quintet or a woodwind quintet) – employing instruments that are not commonly grouped together. What made the project even more special was that I chose to arrange a largely unfamiliar piece of music from the orchestral literature, Zoltán Kodály's Hány János Suite, in order to help acquaint my audience with the idea of the original. This process of reduction was used frequently in the time before recordings widely were unavailable. Inviting a full orchestra to your living room was a ridiculous idea unless you were an aristocrat, so works would be reduced in efforts to bring the music to the people. Another special element of this research project involved replicating the sound of a unique instrument Kodály calls for in his work: the Hungarian hammer dulcimer, called the cimbalom.

### **Who did you seek out as a faculty mentor? How did you know that would be the right person?**

Dr. Morin is the head of the Musicology program at UMBC. Since I had an artistic idea to pursue from a research perspective it was only natural that I turn to Dr. Morin for his advice. Furthermore, I knew from past experience that Dr. Morin would be willing to discuss my research ideas, support my goals, and share my enthusiasm for the subject of my study. Later, when I realized my research would also likely involve actual arranging, I turned to Dr. Linda Dusman, a professor of composition and instrumentation at UMBC, for her guidance in what was a largely unknown territory for me.

### **What courses or other experiences prepared you for this research project?**

While I have a very musical background and have dabbled in arranging before, I had never before studied the constrained art or formally arranged a piece of music. That said, my work drew a great deal upon music theory classes I had taken prior to my research project.

### **What methods or activities were involved in your research?**

My summer was filled with research: score comparisons and analysis, books on instrumentation, a meeting or two with both Dr. Morin and Dr. Dusman. In arranging, I found myself on vastly new turf. To aid me in this aspect of my research, I took a special projects class during the fall semester with Dr. Dusman in which we solely focused on studying instrumentation. She also took time during this class to give me advice regarding my evolving arrangement. During UMBC's Live Wire New music festival, I had the opportunity to participate in a master class with Italian composer and professor of composition at the Conservatorio "G.Nicolini" (Piacenza, Italy) Caterina Calderoni, in which she lectured on her own process in reducing and arranging Puccini's opera Tosca. Finally, after recruiting musicians to assist me, the work was rehearsed four to five times before its premiere performance.

### **What was the hardest part of your research?**

The hardest part of the process was the actual arranging. Arranging a piece of music is kind of like asking a visual artist to replicate the Mona Lisa at a different scale, using different mediums and different colors- -but still replicating, being true to the ideas Di Vinci conveyed by the original. It's all a puzzle, but a

worthwhile puzzle, as not everyone can go to the Louvre and see the original for themselves.

### **Does your research connect back to the courses you are taking?**

The research didn't connect back to any particular course per se. However, the project had to do with arranging music; I am a musician. Given that unconventional ensembles are becoming increasingly common with last-minute gigs and the often-limited resources musicians have, arranging is an extremely valuable skill for a musician to be comfortable with. Moreover, I've discovered that though the arranging process may seem confined to literally replicating the original work, an amazing arrangement requires lots of creativity!

I learned an invaluable amount from this experience! All of this, and a million other things: how to coordinate an ensemble's rehearsal schedule (a tricky task in itself!), how to find opportunities for the work to be performed, how a double bass is played exactly, that the interiors of grand pianos are all different, and so on.

### **What else were you involved in on campus during the time you worked on your research?**

Musically, I was performing with WindStroke, a flute and harp duo I formed with harpist Aimee Raechel. I was also preparing to solo with the UMBC Orchestra at the time, in addition to working on an exciting project in collaboration with the UMBC Theater Department (the fruits of which can be heard in the podcast of Susanna Centlivre's *The Basset Table*).

### **What are your plans for after UMBC?**

I plan to attend graduate school, where I look forward to continue pursuing opportunities for performance, teaching, creative research, and multimedia artwork.

### **What advice do you have for other undergraduate about the research opportunities at UMBC?**

Find a faculty mentor who is willing and excited to help you refine your ideas, and get started on that URA Application as soon as possible!

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**Amy Fowler**  
**Asian Studies and History**

### **“Analysis of the Hukou System in China”**

The hukou system is the household registration system in China that limits internal migration and determines how social services are allotted. Generally, citizens have either a rural or urban hukou, which is passed down from their parents, and household registration is difficult to change. China has experienced a dramatic economic and social transformation since hukou was adopted in the 1950s. It has allowed selective migration to meet the demands of a growing economy in the last 20 to 30 years. Hukou plays a significant role in determining the rights and benefits available to Chinese citizens and has effectively made those who migrate

into second class citizens, denying them the best jobs, education for their children, medical care, housing and other benefits. The public's growing dissatisfaction with the hukou system could threaten social stability in China. As China's economy grows, the trend is likely to continue. My research will take me to Beijing, China, where I will be conducting interviews and using other resources such as newspapers, periodicals, and archival materials. The scope of research will explore the origins of the hukou system, its evolution, and impact on society. Further study will include the government's role and the future of the system.

### **How did you know this was the project you wanted to do?**

I was perusing the China section of a bookstore when I ran across Leslie Chang's *Factory Girls*. After reading the book, I wanted to understand how migrant workers are affected by government policy. After

speaking to my mentor, I narrowed down the scope of my research to focus on the government institution of the hukou (household registration) system and how it affects migration in China.

**How did you hear about the Undergraduate Research Program? Was the application hard? Did your mentor help you?**

I heard about the URA program from my academic advisor who suggested that I apply. The application was not difficult and my advisors helped me throughout the process by providing valuable feedback. My mentor was especially helpful in determining a budget for my project.

**What academic background did you have before you started?**

Before beginning my research, I developed language skills and have also learned about Chinese society, culture and politics. I also completed an independent study focusing on social and political developments in contemporary China. The independent study provided preliminary research and a literature review for my research in China.

**What else are you involved in at UMBC?**

I am also a member of both the Interdisciplinary Studies Council of Majors and the Asian Studies Council of Majors.

**What are your career goals?**

I plan to earn my Masters focusing on Chinese policy and work in the Foreign Service or intelligence sectors of the federal government.

**What is your advice to other students about getting involved in research?**

Speak to your advisors and professors, as they are the best resources.

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**Mahelet Gennene**  
**Africana Studies**

**Summer Researcher**

**How did you learn about the McNair Scholars Program at UMBC?**

I learned about the McNair Scholars Program from Delana Gregg, the assistant coordinator of the Sondheim Public Affairs Scholars here at UMBC. Despite all the flyers, mass emails, etc. that the program disperses every year, a lot of students don't know about it until someone directs them to it.

**Was the application difficult?**

The application was not too difficult. The most important aspect was that all applicants must have the strong desire to pursue a Ph.D.

**Did the McNair program help you find your research project for this summer?**

Yes, the McNair program helped me fund my research trip to Ghana in addition to providing me with intellectual and physical resources. Although I determined my research project on my own, I would have never gotten to where I am without the program and my dedicated mentor Dr. Lateef Badru.

**How are you conducting this research?**

I am combining qualitative and quantitative data that consists of content/archival analysis, field study in Ghana, participant observation at a women empowerment Non-governmental Organization (NGO), and interviews.

**What has been the most interesting or unexpected thing about your research?**

So far, the most interesting thing about my research has been the excited reception of people and their support and enthusiasm for my project. I didn't expect people to go out of their way to help connect me with people and give me much appreciated advice on how I can improve my research.

### **What academic background did you have before you started this research?**

As a member of the McNair community, I was able to take a research methods class that opened my eyes to the process or journey of conducting research in my field. In addition, as an Africana Studies minor, I have taken several helpful courses that focused in that region, most notably, Introduction to Contemporary Africa.

### **What are your careers goals and how does this research fit into your goals?**

I want to be able to make an impact in the world I live in. Right now I am deeply interested in international human rights as well as diplomacy. I am planning on doing my masters in international affairs and eventually perusing my PhD. My current research examines how the empowerment of women through education affects the development and consolidation of democracy in Ghana. Hopefully my research will provide me with an in depth look into politics in Africa and help me focus my interests.

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**Thomas Glantz**  
**Ancient Studies**

### **Summer Research: New Philadelphia NSF**

#### **How did you find out that you could participate in an excavation for this summer?**

I was on the search for an internship for the summer. I was having no luck finding something related to archaeology that was close enough for me to commute to each day. Because of this, I contacted the director of the program for which I interned last summer (The Lost Towns Project). She suggested that I look into programs sponsored by the National Science Foundation (NSF), as she had participated in one such project when she was an undergraduate. She forwarded me to their website, which lists programs by field. This is where I found the project I later became a part of.

#### **What was involved in applying? Was it difficult? Did you have help from UMBC?**

Applying was fairly simple and quite easy. The application consisted of filling out a brief form, which contained questions pertaining to education background, writing a short letter of intent, sending the program a transcript, and also sending a few letters of recommendation. My professors at UMBC provided some of the letters of recommendation, along with a good deal of help in editing my letter of intent. Getting accepted to the project wasn't quite as easy however. Only nine spots were available and over sixty applications were submitted.

#### **What was the project you worked on? What did you do? How long were you there?**

The project I worked on was called the New Philadelphia NSF REU. **New Philadelphia** was once a small town in western Illinois' Pike County. The town was only a few miles from the still existing town of Barry. The town was founded by a freed African slave, Frank McWorter or Free Frank. The town began in roughly 1840, had a small time of prosperity before the rail road bypassed it, and later came to be used as agricultural farm land. I was involved in this project for ten weeks. The first five weeks focused on archaeological field work. During this time, I stayed near the site in the town of Barry. Each day I would travel to the site where excavations were in progress. The main excavation while I was there was the bisection of a cellar feature, or in other words, the excavation of one half of the cellar of a house. From this cellar, I and the rest of the field crew excavated thousands of artifacts. For the second five weeks, I stayed in the graduate dorms of the University of Illinois Springfield. While there, each day I processed the artifacts we had recovered. We began by washing them. Next we cataloged them. After cataloging, we labeled each artifact. Finally, for the last week of the project, we researched various aspects of the artifacts and their relation to the site.

**What did you already know about how to do this when you started? What did they teach you on the job?**

I already knew a good deal about the type of work I would be doing and the environment I would be doing it in. I experienced these things in my previous internship with **the Lost Towns**. While I had the basics of field and lab work covered, this experience reinforced the good habits I had already formed and helped to eliminate the bad ones. I already knew that archaeology is done slightly differently from site to site and from crew to crew, and this was apparent during this experience. For this experience I was taught a different system to keeping track of artifacts and their provenience and a different system of cataloging. I also did a bit of work with the geo-sciences as they apply to archaeology, along with a couple days of learning how to do faunal analysis. Both of these experiences were completely new to me.

