2014-15 Undergraduate Research Highlights

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GET YOUR hands on RESEARCH
The year in undergraduate research

The 2014-15 academic year has been tremendously successful both in terms of the quality of undergraduate research performed on this campus and in the growth of the College’s programs supporting and fostering participation in undergraduate research by students and faculty mentors alike.

With this issue, the Undergraduate Research Council is pleased to announce its inaugural endowed David F. Berger Summer Research Fellowship (p. 2). This fellowship was made through the very generous gift to the College’s Undergraduate Research program to honor the significant contributions in mentoring undergraduate student researchers by Dr. David F. Berger, Professor of Psychology, Emeritus. The fellowship will ensure that future generations of Cortland students will have resources to conduct independent authentic and meaningful research over the summer.

As in past Highlights, a majority of this booklet focuses on the College’s Undergraduate Summer Research Fellowship program. The student researchers featured in this report have distinguished themselves by their active involvement in research at the undergraduate level.

Additionally, the College is continuing to recognize the extraordinary passion and commitment of faculty in mentoring undergraduate research students. Through a competitive review of an excellent applicant pool, this year’s Outstanding Achievement in Mentoring Undergraduate Research award was made to Dr. Frank Rossi (Chemistry Department) for his high-level achievements and dedication in mentoring undergraduate research students during his time at Cortland (see p. 17).

Sustaining the growth in SUNY Cortland’s undergraduate research program remains an important goal of the institution with direct impact on student learning, recruitment, and retention. With this in mind, the Undergraduate Research Council looks forward to the next year.

Christopher McRoberts
Director, Undergraduate Research Council
Undergraduate Research Council News

David F. Berger Summer Research Fellowship

SUNY Cortland's Undergraduate Research Council is pleased to announce the establishment of the endowed David F. Berger Summer Research Fellowship. The David F. Berger Summer Research Fellowship is a prestigious competitive fellowship that is awarded to a SUNY Cortland undergraduate student conducting authentic research over the summer months. The endowed fellowship is in recognition of Dr. David F. Berger, Professor of Psychology Emeritus, who served as faculty mentor for many Cortland student researchers during his tenure. Along with mentoring students, Dr. Berger has a long and established record of research investigating topics such as nicotine dependence and attention deficit hyperactivity disorder (ADHD) using rats as subjects. In addition, Dr. Berger also served as a faculty senator for 12 terms and in 2010 was awarded the SUNY Chancellor’s Award for Excellence in Faculty Service.

The endowment for the fellowship is made possible through a generous gift to SUNY Cortland’s Undergraduate Research Fund by two Cortland Alumni, Dr. Michael Bond ’75, and Dr. Wayne Marley ’75, both of whom worked as research assistants in Dr. Berger’s Psychology lab. Their establishment of the endowed fellowship is to honor Dr. Berger’s long-standing commitment to undergraduate research and the impact his mentoring has made on their lives and those of his former students. Drs. Bond is a board certified physician in Pediatric Dermatology with a degree from SUNY Upstate Medical Center. Dr. Marley is also a board certified physician in Dermatologic Surgery with a degree from SUNY Upstate Medical Center.

The David F. Berger Summer Research Fellowship is administered by SUNY Cortland’s Undergraduate Research Council under the existing Summer Research Fellowship Program and the first award will be determined in the 2016 summer competition.

From left: Dr. Wayne Marley ’75, Dr. Erik Bitterbaum, SUNY Cortland President, Dr. David F. Berger, Professor of Psychology Emeritus and Dr. Michael Bond, ’75.
Devon Dattmore
Biology

Interactive role of VTC3 and GME phosphorylation - the regulation of plant ascorbic acid biosynthesis in Arabidopsis thaliana

“The opportunity to work in a real and active scientific setting has been an incredibly rewarding experience for me, and has further fueled my desire to be a research scientist.”