**Who did you work with?**

I worked with a wide array of people in differing areas. I worked with many archaeologists, most of whom specialized in historic archaeology and one who specialized in faunal analysis. I also had three crew leaders who are currently in graduate school. Two are focusing on historic archaeology and one on the geo-sciences. I also worked with eight other undergraduates who were accepted to the program.

**Was it expensive to go there?**

The program was funded by the **NSF**, so instead of paying for this field school like most others, participants in this field school actually received a sizable stipend. In addition, lodging was completely paid for along with food for the first half of the project. The only thing I had to pay for myself was travel expenses, half of my food, and a bunch of cool souvenirs from the awesome places we visited while there.

**What was the most interesting thing about your time on this project? The most difficult?**

The most interesting aspect for me was being able to leave the comfort zone of being near people and places that were familiar to me and immersing myself in a totally new environment. It was also really beneficial to learn how others approached different topics and problems and to get a feel for how a job or grad school will likely be.

**Will you stay in touch with the project and people now that your summer program is over?**

I will stay in touch with many of the people I met there. I made some new friends and did quite a bit of networking, which I am learning is crucial in this field, as it is in most others. I will see many of the people I worked with again in January, as one of the big conferences is being held in Baltimore.

**How will the work you did this summer relate to your classes at UMBC? To your career plans?**

All of my archaeology classes have prepared me for field work, lab work, and academic writing; in other words, they prepared me for everything I did while taking part in this project. My classes and this experience continue to prepare me for the future, as I plan to have a career doing the same type of work, either in an academic setting or a corporate setting.

**What would you say to other UMBC students about finding such research opportunities?**

If you can find an NSF REU that relates to your field of study, by all means apply. It is hard to find research positions that pay you to be a part, not to mention how good National Science Foundation looks on a resume.

**Did you present your results at an end-of-summer symposium?**

At the end of the program I presented some research that I had done on a handful of the artifacts we recovered. I used makers marks and other distinctive features to determine both the date and location of manufacturing. With this information, those working on the project later will be able to date the different levels of the excavation units we dug, as well as make connections between the site and the rest of the country and world.



**Daniel Graham**  
**History and Philosophy**

**“The Rising Tides: A Comparative Study of the Circumstances and Outcomes of the North Sea Floods of 1953 and the Hurricane Katrina Disaster of 2005”**

In early 1953, the North Sea was experiencing uncommonly high tides for the season. On the evening of January 31, this high tide combined with a tidal surge and a fierce windstorm to inundate over 1,000 square miles of the Netherlands, and over 350 square miles along the coast of England. Within six hours, the flooding claimed the lives of nearly 2,000 people in the Netherlands (primarily in the provinces of Zeeland and South Holland), and over 500 British people drowned in the floodwaters. The

circumstances of the North Sea flood of 1953 shares a number of important similarities with the flooding of New Orleans in 2005 arising from Hurricane Katrina. My study will consist of a comparison of the North Sea disaster of 1953 and the Hurricane Katrina catastrophe of 2005. I will consider water-management efforts in the Netherlands, Great Britain, and the United States, and will analyze the events of each flood in light of these efforts. I will further investigate and compare flood responses in each country.

**When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

I received several emails through the Humanities Scholars Program, and am close friends with several past URA recipients.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

As I was preparing to study abroad in the Netherlands, I began to research Dutch history. In doing so, I stumbled upon the 1953 North Sea storm surge. I was taking a class on writing historically about natural disasters, so my interest was piqued. I approached Dr. Bouton, a history professor with whom I had previously taken a class, and whom I get along with quite well.

**How much time will you put into this research/creative work?**

I will spend much of the summer conducting preliminary research, and refining my research questions. While abroad, I am planning to take between two and five weekend trips to the British National Archives, and will take a similar number of trips to Dutch archives in Amsterdam, and throughout Zeeland.

**What academic background did you have before you started on this research?**

I have experience writing about natural disasters. I have also worked with the British National Archives for other projects. I will be taking Dutch language course over the summer and while abroad to further facilitate my research.

**How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

My girlfriend, a past URA recipient, suggested that I apply. The application was relatively simple, and although I did not ask my mentor for help, I'm sure he would have assisted me had I needed it.

**What is your advice to other students about getting involved in research?**

JUST DO IT! I never thought I would receive a research grant, but you cannot succeed if you do not try, and once I committed myself to this project, it was easy to apply, and now I get the opportunity to conduct original research!

**What are your career goals?**

I intend to earn a Master's degree in history, and hope to work as an historical researcher or analyst for an archive, or the government, or an independent contractor.



**Esther Gross**  
**Mathematics**

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### **Summer Researcher**

#### **Where did you conduct your research this summer?**

I conducted my research at the Claremont Colleges in Claremont, California.

#### **How did you find out about applying for summer research?**

I found out about applying for summer research because through the Meyerhoff program. They strongly encourage all of us to apply for Summer Research Opportunities for Undergraduates (REUs).

#### **Where did you look to learn which places were hiring undergraduate researchers?**

There are lots of great opportunities on the NSF website. Furthermore, Google is a great resource if you just search for keywords like "internships," "REUs," and "Undergraduate Research."

#### **How many places did you apply to?**

I applied to around 10 different internships. This was helpful because they can be really competitive.

#### **Was the application process difficult? Who helped you?**

The application process reminded me of applying to college. It's not too difficult, though it is very important to keep organized. I recommend making a chart to keep track of deadlines, reminding professors about recommendations, and writing a generic personal statement that can be modified as needed.

#### **What research did you do?**

My research was on the statistical modeling and clustering of music. We looked at 544 short drum interludes and worked on instrument recognition using template matching and Hidden Markov Models.

#### **Was this your first time conducting research in the summer?**

Yes and I highly recommend it. It was the most fun enriching experience that I had all summer.

#### **What background did you have before you applied?**

Though I was vaguely familiar with statistics, I had never actually taken a class and had very little experience with the material. However, I had no difficulty picking it up. All of us were glad to help each other overcome holes in our background. Don't let background stop you from applying, just be up front about it.

#### **Who did you work with during your research? A professor? Graduate student? Other undergraduates?**

I worked with a group of undergraduates as well as a professor. It was such a pleasant experience working side by side with a professor rather than being 'told what to do.'

#### **Where did you live while you were doing the research?**

I lived on Pomona campus in the dorms with the rest of the researching.

#### **Were you paid?**

The internship provided a very generous stipend. Furthermore, housing and food with provided along with lots of fun activities.

#### **How do you think this research experience helped you?**

In addition to helping me learn more about graduate school and academic research in the field of mathematics, it was a very empowering experience. Furthermore, I made tons of friends with similar interests.

**Will you do any research this year during the academic year?**

Yes, I am currently in the process of searching for a professor to do research with for the next couple of years.

**What about next summer?**

I will either be participating in research on campus or applying to another internship. I can't wait.

**What would you say to other UMBC students about finding and doing summer research?**

You should definitely do it! Don't be afraid to ask others for help and whatever you do, don't limit yourself. Apply to several places, even places that are on the other side of the country. It's about a lot more than just research; it's a wonderful life experience.

**What are your goals after UMBC?**

My goal is ultimately to earn a Ph.D. in mathematics and become a professor. I am still trying to determine what graduate school I would like to attend. Regardless of where life takes me, I hope that I can be a perpetual student and continue to learn.

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**William Hanchett**  
**Financial Economics**

**“The Effects of Risk Aversion on Portfolio Asset Allocation”**

Standard advice for retirement investment portfolios makes use of a glide path by which the portfolio holds less in stock and more in bonds over time. This implicitly assumes a rising level of risk aversion of investors as they approach retirement. This study examined how those percentages are calculated and more specifically, what those percentages imply about both the level and path of investors' risk aversion. Through utility analysis and simulation methods, this study has shown that a one-size-fits-all glide path cannot be the optimum for all investors when their risk aversion varies. A wider variety of investment strategies would benefit investors. For example, rather than a single path for all investors,

aggressive, moderate, and conservative strategies can be used. With a more individually tailored portfolio, an investor can use a more appropriate investment strategy. Implementing more congruous strategies, however, requires improved assessments of investors' risk aversion, so ways to do this were also examined.

**How did you decide on your research project?**

The topic was presented to me by Dr. Lamdin of the Economics Department.

**What courses or other experiences prepared you for this research project?**

I work in the field of finance which definitely helped when exploring different concepts while I researched the topic. The courses I'd taken in personal finance as well as macroeconomics definitely helped when applying the ideas and implications of the data to the real world.

**What was the hardest part of your research?**

The hardest part was pulling all of the data together to form cohesive conclusions. With so much information, it took a lot of time and analysis to figure out which parts were most relevant. I also wanted those who saw my presentation and/or read my paper to really grasp the implications, so getting my points across congruently was challenging, but definitely an enriching learning experience.

**Does your research connect back to the courses you are taking?**

My research definitely connected to my classes, most specifically the macroeconomics class I was taking at the time through large scale implications of the research itself. Becoming familiar with more research methods and formats gave me new perspective on some of the material covered in previous classes as well. I had taken Dr. Lamdin's corporate finance class and I applied material learned from that class and statistics classes in gathering and analyzing the data.

### **What are your plans for after UMBC?**

I want to do the Master's program at UMBC through the Economics and Public Policy departments. I may also complete a Master's program elsewhere in Economics; more specifically, International Economic Policy and Analysis, but I'm very interested in many different subjects as they relate to Economics, Public Policy and Finance.

### **Do you plan to do anything that builds on your research?**

I've definitely had many ideas that have come from researching this topic that tie financial markets with economic indicators as well as analyzing past economic policy's effects on current conditions in both the US and other areas of the world. I believe this topic has many, many different paths for interest and I'm open to exploring some of them in the future.

### **What advice do you have for other undergraduate about the research opportunities at UMBC?**

Definitely be active in seeking out opportunities and if you're like me and are presented with the opportunity, do not hesitate to do it. I had a lot going on the past semester, but researching was such a rewarding experience even though my workload was stacked. Also, don't be afraid to look into every possibility for information because you never know what aspect may be important to your research.

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**Kathryn Henry**  
**Political Science and Public Administration**

### **"Considering Intestinal Permeability in Eating Disorder Treatment"**

Increased intestinal permeability (IP) has been linked to a number of psychiatric, developmental, and physiological diseases, but its role in the development or worsening of eating disorders has yet to be thoroughly investigated. Because high levels of chronic stress and erratic eating behaviors are risk factors for developing both IP and anorexia nervosa (AN), it is theoretically possible that patients with AN could be suffering from IP. The existence of IP in patients with anorexia nervosa (AN) would have important implications for eating-disorder treatment, primarily because the nutritional approaches to treating the disorders are contradictory to one another. Since anorexia nervosa is a notoriously hard-to-treat disorder and only a small number of patients ever fully recover from it, IP would appear to be worth investigating as a possible factor in the treatment-resistant perpetuation of the disease. The likelihood that patients with AN could be suffering from increased intestinal permeability, the pathophysiology of each disorder, and the implications that these findings could have for eating disorder treatment are the things I'll be studying during my research endeavors this year.

### **How did you learn about the McNair Scholars Program at UMBC?**

My Sondheim Public Affairs adviser Delana Gregg told me about the program and encouraged me to apply. Her support really made the difference and I am so thankful that she thought of me for this!

### **Did the McNair program help you find your research project for this summer?**

The McNair program has provided everything I could possibly need for researching this summer. They helped me find a mentor, draft a proposal, design my project, and they've also provided me with a place to stay and conduct research. In addition, they've helped me out with the cost of food, so I'm free to spend time working on my project rather than trying to make money by working another job in addition to my research duties.

### **How are you conducting this research?**

I'm doing a literature review and some analyses of my own. In addition, I hope to do some surveys and patient data analysis in the future.

### **What has been the most interesting or unexpected thing about your research?**

Learning that peptides from wheat (gluten) and dairy (casein) can act almost exactly like opiates in the brain was very interesting. In addition, the finding out that anorexic patients experience less intestinal permeability and have better immune function than normal controls was really surprising.

### **What academic background did you have before you started this research?**

I'm a Political Science and Public Administration major, so at first glance this research project would appear to be way outside of my field. As someone who's interested in public health, however, it was concerning to me that so little research has been done linking the incidence of eating disorders to food and lifestyle habits. Eating disorders, obesity, and chronic disease have all been on the rise since the early 1900s, and this trend matches very nicely with increases in food processing and sugar consumption in the U.S. diet. I've conducted original research before and have a pretty extensive background knowledge of my subject from previous research endeavors, so I felt confident that, with some advice from professionals, I could take this on.

### **What is your advice to other students about getting involved in research?**

Talk to people and professionals who are studying what you are. I tend to get really into reading reports and my ability to produce written work often slows because of this. There is so much to learn that it's easy to get off track and never end up writing everything. Talking to people reminds you of your goals and gives you new ideas when you're stuck. Networking is never a bad thing, and I've found that professionals generally really like to help undergraduates who are passionate about what they're studying.

### **What are your careers goals and how does this research fit into your goals?**

I'm actually planning to attend medical school after college and pursue a naturopathic degree. An N.D. is similar to an M.D.; both have the same basic sciences as the core of their educational curriculum, but I like that N.D. is more systems-based and holistic. Naturopathy is based on the idea that the body is capable of self-correcting disease (often without drugs) if given the right support. It's focused a lot on educating and empowering the patient and preventing diseases before they start. I think we will see a huge increase in popularity as the skepticism around the practice decreases and people being to understand the value of this approach. The accredited medical schools that offer this degree are pretty legitimate and I've actually found that N.D.s are now training M.D.'s regarding topics like endocrinology, adrenal function, herbal supplementation etc. My research on this topic takes a functionalist approach, which means it will fit right in with what I'll learn in medical school. I plan to continue this research well into my adult life. I think the issues I'm hitting on are really important and will need to be publicized in some way.

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**Dalton Hughes**  
**Chemical Engineering**

#### **“Signaling Response of Neuronal Cells to 3D Tissue Scaffolds”**

Neurons grow and develop in the three-dimensional (3D) environment of the developing embryo. Previous work from our group has demonstrated that culturing embryonic neurons in 3D matrices allows the cells to respond in a way that more closely resembles natural development than traditional 2D culture. Cells interact with their extracellular matrix and sense the dimensionality of their surroundings via integrin receptors on the cell surface that bind to matrix molecules, initiate intracellular signaling cascades and affect changes in cell shape and function. My work focuses on elucidating the signaling events that regulate these changes in cell response. We hypothesize that 3D environments impose changes in matrix-ligand organization and alter neuronal behavior by modulating  $\beta$ 1-integrin cytoskeleton signaling. To test this hypothesis we culture PC12 cells, a neuronal cell model, on 2D and within 3D collagen substrates and probe the signaling response by inhibiting several key signaling molecules involved in regulating neuron morphology:  $\beta$ 1-integrin, Focal Adhesion Kinase (FAK), and an activated form of FAK that is phosphorylated at tyrosine 397. Immunocytochemistry techniques and

fluorescent microscopy will be used to analyze the effect of inhibiting these signaling molecules on neuronal behavior. The results of this experiment will identify the key signaling mechanisms in 3D neuronal culture and provide a biological basis for testing new biomaterial-based therapeutics.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

Around the time I was entering UMBC as a freshman, I was deeply interested in the field of regenerative medicine. I came across Dr. Leach's research on the Chemical Engineering Department website and immediately started reading publications and reviews. I found every single research topic interesting and after meeting with Dr. Leach, we found the perfect project.

**How much time do you/will you put into this research/creative work?**

I plan to spend 8 – 12 hours a week conducting my research.

**What academic background did you have before you started on this research?**

My experience in several summer research internships as well as knowledge from my science courses definitely helped in understanding my research project.

**How did you learn about applying for the Undergraduate Research Award? Was the application hard?**

Both Dr. Leach and my graduate student mentor encouraged me to apply. The application was very straightforward and was good practice in scientific writing.

**What has been the hardest part about your research?**

As with all research experiences, it is easy to get caught up in all the experiments and freak out when you hit a roadblock. However, this is easily managed by taking two seconds to realize that everyone goes through some sort of frustration in research.

**What is your advice to other students about getting involved in research?**

Research is exciting. No matter what your interests or major may be, there is always a question that needs an answer. If a student has the opportunity to conduct research, they should give it a shot.

**What are your career goals?**

I plan to pursue a PhD in biomedical engineering and conduct research in either an industrial or academic setting.

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**Eva Jannotta**  
**Gender and Women's Studies and English**

**“What is Chick-lit? Gender and Genre in Contemporary Popular Fiction”**

This research will examine “chick-lit,” a contemporary popular fiction genre, from a Gender and Women's Studies and literary criticism perspective. Ten chick-lit novels written by women in the United States will form the basis of my analysis. I will first examine the way in which chick-lit novels imagine and represent contemporary professional white women, paying particular attention to portrayals of female relationships, feminism, careers, and the perpetuation of whiteness as an invisible racial category. I am also interested in how traditional gender roles and norms may be reified or undermined in these novels through the ways in which female characters negotiate their careers, families, and romantic partnerships. I will then analyze chick-lit novels as part of a supposed genre, using genre theory to determine if and how chick-lit novels comprise their own “genre.” Novels considered chick-lit are many and varied, with roots in romance novels, novels of manners and epistolary and diary writing. I will examine these and other influences and analyze the components of chick-lit novels to determine if they merit categorization as one cohesive genre.

**How did you find out that you could do research in your field as an undergraduate?**

I came across literature review or research proposal assignments in several of my classes and decided that if I had to propose to review research for a class, then I could certainly do research myself. My current project was born out of a literature review assignment in GWST 300.

**How did you decide on your research project?**

Several professors helped me narrow my topic and gave me suggestions for how to make the research specific enough to be doable. I chose my topic because I'd read a lot of chick-lit novels and felt uncomfortable with how poorly these books are portrayed in the media and academia. Whenever you have a concern like that, something doesn't feel right or doesn't make sense to you, it might be a place to do research.

**Who did you seek out as a faculty mentor? How did you know that would be the right person? Was he/she easy to approach?**

I first approached professors I was familiar with in the Gender and Women's Studies (GWST) and English departments. They in turn directed me to my independent project mentor (Dr. Kathy Bryan in American Studies) and my URA mentor (Dr. Jessica Berman, chair of English). I asked Dr. Berman to be my mentor because she has extensive experience both in GWST and Literature. She was very easy to approach and very supportive. I am fortunate to also have taken a class with her, which I greatly enjoyed and which helped me feel comfortable working with her (but taking a class with your mentor is by no means necessary!).

**Was the Undergraduate Research Award (URA) application hard to complete? Did your mentor help you?**

It was not hard to complete but did take several drafts. Another professor I consider a mentor helped me with the application process: Dr. Osherow in the English department. She had great feedback and was very supportive. I asked her for help because I have known her since freshman year and she has helped me with other projects in the past.

**What courses or other experiences prepared you for this research project? What has been the hardest part of your research?**

All my courses that required research helped - the Humanities seminar I took freshman year, GWST and English classes. It has been challenging to keep up with the research sometimes, as there is no syllabus or immediate "due dates" for the work. It has been a good lesson in accountability and pacing myself. It's very easy to put off the work! I'm working on self-discipline.

**Does your research connect back to the courses you are taking?**

Yes. It connects generally to English and GWST topics, as well as to my plans for the future. I am applying for a Fulbright Scholarship to study the intersections of gender and writing in Peru and I want to study gender and writing in grad school. This URA project has been an invaluable experience and opportunity.

**What else are you involved in on campus?**

The Humanities Scholars Program, Women Involved in Learning and Leadership (WILL), Gender and Women's Studies Coordinating Committee

**What are your plans for after UMBC? Do you plan to do anything that builds on your research?**

I hope to win a Fulbright to do research abroad. If that does not work out I want to find another way to spend time abroad, improving my Spanish and experiencing another culture. Ultimately I want to pursue graduate school and my Ph.D., and teach Literature and Women's Studies at the college level.

**What advice do you have for other undergraduate about the research opportunities at UMBC?**

You CAN do research in your field and it can and should be something you are passionate about. Research doesn't have to be boring! Researching chick-lit has been hard work and fun because I am interested in the results. I used some of my URA grant to travel to a conference where I met other scholars researching

chick-lit. It was a great experience! There is so much out there. Give the URA a shot if you have an idea of something you want to learn. Professors will be there to help you. It's a unique opportunity at UMBC, very valuable experience, and it sure looks good on your resume!

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**Jacob Keener**  
**Political Science**

### **"Rethinking the Liberal Democratic Peace Hypothesis"**

The purpose of this research is to inquire into the various meanings of the word democracy and to use the knowledge from that inquiry to investigate the democratic peace theory, which holds that states with democratic forms of government tend to be more peaceful than non-democracies. A substantial amount of research has been done about democracies and war, including the democratic peace theory by international relations scholars, but much of this research has taken the meaning of democracy for granted. At the same time, political philosophers have written at length about the meaning of democracy, but both groups do so in their separate spheres. The nexus of international relations and political philosophy is a sparsely-researched area and both fields would be better served by research that takes into account both theoretical philosophy and empirical research. Through this research I will investigate the different meanings and variants of democracy and classify various democratic states according to these definitions. The research will then investigate the political and military actions of each state in its foreign affairs in light of democratic peace theory in order to come to a conclusion about the accuracy and relevance of the theory to differing democratic states.