Devon is investigating the role certain enzymes play in plant’s ability to synthesize ascorbic acid. Plants are able to regulate the synthesis of ascorbic acid (vitamin C) and many plants increase their production of ascorbic acid under high light. One of the enzymes that catalyze the synthesis of ascorbic acid was analyzed by Devon with an eye towards its possible regulation. Specifically under study was whether or not an interacting regulatory protein chemically modifies this enzyme. The enzyme was extracted from Arabidopsis plants, and concentrated using techniques developed in the lab. Mass spectrometry was used to analyze the enzyme for chemical modifications, however the results were inconclusive due to the low yield of the enzyme. Further studies are to be conducted in the fall with refined techniques to yield higher concentrations of protein. A more comprehensive understanding of vitamin C production in plants might allow for better, more sustainable agricultural practices, and also more nutritionally dense food.

Faculty Mentor
Patricia Conklin, Professor, Biological Sciences

“It was very rewarding watching Devon grow from one who reads scientific papers to one who is able to do the research himself, and in doing so, generate beautiful Western blots”
Matthew Ellis
Chemistry

Computational best practices for modeling group 10 catalytic complexes

“Undergraduate research opportunities like these have allowed me to get an insight as to what professional research is really like so that I can decide whether or not this is really the type of work I want to get into.”

Matthew’s research involves employing a variety of modeling methods to compute the geometry and energy of different nickel complexes intended to be used for catalysis. With both laboratory experiments and computer modeling using GAMESS and Spartan software, Matt is comparing known bond lengths and angles, previously determined using x-ray diffraction. This has allowed Matt to determine which computational method most accurately models these catalytic complexes. This method can then be used to compute the same properties of similar complexes that have yet to be synthesized. These properties can then be used to predict the reactivity of the complexes in question.

Faculty Mentor
Karen Downey, Assistant Professor, Chemistry

“Matt keeps me on my toes, which makes mentoring him both a challenge and a delight. He has taken a great deal of ownership of this research project, finding new references and learning new computational modeling software beyond what I’d already introduced him to. He’s presented his work in three venues and looks forward to authoring his first journal article at the end of the summer.”
The analysis and interpretation of the historical lineage of scientific literature based on the hypothesis of earthworm invasion in northern North America

“A student’s purpose is to learn and explore, and through the summer research fellowship, I was able to perform both to an extent that cannot be replicated in a classroom. Working with my mentor this summer, I feel inspired, rewarded, and more prepared to think about the process of science in a different way, which will aid me in my plan of going to medical school.”

Anna’s summer research involved investigated the question of how earthworms first colonized this continent. Using a hypothesis formed during the early 1900s, that nearly all earthworms in northern North America are non-native species transported here by humans in only the last 400 years, Anna traced the scientific literature to find the fundamental experiments and observations that formed the basis of this hypothesis. Focusing on the most famous oligochaetologist of the last century, Gordon E. Gates, she found the origin of the hypothesis and investigated whether it was ever tested. This allowed for an in-depth examination of the process of science itself, as it was possible to inspect the way that scientific information is developed and spread. Field work was also part of the fellowship, as Anna learned about the evolution, ecology, behavior and distribution of many earthworm species.

Faculty Mentor
Peter Ducey, Professor, Biological Sciences

“Anna’s unique project has required her to use lab and field studies, as well as extensive literature analysis, to develop a deeper understanding of an ecologically important hypothesis. It’s been a pleasure to work with her as she has excelled in all aspects of the work.”
Sarah is investigating the sociological aspects of single motherhood. Her research involves interviewing low-income single mothers in Cortland County. These are in-depth interviews lasting up to an hour and a half. To understand the lives of these women and the decisions they have made, from their point of view, Sarah will use a life history approach in which each woman will be encouraged to tell the story of her life since becoming a mother. The interviews will be recorded and transcribed and then analyzed using a software program designed for qualitative data. The analysis should yield a number of salient similarities and differences which will be interpreted in relation to previous research (which she has reviewed extensively). Of particular interest is the role of changing cultural norms regarding childbirth among single mothers. This topic has not often been studied using a life history approach and we are excited to see what insights may result.