### **When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

I was told by my academic advisor, Dr. Hody (who is also my research advisor) about POLI 409, which is a class that prepares students to do research. My professor in that class, Dr. Forestiere, encouraged me to apply for the URA.

### **How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

I knew that I wanted to do a project in political science since that is what I've been studying the longest. Additionally, since I was already in POLI 409 planning to do a Poli Sci honors project, it made sense to do stay in this field. I decided on democratic peace theory as my topic because, as part of International Relations, it has interested me since my very first semester at UMBC. I have taken two International Relations courses with Dr. Hody and I also know her from advising, so she seemed a natural choice for advisor.

### **How much time do you/will you put into this research/creative work?**

I expect to do the majority of the research for this project over the summer months of 2011. I estimate that I will invest 10-20 hours per week doing research through online databases and at institutions such as the Library of Congress. Throughout the summer I will distill these readings into an annotated bibliography and craft both a literature review and the first, primarily theoretical, part of my final paper.

### **What academic background did you have before you started on this research?**

I have been a political science for all three years that I have been at UMBC so far, and I have taken numerous classes on the subject both within the department and through the Honors College, where I am also a student. I have taken two classes specifically on International Relations, though the subject has come up in other classes as well.

### **How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

I learned about the URA through Dr. Forestiere in the Political Science Department. I was taking POLI

409 with the idea of doing an honors research project within the department, and Dr. Forestiere encouraged me to apply for the URA. The application was difficult, particularly in that it was unlike any other application I had filled out before, but I received help from both Dr. Forestiere and my mentor on the project, Dr. Hody.

### **What is your advice to other students about getting involved in research?**

Start early and keep your plans in mind at least a semester in advance of starting the actual process. Find a good advisor early and meet regularly to discuss your project and your plans for how to complete it. Having a strong start and support from a mentor will enable you to have a sense of what you need to do. Then follow through! In that vein, it is a good idea to have a comprehensive schedule early on.

### **What are your career goals?**

I am not sure what I want to do beyond college and (eventually) graduate school, but I am interested in the possibility of working in a library or museum, and studying either library sciences or museum studies in graduate school.

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**Allison Kelly**  
**Chemistry**

### **NIST Summer Researcher**

#### **How did you find out about the NIST/SURF research opportunity?**

I attended a seminar on Undergraduate Research opportunities presented by Janet McGlynn, where NIST was highlighted.

#### **Was the application difficult? Did you have help with the application?**

#### **How many places did you apply to for summer, 2011?**

I did not find it difficult to apply. Most of the summer applications require basically the same material. The most difficult part was writing the personal statement (See below.), which can be difficult for any application. I attended a personal statement workshop and I asked for a lot of advice from fellow students more experienced with applying for research positions. I applied to somewhere between five and nine programs.

### **What project were you assigned at NIST?**

I was working with Dr. Lee Richter with organic solar cells. I used ellipsometry to study and characterize the interactions of the components of these devices.

### **What did you know about this field before you started?**

Very little. I knew absolutely nothing of the experimental technique I employed and only had the smattering of background from my undergraduate classes to help me grasp the underlying concepts of the work. But I found so many willing tutors.

### **What did you learn from the project? Does any of this apply to your work in your major at UMBC?**

I learned more than I can realize. I gained a lot of lab experience, as my mentor allowed me to be very involved in the hands-on work of the study. Additionally, I learned about more about the field of physical chemistry, which has guided my graduate school plans. And, perhaps most importantly I learned about how to think about science, and research science in particular.

### **Who did you work most closely with over the summer?**

I worked most closely with my mentor, who personally oversaw my project. I also leaned greatly on the skills and tutelage of several postdocs in our research group.

### **Did you live with the other NIST/SURF students? What was that like?**

I lived in the provided housing. The facilities were very nice, and the chance to participate in group

activities was a welcome relaxation.

**What do you want to do next summer?**

I'd like to pursue another internship. Possibly at the Maryland Science Center, but also possibly returning to NIST or a similar experience.

**What would you say to other UMBC students about getting involved in research as an undergraduate?**

Do it. It may take work and planning to get an internship, but it will broaden your mind. Both in the skills and knowledge you will take away, and the chance to experience what you may be spending the rest of your life doing.

**Research Reflections:**

On the grandiose level we talk about understanding the nature of the universe or discovering truth by logically doing things over and over again. But in reality, on the day to day level, scientists sit around and ask small questions. We don't question the nature of reality; we question the structure of one polymer. We don't discover a new way to move mountains, we talk about tossing pebbles. Every scientific leap is preceded by years of miss-steps and baby steps.

Scientists acquire knowledge in a different way. Throughout school and college we are taught to read, to search, that somewhere, someone has the answer. But what happens when the reference book doesn't have that value? When Google responds to a yes-or-no question with a shrug? What happens when no one has the answer? Our simple questions become complicated when there is no where to look them up. But we are scientists, and we can test it. So step by step, simple fact upon simple fact, we try to nail down truth.

Science doesn't always work. In school, when I suddenly measure negative Kelvin in the middle of a lab class, I don't celebrate redefining the laws of physics; I realize once again that I am an incredibly flawed human being. Research does not have this comfort. When something goes "wrong" (and it will) there is not the comfort of knowing it should have gone "right." Such is the nature of research: expecting the unexpected. Because science teaches us, not the other way around.

I entered my undergraduate career confident that I was going to become a scientist so that I could understand everything. It may sound like I have been disillusioned about my career choice, that my view of science has shrunk. Not at all. For a summer, I took a corner of the universe and made it mine. Yes, my project was small and hardly life changing, but for a summer, I dedicated my heart and mind to understanding and mapping out that corner. Ten weeks to answer three questions and discover twenty more. Did my view of science shrink? No, instead it rose up in front of me as a mammoth labyrinth of questions that would take an eternity to answer. But working at NIST showed me I didn't have to answer them all, not alone. I tried to answer one question, but next to me Marlon was answering another, down the hall Matt was answering yet another and in the building across campus, Xinran, Nayool and Ro were answering still more. Science is about much more than simply my ability to puzzle through the universe. It is about a network of thousands of curious, meticulous people working together to answer each other's questions. That is what I've seen at NIST, and that has driven me closer to, not farther from, a career in research. Because being a part of this collaborative community of intelligent, curious people are more inspiring vision than plodding along on my own solitary intellectual quest.



**Daniel Litwak**  
**Physics**

**NIST Summer Researcher**

**How did you find out that you could do research in your field this summer?**

I am a physics major, and I received many emails from people all over campus about research opportunities. Many of these were about the NIST SURF program, which caught my attention.

**Did you apply to other places?**

Yes, I applied to about five other places. NIST was the first response I received. It was exciting to know I had a confirmed place for the summer.

**Was the application difficult to do? Did you have help with this?**

The application was quite possibly the easiest of all the places to which I applied. Ms. McGlynn made deadlines well-known, and there were no problems whatsoever.

**Who was your mentor for this project?**

My mentor was Dr. Ron Tosh, a physicist in the Ionizing Radiation department at NIST. We had a great time over the summer, learning new information from medical physics to electrical engineering.

**How were you financed? Where did you live?**

We were paid a hefty sum of \$5,000, which was an attraction of the program. The folks at NIST put us up in a Summerfield Suites, a nice hotel about 10 minutes from campus, where we got to know the staff during the summer.

**What was the hardest part of your research?**

The hardest part was getting any of the results to match up with expectations. I would spend an entire day running an experiment and letting a program process all the data, only to find that I'd messed up a minor detail eight hours previous, throwing off the results. But the whole experience is about learning (or discovering) new science, experiencing research, and gaining patience.

**What was the most unexpected thing?**

How far the research at NIST extends. I have gone to class and heard professors present some information, only to realize during the summer that I was working with the people who discovered that fact. It's a surreal experience.

**How does this research relate to your course work at UMBC?**

The most relevant was the Electronics Lab I took at UMBC. We learned about all these separate pieces of circuitry throughout the course, and during the summer I was asked to create a circuit using all of these pieces. To be able to apply exactly what I had learned towards something useful and new was exciting.



**Asif Majid**  
**Interdisciplinary Studies**

**"The Moroccan Diaspora: An Identity Struggle"**

Juxtaposing their experiences against a backdrop of living in the Global North, members of the Moroccan diaspora undergo a unique identity struggle, given the already complex nature of Moroccan society. A multicultural environment, Morocco is influenced by Berber, Arab, African, and European traditions with incredible variety ranging from north to south. Accordingly, this research project seeks to examine the challenges that Moroccans living outside Morocco experience in cultural, political, social, geographic, and economic terms. Through an interdisciplinary analysis, I plan to explore how this identity struggle is experienced and what lessons may be derived from it so that peace may develop or

be maintained despite whatever diaspora challenges exist. Through a video documentary, I plan to then extrapolate the multicultural and identity-based nature of this research project into possible implications for peace both in Morocco and within the diaspora community.

**When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?** I first found out that independent research was an option while searching for colleges and determining whether or not UMBC was the right choice for me. This was late 2008 or early 2009.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?** I found a mentor that shared my interests and with whom I felt I had a good connection. She happens to also be the advisor for my self-designed major. I knew I wanted to do this project because of my background investigation as well as my intention to study abroad and match up my interests in that manner.

**How much time do you/will you put into this research/creative work?**

My research will require me to do interviews, background investigation, and edit video footage. This will probably be at least a month of intense work, in addition to forming the questions and answers throughout the prior semester.

**What academic background did you have before you started on this research?**

Before starting the research, I will have developed language skills, field study basics, and knowledge of what identity means within a Moroccan context. These will supplement my experiences and understanding of the Middle East in a way that will help shape my project.

**How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

I learned about the URA around the same time that I knew of the opportunities to pursue research at UMBC. I did not find the application to be too difficult, but a few revisions were necessary. My mentor was very helpful throughout this time, giving me advice and commenting on drafts.

**What is your advice to other students about getting involved in research?**

Research is about asking questions. I think that if there is a question that any student is interested in, they ought to pursue it in a manner that will lead them to inquire. Doing so is personalized and individualized, and should be encouraged as it is at UMBC. Students should take advantage of the opportunities available and answer the questions that they have.

**What are your career goals?**

I plan to participate in Peace Corps, work for USAID, achieve a PhD, or all three.



**Charles Mason III**  
**Graphic Design and Philosophy**

**“Lead by Example”**

I will address the problems facing some city and county high school students in obtaining an education of value. Through the creation of six posters, I will try to express some of the challenges faced by youth as they pursue their education. These include, but are not limited to, stereotypical attitudes, peer pressure and lack of a support system. By speaking with teachers, students and administrators from several schools, I will investigate what conditions might encourage students to stay focused, to increase their productivity and to heighten their success rate in school. I will display the six posters in cinematic form, that is, as six individual frames in a strip of film. At the conclusion of this research, I will display the posters in some of the schools I approached. Students will then have a visual reference that will reflect the issues many of us have at one time encountered throughout our educational journeys. This research is important for its ability to reach across multiple ethnicities, because students of all races have experienced these forms of hindrance to gaining a quality education at one time or another.

**When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

I first found out about doing independent research or a creative work through myumbc. I was honestly looking for ways to help pay for school and I happen to stumble along a grant where I could do research or creative work.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

I found a mentor through the help of Ms. Janet McGlynn. She was able to point me in the direction of a few individuals and from there I was able to choose my mentor, Dr. Vin Grabill. I knew that I wanted to do this type of creative work because I could reach a variety of students and could relate with the issues they face being in high school.

**How much time will you put into this research/creative work?**

Throughout this year I plan on spending at least 20 hours a week on this work. This will include gathering data and coming up with preliminary designs for the final project.

**What academic background did you have before you started on this research?**

Before starting this research I received my associates degree from the Community College of Baltimore County in general studies. I then transferred to UMBC in effort to extend my knowledge and education in hopes of receiving my BA from the University of Maryland, Baltimore County.

**How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

I learned about applying for the URA from searching for scholarships. The application was not hard, but paying attention to detail was the key. My mentor assisted me as I filled out my application. As I went through every step, he was their critiquing and brainstorming with me until I finalized the application.

**What is your advice to other students about getting involved in research?**

My advice to other students who want to get involved with research is to dive right in. If there is something you feel like you can change, or you want to see change through independent research or creative work do it. When we start to over think and wonder if we should or shouldn't, we lose the drive to achieve. So research and have fun doing it.

**What are your career goals?**

My career goals include starting my own magazine or being a traveling artist who through my artwork can change the mindset of a city or nation.



**Ngeri Nnachi**  
**American Studies**

**“The Effects of Patriarchy and Migration on Nigerian-Igbo Culture Sibling Sets within the United States”**

This study focused on immigrant familial relations within sibling sets of Nigerian-American families of the Igbo tribe living in the United States. Traditionally Igbo culture is patriarchal, granting males greater respect than females within the family. As a second generation Nigerian-American, I have been afforded the opportunity to negotiate between that traditional system and a range of family styles practiced in the United States in constructing my family relationships. In this study I examined how four sets of siblings from immigrant families negotiated the tension between Nigerian and American practices to create distinctive family structures and practices. The extent to which families retained or modified tradition depended on the values held within the families. I conducted and analyzed interviews with key members of each sibling set to examine the effects of migration and patriarchy on their families. The dynamics between each of the sets as well as the structure within them varied. All families have retained the sibling-centric structure, but some now allow sisters to function as the head of the family. Where one lived, where one grew up, how many siblings one had and what gender grouping one belonged to all worked together to affect how they interacted.

**How did you find out that you could do research in your field as an undergraduate?**

My department (American Studies) approached me with an application to apply for the Honors Section, which involved a year-long research venture.

**How did you decide on your research project?**

I changed my topic a few times and finally landed on my topic through critical analysis of my family dynamic.

**Who did you seek out as a faculty mentor? How did you know that would be the right person? Was your mentor easy to approach?**

I love everyone in my department so it would have been very difficult for me to pick a faculty mentor. I left it up to our advisor to place me with whomever she felt was best.

**How long did you work on your project? How much time did it take each week? Did you get academic credit for the work?**

It was a two-semester-long project with deadlines to guide us along the way. There were no set time intervals for me due to the nature of my research. I had many interviews to rely on so I was going along with other people's schedules which got in the way of my keeping myself to a set schedule. I did get academic credit through the Honors course.

**What was your research project?**

My research project looked into the issues of gender, preference, tradition and socialization practices within the Nigerian-Igbo community particularly amongst sibling sets born and raised within the United States.

**How did you know about presenting your work at URCAD? Was the application difficult?**

I had attended URCAD a few years before and really enjoyed the experience. The application process was relatively easy. It was made to be easy by the facilitators and I am very thankful for that.

**Were you nervous about preparing and delivering an oral presentation to the UMBC community? What help did you have preparing? How many people came to your presentation?**

I was most certainly nervous. To put myself at ease, I attempted to practice on friends but soon realized that method was highly ineffective because I was too comfortable with them. My whole department (which I love so much) attended my presentation as well as a few other students and friends.

**What else were you involved in on campus during the time you worked on your research? Did you have time for anything other than course work and research?**

Well, including my class load, I was also the President of the American Studies Council of Majors. I made sure I had time for other things such as leisure reading and interacting with family as well as friends.

**What are your plans for after UMBC?**

I plan on taking the LSAT's in December and apply to law schools next year. I hope to become a Family Lawyer and Child Advocate.

**Do you plan to do anything that builds on the research you did last year?**

I am deeply interested in cultural studies as a whole. I hope to look into a lot of that on my own just for my own knowledge. If there is a way to incorporate that into my work or educational experience, that would be even better.

**What advice do you have for other undergraduate about the research opportunities at UMBC?**

Take advantage of all avenues on campus. There are so many resources at your disposal and it is up to you to seek them out. Our school is known for its emphasis on research, which translates to there being an abundance of support on campus. Do not limit yourself to any one source... do not be afraid to tap into anything.

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**Ugonna Ohiri**  
**Computer Engineering**

**"Standoff Chemical Detections using Quantum-Cascade Lasers and Microphone Arrays"**

In this research we propose an innovative method for standoff chemical detection, using the techniques of photo-acoustic sensing and high sensitivity microphone arrays for acoustic beam-forming and noise rejection. Acoustic beam-forming is a technique used to detect signals along the formed beam while rejecting and filtering surrounding noise outside the regions covered by the beam. Similar to phase array antenna characteristics, we can form receiving beams using a 2D microphone array. The more microphone elements in the array, the narrower the receiving beam becomes (higher directivity). Our plan will be to use an array of 4 microphones and collect their signals simultaneously using a multi-channel A-to-D unit. The collected signals will be processed in real time with a delay time constant training section and will also achieve ambient noise cancellation and signal enhancement.

**When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

After my two successful research experiences combined with the research I am doing this summer, I was very confident of my capabilities to do research on-campus. I was able to complete both solo and group research projects as each summer presented a newer opportunity.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

My roommate is currently a returning URA Scholar and fellow Meyerhoff Scholar. He linked me up with his mentor to pursue a project that was in my realm of research interests. After meeting with him about the potential project, I was even more excited for his vision, direction, and contributions into real-world applications.

**How much time will you put into this research/creative work?**

I plan to put as much time necessary to make sure the project is successfully completed.

### **What academic background did you have before you started on this research?**

This past semester, I successfully completed three Computer Engineering courses for my major. I plan to use the knowledge I gained from these courses to help develop my research. In addition, I plan to use the concepts learned from my courses this semester.

### **How did you learn about applying for the Undergraduate Research Award? Was the application hard? Did your mentor help you?**

As a whole, I found the URA application to be moderately easy. I was able to get assistance from my mentor to help formulate the abstract and some of the additional details of the project.

### **What is your advice to other students about getting involved in research?**

Have patience! In the process, there are times where it can and will become frustrating. Sometimes getting some fresh air or even setting mini leisure-time can help clear one's thoughts and open up the mind more.

### **What are your career goals?**

Post-undergraduate education, I would like to obtain my PhD in Electrical Engineering. I plan to either teach in academia and/or continue to do research. I will take each day one step at a time.

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### **Catherine Pasqualoni Ancient Studies**

#### **“Image and status: representations of Etruscan women in funerary art”**

In general, the elite Etruscan women of the 6th century BCE held important and elevated positions in society, specifically when compared with low the social positions held by their Greek and Eastern Mediterranean counterparts. Following a long period of reduced intercultural trade and contact, and of general economic strife, in the Mediterranean world during the 10th and 9th centuries BCE, Greeks, Phoenicians, and other peoples began to make a reappearance on the Tyrrhenian coast of Etruria (which consisted mostly of modern-day Tuscany) in the 8th and 7th centuries BCE. In this period of renewed contact, Greek and Eastern Mediterranean art had a great stylistic impact on Etruscan artwork. This research will explore whether or not these influences had an effect on the public representations of elite Etruscan women in the 7th and 6th centuries, and whether they resulted in regional differences in public representations of elite women. I will examine images of women from sites such as Fiesole, Bologna, Murlo and Chiusi in the interior of Etruria and compare these images with those from coastal sites, including Tarquinia, Cerveteri, Populonia, and Vetulonia. The majority of the images I will be examining come from a funerary context.

### **How did you find out about the URA program?**

I heard about the URA program when I was first applying to UMBC in 2007, and it has always been something for which I planned on applying--and, with any luck, receiving!

### **How did you figure out the project you wanted to work on? How did you find a mentor for this project?**

I always knew that I wanted to study abroad in Italy, and to enrich my experience; I wanted to conduct research during my time there. When I knew for sure that I was going to be studying Archaeological Conservation in Florence, and that I would be working with Etruscan artifacts, I went to the professor in my department who has the most expertise in Etruscan archaeology, Dr. Marilyn Goldberg, and we began to brainstorm project ideas.

**Was the URA application difficult? Who helped you? How long did it take?**

The URA Application wasn't especially difficult, though to write a strong, clear, and concise proposal certainly wasn't easy. I had help from my mentor, of course, and also from friends who have had little or no experience with the subject. They helped me to make sure that my proposal would be clear and understandable to non-experts in the field.

**What was the most interesting thing that happened in your research?**

While conducting the travel portion of my research in Italy, I was able to gain permission to access the library of the Archaeological Superintendent of Tuscany. My professors in Italy were also able to connect me with some of the top scholars in Etruscan Archaeology, who in turn provided me with some advice on where I might find the most information relevant to my research.

**What was the most difficult?**

I think that very few research projects ever end up working out exactly as planned. During my travels, my visits to museums, and my attempts to gather a large and strong corpus of images for my study, I constantly had to slightly tweak my viewpoint or the direction in which I had been planning on going with this project. It can be very difficult to keep your mind open to changes, and not allow yourself to be biased by your original hypotheses, while researching and interpreting evidence, but this is also extremely important.