**Faculty Mentor**

Stephen Halebsky, Associate Professor, Sociology/Anthropology

“*Sarah has just the right combination of intellectual curiosity, interpersonal sensitivity, attention to detail, and practicality to successfully undertake this research, which will contribute to a better understanding of the lives of single mothers*”
Meghan’s research involves taking an in-depth look at media images of women in prison. A majority of the images of women in prison presented by the media are often stereotypical and skewed as a means for entertainment. These images often portray women as subpar criminals even if their sentences come from dangerous crimes, simply because of their sex. There is a heavy emphasis on lesbianism and sexuality in prison, which she focuses primarily on in her research. The main focus of her research spotlights the hit Netflix show, Orange is the New Black. Using the program nVivo, she is able to analyze and code the show for specific key words and scenes previously determined as being the most important when it comes to analyzing these images of incarcerated women. Using this program, she will be able to see how sexuality (amongst other issues) is presented by this popular show, and if the show is an accurate representation of women in prison.

Faculty Mentor
Anna Curtis, Assistant Professor, Sociology/Anthropology
“It is particularly rewarding to help a student find the tools they need to answer their questions about the world. Meghan has been the driving force behind this project and keeping up with her has pushed me intellectually.”
The objective of Joe’s research is to devise a more feasible method of synthesizing carbon-phosphorus (C−P) bonds. These bonds have relevance in a variety of applications throughout fields of biology and chemistry, but currently known methods used to make these bonds are inefficient and often involve complex synthetic schemes and the use of hazardous chemicals. We aim to achieve a safer and more economical method of making C−P bonds by using a catalyst. Thus, this research involves synthesizing a nickel-based organometallic complex and assessing its ability to catalyze hydrophosphination, an organic chemistry reaction that generates a new carbon-phosphorus bond. In addition, we hope to identify the steps involved in product formation and isolate key intermediates to determine a mechanism for this process. Lastly, changes in metal-complex properties will be investigated to design the most efficient catalyst for facilitating C−P bond formation.

Faculty Mentor
Andrew Roering, Assistant Professor, Chemistry

“I am pleased to see the amount of knowledge and laboratory skill Joe has developed over the summer in my research group. These skills will help him on his journey in graduate school and beyond.”
Michelle McGinnis
Chemistry

Using LC-MS/MS to identify enzymes used in a bioreactor microbial community to produce hexanoic acid

“Summer research has allowed me to become a more confident and independent scientist and researcher. It has provided me insight as to what I would further like to do in this field.”

Michelle is investigating a complex ecosystem of microbes that are used in a reactor to break down waste and produce the compound hexanoic acid. The hexanoic acid can be sold as a commodity chemical or converted to liquid fuel as a green energy source. Michelle’s project involves using a liquid chromatography mass spectrometry instrument to identify hundreds of enzymes expressed by the microbes in this system, in order to understand the ecosystem structure and the diversity of microbes at different steps in the overall food web. The goal is to discover ways to optimize this waste-to-energy bioreactor and to ensure that it will be reliable at full scale. Michelle has developed new laboratory methods for analyzing enzymes in this microbial ecosystem, and her work is expected to have an impact on green energy technology. Her work is in collaboration between the Werner lab at SUNY Cortland and environmental engineers in the Angenent lab at Cornell University, who are running the bioreactor system.

Faculty Mentor
Jeffrey Werner, Associate Professor, Chemistry

“Michelle’s work will have a significant impact on green energy production, in addition to the equally important impact her undergraduate research experience has on her development as a scientist.”
Stephanie Offutt
Archaeology

Continuity or change at prehistoric Çadir Höyük

“There are not words adequate to describe my experience this summer while conducting my research, in Turkey. As a Summer Research Fellow I had the opportunity to travel across the ocean, and have hands on experience analyzing artifacts that were thousands of years old. Not only did I get to learn about past peoples and cultures in Central Turkey, but I also got to live among a culture very different than my own, for 7 weeks, while conducting my research. This was a summer I will never forget.”

Stephanie analyzed ceramics from the Late Chalcolithic (LC) and Early Bronze Age (EBA) periods (ca. 3600 – 3000 BCE) at Çadir Höyük in central Turkey. The purpose was to determine if there were observable changes in ethnic population by analyzing cooking and daily serving wares used across these two time periods. Changes in cooking styles and cuisines, and serving and consumption ceramics could indicate a new or changing population at the settlement. Analysis indicated that there were in fact changes in the LC and EBA pottery. However, these appear to be in the quality of the ceramic construction and material, while the forms remained consistent. This could indicate that the cuisine, and therefore population, remained the same. Rather, there was more likely a change in available resources and possibly economic status from the earlier to later period.