**What academic preparation did you have for the research you proposed?**

I had completed five semesters of various Archaeology and History courses before applying for the URA. In the courses I had written research-based term papers, as well as papers based mainly on the interpretation of artifacts and images. My URA research is the first large-scale, artifact-based project I have undertaken, but I feel confident in my preparation, especially having the guidance and support of my mentor, Dr. Goldberg.

**Would you recommend this kind of research project to other students?**

I would absolutely recommend this kind of research to others! Unfortunately, these days, many people don't see how important it is that we understand the ancient civilizations of the world, for nothing that exists today would be the way that it is had it not been for the people and civilizations that existed before us. Understanding ancient history and archaeology is just as important to us in the twenty-first century as is understanding the political and cultural implications of World War II, or understanding the mechanics of the circulatory system. This kind of research is not only personally rewarding, it is important for all of humankind.

**What are your career goals/plans for after UMBC?**

I will be graduating in May 2012 and I plan on going straight to graduate school to study Near Eastern Archaeology, and (hopefully) Archaeological Conservation.

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**Jessie Poole**  
**Theatre**

**The Body as a Vehicle for Performance**

In the acting program at UMBC, we are taught not only movement and voice work but also how to connect to an active inner emotional life. When combined, skills in these disciplines contribute to vulnerable and compelling performance. I would like to further bring together body and inner emotional life through the study of physical theatre, specifically through work with "neutral mask." Neutral mask, as developed by theatre luminary Jacques Lecoq, helps the actor achieve greater expressiveness by developing movement and gesture that is free of mundane, pedestrian patterns. This work is important because performers share traits with athletes. We must have strong, present, and enlivened bodies because our bodies are the vehicles for performance. My own experience has shown me that I have access to more compelling

performance choices as I study and practice various movement disciplines. I plan to pursue my research at a workshop at the Center for Movement Theatre called the “Neutral Mask Comprehensive Summer Intensive” at the Academy for Classical Acting in Washington, DC. The workshop is taught by Dody DiSanto, a teaching protégé of Jacques Lecoq. I plan to hold workshops with my peers culminating in a performance at URCAD, which will incorporate and demonstrate my research. My overall long-term goal is to create new performance pieces focused on movement in connection with human emotion and experience.

### **How did you learn about the URA program at UMBC?**

I first learned about the URA program through our department chair Dr. Alan Kreizenbeck and my academic advisor, and now URA mentor, Ms. Lynn Watson. I went to them knowing only that I wanted to take the acting training I’ve received so far at UMBC and explore new ways of creating theatre. What I would do, or how I would be funded, came later with my application and acceptance into the URA program.

### **What kind of research do theatre students do?**

Most of the work we do in our acting classes is experiential, and we work to translate cerebral techniques into our physical bodies. A theatre student can “research” by reading and studying acting theory or method text, but it doesn’t do any good if it cannot be implemented with the body.

### **How did you decide on the project you proposed? How did you find a mentor?**

Ms. Lynn Watson, who was at the time my academic advisor, and Ms. Wendy Salkind, a movement and acting teacher at UMBC, both suggested the “Neutral Mask” work. Ms. Watson offered to be my mentor. I did some research on neutral mask and the work of Jacques LeCoq, but I knew that a workshop where I could try it out for myself was imperative. Luckily a student of his, Dody DiSanto of the Center for Movement Theatre holds workshops in DC, and I applied and was accepted.

### **Was the URA application difficult? Did your faculty mentor help you?**

I found the application difficult because it was early in the process. I knew what I wanted to study, but I wasn’t sure where it would all take me, I wasn’t sure of the outcome. Ms. Watson assured me that it is a process, that it was okay to be in the middle of it. And that it was important to be open, I didn’t have write the ending to my story before the beginning.

### **How much time do you put into your project?**

The majority of the workload is still to come. In June I participated in the six-day workshop in downtown DC. Since then, I’ve spent a lot of time note-taking about my experience. Now that the workshop is over I can respond to the information my body received and start the process of creating my performance piece. I’ve also been exploring further the work of Jacques LeCoq and his L’École Internationale de Théâtre in Paris. Next I plan to research other types of masks beyond the Neutral Mask, and explore what a mask does to a ritual or performance.

### **What has been the most rewarding thing about the project?**

So far, the most rewarding part of the project has been the dialogue I’ve begun with myself, my professors and my colleagues at the workshop about what theatre is. The workshop was an incredibly diverse group of people, I was one of only two undergraduate students. Everyone else was either a professional actor, a theatre professor or a graduate student, and all were participating in different facets of theatre art.

### **The most unexpected? The most difficult?**

The most difficult and yet most surprisingly unexpected part of my experience thus far was that my training at UMBC has prepared me for the professional environment at the workshop. However, it was still difficult at times to keep up, and important to not worry about “being good” at the work, but to just do it.

### **Would you suggest that other theatre students pursue funded research through URA?**

Absolutely! There are so many things to do and learn, and people to meet and connect with, that as artists we simply cannot afford to miss out on this opportunity.

### **What are your plans for after UMBC?**

I hope to go to graduate school for theatre, and hopefully continue this dialogue about what theatre is and how we can make it new.

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**Mercedes Randall**  
**Psychology**

### **“The Effects of Meditation on Reading Comprehension and Attention”**

The effects of meditation on the mind and body have been the topic of numerous research studies. Many of these studies have examined the physical and psychological effects of meditation and have found that meditation can increase one’s ability to relax, may improve mood, and most importantly increase one’s ability to concentrate. This special ability to concentrate is known as mindfulness and is the desired outcome of the steady practice of mindfulness meditation.

Although previous research has supported all of these effects of meditation, none of them have offered ideas as to the practical implications of this knowledge. This study aims to examine the effects of mindfulness meditation in an academic context. Using a sample of students, I hope to demonstrate the effects of meditation on reading comprehension and attention. My aim is to show that practicing mindfulness meditation can be of practical use to students in an academic setting.

### **How did you find out that you could do research in your field as an undergraduate?**

I knew from several of my psychology classes that undergraduates should have some research experience before they graduate. My mentor told me that I could do an independent project as an undergraduate student. I thought that would be a really great way to gain research experience while studying something I am passionate about.

### **How did you decide on your research project?**

I decided to do research on meditation because it is something that I have a great interest in and would like to study in the future.

### **Who did you seek out as a faculty mentor? How did you know that would be the right person? Was he easy to approach?**

During a meeting with my advisor, I talked about my interest in psychology and spirituality and wondered how I could combine the two subjects. My advisor introduced me to Dr. Bediako who has background in doing research on different aspects of spirituality and I knew immediately that I wanted to work with him. He was very nice and easy to approach so I decided to ask him to be my faculty mentor for my independent research.

### **What has been the hardest part of your research so far? The most unexpected?**

The hardest part of my research so far has been designing my study. There are so many things to think about and consider when trying to make the methods as sound as possible.

### **What advice do you have for other undergraduates about the research opportunities at UMBC?**

The great thing about UMBC is that there are so many research projects going on. Students here have the opportunity to jump on board with current projects or create their own. I would tell other undergraduates that if you have an idea about a great study, you can make it happen.



**Emma Rixmann**  
**Social Work**

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### **Toddler Obesity Research Prevention Study**

#### **Where are you working / researching this summer?**

I am working at The University of Maryland School of Medicine, Pediatrics Department, Growth and Nutrition Division for a research study entitled Toddler Obesity Research Prevention Study (TOPS).

#### **How did you find out about research opportunities for Summer 2011? What is your project?**

I found TOPS on craigslist! The program was advertising for a childcare provider to entertain the children while the moms (the study participants) came in for the research evaluations. Since I have a background in public safety (I'm an EMT), they invited me to teach the control portion of the intervention (toddler safety) but soon had me begin teaching the toddler parenting/mealtime intervention as well as the maternal physical activity and nutrition intervention. I did that for a few years. The intervention part of the study ended a few months ago so I am now doing data coding, a totally new experience. We videotaped our participants sharing a snack with their child at three different time points during their participation with us and we are now determining and classifying the maternal feeding behaviors. We will evaluate the data from the videos and participant feeding questionnaires through the lens of feeding-style theories. What is really great is that I was able to observe and assist with the start-up of the coding system, something used throughout qualitative research.

#### **How many places did you apply?**

I applied to many places from catering companies to flower delivery companies. I really just needed employment but realized that this experience could lead (and has!) to so much more. Though I did not find TOPS via The Shriver Center, once I started working at TOPS I approached The Shriver Center and they gave me academic credit. Once I "maxed out" on credits I could earn, they offered to give me a research notation on my transcript for every semester I work, even the winters and summers!

#### **Was this your first research experience? What background did you have before starting this summer research?**

I had never done research before nor was I ever interested in research. I was a volunteer EMT and had worked as a clinical assistant at a fast-paced surgical practice throughout high school.

#### **Are there other undergraduates involved in the same research this summer? Who do you work with directly each day?**

Yes. I work with graduate students, professional researchers and faculty members. I am the youngest person in the entire division!

#### **What did you gain from this experience?**

I learned that no matter what you do, do it to the fullest of your ability and take pride in your work because you truly never know what an opportunity can blossom into. Prior to working as a health educator (my old title), I didn't even know if I would enjoy teaching others. Thanks to TOPS I have realized I LOVE to teach adults and I'm good at it! With all the amazing experiences I have gained at TOPS, I hope to become a professor and combine teaching and researching.

#### **What is your advice to other UMBC students about summer research?**

Start early! No employer is going to laugh at you if you call six months ahead of time to set up an internship. Utilize The Shriver Center. They are the most knowledgeable and helpful entity on campus. Also, never be afraid to ask for more challenging work during your placement! You'll be surprised the chances people will take on you. I began as a childcare provider and now I am getting some of the best research experience I could have ever asked for!

## Can you tell us your major and your plans for the future?

I will be a senior Social Work major and Emergency Health Services minor next year. I am in the process of applying for MSW (Master's in Social Work) graduate programs and hope to continue on to do my PhD. My interests include forensic social work, criminal justice, public safety, mental health and nutrition.

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### **Rachel Robinson** **Modern Languages, Linguistics, and Intercultural Communication**

#### **“Introduction to a Language Acquisition Model”**

This paper presents an introduction to a theoretical model of language acquisition that incorporates the psycholinguistic principles of Generative Grammar on which the Theory of Principles and Parameters is based, and argues that the following conclusions follow in a natural and logical manner from such a model:

(1) The [mental] Language Acquisition Device becomes functionally less efficient during puberty for reasons pertaining to its internal structure and related to the values on which the parameters of the first language are fixed.

(2) First language acquisition involves setting the parameter values available in Universal Grammar (Chomsky (1989: 27-29), whereas post puberty language acquisition involves the creation of a new set of parameters in reference to the parametric values of the first language.

In addition to the presentation of the above said theoretical model and relevant arguments, the paper elaborates on the neuro-linguistic correlations between such a model and several brain scans of monolingual and bilingual subjects.

Given the theoretical nature of this paper, its methodology follows the principles of deductive argumentation.

#### **Why do you think research is important in an undergraduate education?**

I believe that research is important in any area of education. Professors are guides and mentors, not salesmen of information. To truly gain knowledge of a subject, independent thought is required. Going beyond the textbooks, and really diving into the meat of an unexplored area is a challenge, but a necessary one for progress and growth not only in the field, but for the student as well. Students shouldn't wait until research is “required” of them in graduate school. It's never too early to take an interest and run with it.

#### **When and how did you find out that you could do independent research or creative work as a UMBC undergraduate?**

I was actually researching on my own, floundering a bit, and bouncing ideas around with Professor Westphal. The area of neuro-linguistics is not something which is often studied on the undergraduate level. I think he saw that I wanted to do more than what was required in the classroom, and eventually after many discussions, we started to see that there were patterns and evidence that could be explored. At that point, he informed me that there were opportunities for undergraduates to do research and be supported by UMBC.

#### **How did you know this was the project you wanted to do?**

I've had a dual love-affair with linguistics and the human sciences for as long as I can remember. The problem is that in many ways they seem to be mutually exclusive, at least in regards to how they are approached. I never really believed this should be the case, and I felt that they could be very valuable and complementary to one another. To take an abstract idea, something like the Critical Period of Language Acquisition (which is anecdotally understood) and explain it in terms of brain development and function, that was a very exciting topic to me. The beauty really presents itself when a linguist can look at this and

understand that there are concrete mechanisms in place within the human body that can be measured, and when a neurologist can look at this and see that there are still vast wonderments in the creativity of language.

### **What has been the most challenging aspect of this project?**

Time is always a factor; I have so little of it. In that regard I've felt challenged because there are many things which I would like to work on, or ideas that I'd like to put down on paper, but because of the obligations of life, I am often unable. Thankfully, I have had enormous amount of support from my entire family as well as my coworkers. That kind of support has helped me in ways I cannot articulate. Another aspect which is a meaningful challenge is the risk of being wrong, the challenge of scrapping ideas and putting one's ego aside for the sake of quality research.

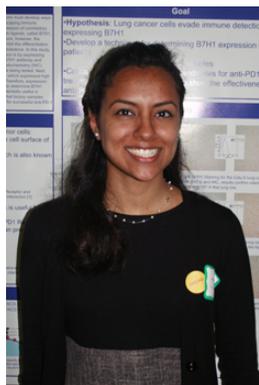
### **What is your advice to other students about getting involved in research?**

Take the initiative and responsibility for your education. If you have an area of interest that doesn't fit neatly into your regular curriculum then get involved in research. If you aren't sure where to begin with research then speak candidly with your professors and assess your strengths and weaknesses. This isn't about instant gratification, but ultimately the experience is a huge reward.

### **How did UMBC help you with your research?**

The Travel Funding was an integral part of this experience, without it, I'm not sure if I would have been able to participate in the SOCHIL conference. I feel that between the ongoing support from my mentor Dr. German Westphal with the MLLI department, and the Travel Grant Committee, UMBC as a whole has helped me reach goals that I initially thought were perhaps a bit lofty. My opinion has changed dramatically, and now I am aiming even higher than ever, I am inspired to continue and expand on my studies, and I have more confidence in my own abilities. The hard work completed and the memories of the fantastic trip are so rewarding, but are nevertheless overshadowed by the way this has helped shape my goals for the future. I am eternally grateful to Dr. Westphal, The Travel Grant Committee, and my alma mater UMBC.

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**Reema Sharma**  
**Biochemistry and Molecular Biology**

### **Incorporation of Tagged and Untagged L4 Ribosomal Protein into Ribosomes**

Ribosomes are responsible for the synthesis of protein in every living organism. They contain a large number of protein subunits (50-75 depending on the organism), and the functions of these proteins are not clear. Ribosomal protein L4 (RPL4) is an evolutionarily conserved protein present in ribosomes from bacteria to humans. My lab uses a "tag" in mutated versions of the RPL4 to observe the role of its various features in yeast ribosomes. This tag consists of six histidine amino acids added onto the N-terminal end of the RPL4 amino acid chain, which makes it possible to observe the relative amounts of mutant and wild type RPL4 protein accumulating in the cell. This in turn should make it possible to determine the function of mutant versions of RPL4 in ribosome assembly. However, the histidine tag may affect the overall structure of RPL4 and result in the tagged protein being less compatible with the ribosome than the un-tagged protein. My project is to determine if the tagged version is as effectively incorporated into the ribosome as the wildtype protein. The results of this project will be used to better plan and conduct other projects involving the N-terminal histidine tag on the L4 protein.

### **When and how did you find out that you could do independent research work as a UMBC undergraduate?**

UMBC is a school that is very much focused on advancing undergraduate research. Therefore by enrolling at UMBC, I knew I would have an excellent opportunity to do hands-on research and be able to work on a project of my own. Also, as a Meyerhoff Scholar, I was encouraged to find a lab of my interest.

### **How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

I knew I wanted to look for a lab on campus since it would allow more time for me to do research. I started by browsing through the research profiles of professors on the UMBC Biology and Chemistry Department websites and contacting the ones whose research seemed appealing to me. I kept my options open and talked to several professors in each department. Eventually, I decided to work with Dr. Lindahl since I had never worked in a lab that focused on the genetic aspects of an organism and wanted explore research areas that I was not familiar with. We worked together to find a project that was suitable for me.

### **How much time will you put into this research work?**

Over the summer, I plan to spend as much time necessary to progress my project. Over the academic year, I plan to spend an average of 15 hours a week.

### **What academic background did you have before you started on this research?**

Before joining my current lab, I had the opportunity to work in two different labs focused on two different areas of research. So I had a basic understanding of lab technique and environment. As for the course load, I had taken basic courses required for a Biochemistry major. During my sophomore year (the year I joined my lab), I took Genetics and Cell Biology both of which were very useful in understanding my research project. However, having said that, I don't think anyone should be discouraged or intimidated from working in a lab just because they believe they will not be able to understand the information. With time and enough literary research, anyone can understand the concept behind a research project and, in some cases, even help you study for your current or future classes.

### **What is your advice to other students?**

I would advise others to look for a lab that not only interests them research wise but also creates a comfortable environment for them to work in. It is important to have the freedom to ask as many questions as necessary to gain a better understanding of your project and the best way to achieve this is to have mentors who encourage your curiosity. Support from your mentor combined with genuine effort on your part can make research a very enjoyable experience. Also, time management is necessary as well as flexibility in your lab work. Working in a lab, especially during the school year, can be difficult because of time limitations. Therefore, looking into how you will incorporate lab work into your schedule is helpful. I found working in a lab on campus to be more convenient as it allowed more time for me to do research instead of commuting.

### **What are your career goals?**

I plan to pursue an MD/PhD after graduation. The areas of Oncology and Neuroscience are very appealing to me and I hope to pursue these fields in my future.

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**David Sweigart**  
**Physics and Mathematics**

#### **“Study of Single and Diboson Z Production at the LHC”**

This year, the Large Hadron Collider (LHC) at CERN has been running exceptionally well with pp collisions at a center-of-mass energy  $\sqrt{s}$  of 7 TeV. This has led to an unprecedented amount of data collection by the ATLAS experiment with an integrated luminosity of roughly 0.84 fb<sup>-1</sup> after selections to require data quality sufficient for physics analysis. The aim of my project was to acquire an understanding of how data analysis is used in high energy physics. To do this, I implemented a cut-based technique using the needed Monte Carlo (MC) corrections to search for single and diboson Z production. In the Z → μμ channel, I discovered a distinct peak of the invariant mass signal against the background at 91 GeV which indicates the

production of Z bosons. Furthermore, by implementing a cut on the ETMISS,  $A_x$ , I started to determine how to separate the ZZ process from the rest of the background in the  $ZZ \rightarrow \mu\mu\nu\nu$  decay channel. This cut may prove to be a powerful tool for future diboson Z production studies. Future work on this project will need to include applying additional MC corrections that were not considered and calculating the corresponding cross-sections for both single and diboson Z production. Comparison of these results with theory could serve as a stringent test of the Standard Model and potentially indicate the presence of new physics.

### **Where did you do your research this summer? When were you there?**

I conducted research at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland as a summer student. I was part of the University of Michigan (UM) Research Experience for Undergraduates (REU) program, which is funded by the National Science Foundation (NSF). My stay at CERN was for a total of 9 weeks starting in mid-June.

### **How did you learn that physics students could do research away from UMBC in the summer?**

Before attending UMBC, I had two summer internships at the U.S. Food and Drug Administration researching implant materials for medical devices. Therefore, I already knew that research opportunities existed away from UMBC, but I did not learn about the REU programs until my freshman year from one of my professors.

### **Did you already know that undergraduates could work at a place like CERN? How did you find out?**

I had no idea that undergraduates could work at CERN until I saw the UM REU program on the NSF's website. The UM REU program is in fact the only program that allows Americans to be official CERN summer students. This is because the United States is not a Member State of CERN.

### **What did you do at CERN?**

In the mornings, I attended a series of lectures specially designed to teach us about a wide range of topics in theoretical and experimental particle physics. In the afternoons, I worked on my summer-long project to study single and diboson Z production at the Large Hadron Collider (LHC) using data collected from the ATLAS detector. To do this, I ended up spending most of my time writing code in a programming language called ROOT. The goal of my project was to understand how data analysis is used in high energy physics.

### **Did everyone speak English?**

Geneva is in the French-speaking part of Switzerland. However, everyone at CERN spoke English except for the workers in the restaurants. I do not speak any French, but I still found it easy to get around and order food by just learning a few useful phrases.

### **Where did you live while you were there?**

I lived in one of the CERN hostels. This was very convenient for me because it was located close to most of the main facilities including the building where I worked as well as the restaurant.

### **Did you have time to travel in Switzerland or around Europe during your program?**

Yes! While the program did not organize any traveling, the summer students formed groups to go places each weekend. Being my first time in Europe, I was very adventurous and went on a tour of Europe. In Switzerland, I visited Geneva, Zermatt, and Bern, which were all very beautiful places. I also traveled to Paris and Lyon in France as well as other large cities including Barcelona, London, Rome, and Berlin.

### **What experience did you have before you went?**

I have actually never taken a course in particle physics since one is not offered at UMBC. Before going to CERN, I only had a junior-level knowledge of general physics. However, I was able to learn everything that I needed to know for my project with the help of my supervisors.

### **Were there other undergraduates at CERN? How many?**

The UM REU program was composed of 15 undergraduates including myself, but the entire CERN

summer student program was made up of over 200 undergraduates from all over Europe.

**Who did you work with most directly? Other students? Full-time researchers?**

I worked each day at a table with other summer students, and we would frequently help each other debug our code or talk out any problems we had. I met with my supervisors only once or twice a week to discuss the progress of my project, but we would still correspond often via e-mail.

**Was it expensive to do this?**

The UM REU program covered the cost of my plane tickets and my travel insurance. I also received a per diem of 90 CHF to pay for my hostel and food which turned out to be more than enough. Furthermore, the program gave me a stipend of \$2,500 which I used to help pay for all of my traveling.

**Do you want to go back?**

Yes! It was amazing to participate in our universal quest for knowledge during these very exciting times at CERN, especially with the first of many results now coming from the LHC. This experience has extremely enriched my cultural and academic knowledge!

**What are your goals after UMBC?**

After graduating from UMBC, I plan to attend graduate school for a Ph.D. in physics with the ultimate goal of becoming a research scientist. However, I am still keeping my options open regarding my specific sub-field of concentration. Who knows? I might even find myself back at CERN one day!

**What should other UMBC students know about summer research opportunities?**

There are plenty of research opportunities in all different fields if you know where to look for them. The NSF maintains an updated list of their REU programs, which can be accessed by going to their web site: National Science Foundation. These programs offer an incredible chance to experience the day-to-day work of research groups across the United States and abroad. I strongly encourage applying to anyone thinking about going to graduate school.

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**Kevin Triplett**  
**Gender and Women's Studies**

*"The Gendered Asylum: Nineteenth Century Asylums Used as Tools of Female Socialization"*

**How did you find out that you could do research in your field as an undergraduate?**

Research is encouraged within the Humanities Scholars program. We were given the tools and understanding to seek the answers to our research questions by actively engaging professors and scholarly sources. When I found that the professors were just as excited to enable us to do our own research, it became a matter of finding which professors had the same interests that the questions required.

**How did you decide on your research project?**

My primary research concerns have dealt with reexamining various topics in terms of sex and sexuality. The piece published in the UMBC Review was a comparison of primary sources to the admission records and latent goals of the mental institution system. My sources were from nineteenth century America and detailed the expected roles of women at the time. This research was meant to examine the ways the asylums were used to socialize women who stepped out of their prescribed roles, pushing them back to the conventional traits of passive femininity.

**Who did you seek out as a faculty mentor? How did you know that would be the right person? Was he/she easy to approach?**

Dr. Phillip Seng was one of the professors who co-taught my Humanities seminar my freshman year. As my advisor he encouraged me to submit my paper.

**How long did you work on your project? Did you get academic credit for the work?**

The paper began as a final research paper for my Humanities seminar and underwent a graduated process of outlining the topic, composing a thesis, collecting sources and solidifying the argument. After the class was over, my mentor encouraged me to polish the piece and submit it to the UMBC Review.

**What did you know about how to do this research when you started? How did you learn?**

I knew the general pattern of research, but synthesizing the primary and secondary sources in a meaningful way was definitely a new experience. The epistemology of the research project allowed for a better understanding of how the researcher himself is a part of the knowledge he acquires and produces.

**What was the most interesting or unexpected thing that happened in your research?**

When the research for the asylum project finally had pieces of evidence that supported my thesis, there was also an interesting consolidation of my academic majors (psychology/sociology/gender studies) in the piece I had produced.

**What difficulties did you encounter?**

The issue was organizing the research in a meaningful way to support both the claims I had presented and purposely use the knowledge I had collected. Mapping out my goals in the research helped resolve the confusion of excess information.

**What else were involved in on campus at the time? Did you have time for anything other than course work and research?**

As I continued my research I was also working on-campus. While the research process took a considerable amount of time, it did not heavily dominate my free time.

**How did you find out that you could submit your research to the UMBC Review?**

Dr. Seng encouraged me to submit the piece to the UMBC Review after the seminar finished. A majority of professors have encouraged students to continue their research and utilize the pieces they write as foundations for further research.

**Was it hard to prepare your manuscript for initial submission? What about revisions and working with the Review editors to get your article ready for publication?**

The primary preparations required the proper formatting of the paper for style guidelines. I was asked to examine my topic in new perspectives for my revisions; for instance, although the paper relied heavily on the construction of femininity, I was asked to put a short piece on the state of manhood in nineteenth century America as well.

**Are you doing further work that expands on your original research or on the research skills you developed on that project?**

I've been working in the gender studies department on other topics involving sex and sexuality. Under the advisement of Dr. Jodi Kelber-Kaye, I've looked at the process of masculinization in the popular music of Ke\$ha and Katy Perry as a form of empowerment and the consequential negative side-effects. This paper used content analysis that involved the combination of lyrical themes and research on manhood, as well as a situational analysis comparing current female music to the Riot Grrrl Movement.

**What advice do you have for other undergraduate about the research opportunities at UMBC?**

I would definitely advise students to work with what they have: use final papers and personal endeavors as a jumping board to ask bigger questions and pursue research. Professors are often happy to hear the ideas of students and will be willing to provide some advising on where they can take their research.



**Ryan Wentworth**  
**Financial Economics**

### **“The Effects of Rebalancing Frequency on Portfolio Performance”**

This research investigates how the frequency of portfolio rebalancing affects the risk and return of an investor’s portfolio. Portfolio rebalancing refers to reallocation between asset classes to match the targeted portfolio allocations. Increases or decreases in asset values over time will cause actual asset holdings to differ from targeted allocations. Popular portfolio allocations will be simulated using U.S. data on asset class returns, such as stocks and bonds, over the time period from 1926-2009. For each portfolio, a sensitivity analysis will be conducted to determine how risk and return are affected by different rebalancing frequencies. One, two, three, four and five year rebalancing frequencies will be used. For each portfolio and rebalancing period, the average return, standard deviation of return (which measures risk) and Sharpe Ratio (the standard risk-return statistic) will be calculated. The optimal rebalancing period will be the one that maximizes the Sharpe Ratio. Additionally, these portfolios and sensitivity analyses will be constructed for multiple time frames within the range of 1926-2009. Using information from multiple time frames can help assess whether the optimal rebalancing period is consistent, and account for differences in returns on different assets during different time periods. Knowing whether there is an optimal time frame to rebalance a portfolio is important for portfolio management decisions because it is a variable that managers of portfolios must consider.

#### **How did you find your mentor for this project?**

Dr. Doug Lamdin was my professor for Fundamentals of Financial Management and then later for Investments. Through these classes I developed a strong relationship with Dr. Lamdin. He has also been the mentor for other students who have participated in URCAD and I knew he would be an experienced mentor for my research.

#### **How much time do you/will you put into this research?**

Over the next year I will be spending three to five hours a week performing research and applying skills gained through academic coursework.

#### **Do you get course credit for this work?**

I enrolled in a spring course designed for independent study for economics where preliminary research was conducted to be investigated further over the next year.

#### **How did you know this was the project you wanted to do?**

I have always had an interest in portfolio management and this research project allows me to analyze historical data to develop my interests and strengthen my knowledge of the subject.

#### **Was the Undergraduate Research Award application difficult to fill out?**

I found the application to be very straightforward and manageable. The two-page limit made me consider what the real purpose of my research was going to be and really gave me a clear focus moving forward.

#### **How much did your mentor help you with this?**

I met with my mentor before beginning the application process to discuss the best way to convey my research in an understandable manner. He then helped me edit the final proposal before submission.

#### **What is your advice to other students about getting involved in research?**

That it is definitely worth it. In every major there is an opportunity for research so find something that you are passionate and want to learn more about and go for it!



**Brandon Young**  
**Biological Sciences**

**“The Functional Analyses of a Mutated Tentacle within the L4 Protein”**

The 50S subunit of bacterial ribosomes, which conducts peptide bond formation at its peptidyl transferase center, contains an exit tunnel, which nascent proteins must traverse to reach the cytoplasm to become functional proteins. The tentacle of the L4 ribosomal protein contributes to the structure of this exit tunnel. It has been shown that mutations within the tentacle of *Escherichia coli* L4 cause detrimental effects to the 50S subunit. In my research project, bioinformatic analyses were used to delineate the L4 tentacle in the following three microorganisms whose L4 proteins are orthologous to *E. coli* L4: *Haemophilus influenzae*, *Bacillus subtilis*, and *Vibrio cholerae*. This analysis resulted in identification of amino acid differences in organisms that are genetically similar to *E. coli*. Polymerase chain reactions (PCR) and site-directed mutagenesis have been used to introduce changes into the *E. coli* L4 protein. Then the function of ribosomes carrying this mutated L4 protein will be analyzed. Most of these mutations are expected to show little or no detrimental effects on ribosome assembly or function. However, mutations causing harmful effects will shed light on the role of specific amino acids in the L4 tentacle.

**When and how did you find out that you could do independent research work as a UMBC undergraduate?**

Well, coming to UMBC I knew that there were plenty of undergraduate research opportunities for interested students. All it was going to take was sifting through the opportunities and pursuing the ones that were extremely enticing. I began looking for research laboratories in my freshman year and eventually I found the perfect fit.

**How did you find a mentor and decide on a project? How did you know this was the project you wanted to do?**

My principal investigator Dr. Janice Zengel has been one of my most influential mentors here at UMBC and it is thanks to her that my ambition was able to turn into actual research. When I first joined Dr. Zengel's laboratory she helped me to develop my own project that I would be able to work on during my undergraduate research career. I currently work on this project independently with the guidance of Dr. Zengel.

**How much time will you put into this research work?**

I have and will continue to work on this project about 15 hours a week during the semester. Not to mention working in the lab during our winter break.

**What academic background did you have before you started on this research?**

I started working in this laboratory the second semester of my freshman year so my class background was just really some introductory science classes. However, I believe my excitement and ambition towards science really helped me to solidify my spot in this research laboratory.

**What is your advice to other students about getting involved in research?**

I believe that anything can be achieved through hard work and if you truly feel that getting involved in research is something that you want to do then you should pursue the opportunities that are offered. It is never too early to position yourself for an even better future.

**What are your career goals?**

I eventually plan on receiving my MD/PhD and I am particularly interested in the fields of cardiology and oncology.