Faculty Mentor
Sharon Steadman, Professor, Sociology/Anthropology

“Stephanie is a born researcher. She jumped in with both feet and undertook copious analysis of all aspects of the ceramics relevant to her research question. She also turned out to be a fine field archaeologist and was often tasked with doing delicate and difficult work in the field.”
The effects of environmental enrichment on stress in ethanol addicted rats

Through her summer research, Claire has been working to develop a deeper understanding of the environmental and neural mechanisms underlying drug addiction. Her research involves exposing ethanol dependent rats to environments that are enriched with ample stimulation and rewards in order to observe the effects that an enriched environment may have on future alcohol seeking and taking in rats. Claire and her mentor hope to determine if the implementation of environmental enrichment after alcohol self-administration training has occurred reduces or eliminates continued alcohol consumption in rats (abstinence) and protects against stress-induced relapse. Claire has been learning the basic and applied significance of behavioral neuroscience in the field of alcohol addiction and will become more proficient in her research abilities.

Faculty Mentor
Joshua Peck, Assistant Professor, Psychology

“As a newly hired faculty member, the opportunity to conduct summer research with an undergraduate and provide mentorship in the laboratory has certainly fostered my own professional development.”
Jenna Zaia  
Biology

**Legionella pneumophila (Lpn) attachment to biofilms of environmental bacteria**

“Having the opportunity through the Summer Research Fellowship has given me an amazing experience. In this short time I have learned a variety of procedures, but more importantly, I have learned to think more like a confident, independent scientist/researcher.”

Jenna’s research involves the interactions between bacteria isolated from tap water and the bacteria *Legionella pneumophila* (**Lpn**). **Lpn** can cause Legionnaire’s Disease, a deadly pneumonia in humans, by contaminating aerosols produced by stagnant water systems, like air conditioners, shower heads or cooling towers that are inhaled. Naturally, **Lpn** is found in multi-species adherent communities of bacteria called biofilms. She is testing the ability of **Legionella** to grow with and adhere to biofilms formed by bacteria already found within the water system. Finding species of bacteria that are beneficial to **Lpn** growth in the biofilms could help lead to treatment of water systems early to prevent the adherence, and eventual persistence, of **Legionella**. Overall, this could result in cutting back the potential of Legionnaire’s Disease from occurring.

**Faculty Mentor**

Christa Chatfield, Assistant Professor, Biological Sciences

“I love doing summer research projects, so far Jenna and I have learned a lot about the behavior of environmental bacteria when exposed to pathogenic bacteria.”
Other Undergraduate Research Awards

The following undergraduate students were awarded a 2014-15 Undergraduate Research Council Travel Grant to attend conferences in which they were a presenter

Samantha Glassmann. Annual Meeting, American Public Health Assoc. (New Orleans, LA)
Allison Dougan. Eastern Athletic Training Association Conference (Philadelphia, PA)
Eric Plante. Experimental Biology 2015 (Boston, MA)
Nicholas Puoplo. Experimental Biology 2015 (Boston, MA)
Shawn Taylor. Geological Society of America Meeting (Bretton Woods, NH)
Thomas Lee. Costa Rica Global Conference on business and Finance (San Jose, Costa Rica)
Samuel Lothridge. Northeast Regional Meeting, American Chemical Society (Ithaca, NY)
Dylan Kahlstorf. 32nd Annual NEMPET Meeting (Blue Mountain Lake, NY)
Joseph Kraai. Northeast Regional Meeting, American Chemical Society (Ithaca, NY)
Anthony Terzolo. Gordon Research Conference (South Hadley, MA)
Weifeng Zhen. Northeast Regional Meeting, American Chemical Society (Ithaca, NY)

The following undergraduate students were awarded a 2014-15 Undergraduate Research Council Small Grant

Alex Bossert: The impact of dehydration on musculature strength in college age males.
Casey Peterson and Sara Jay: Microscopic visualization of *Legionella pneumophila* biofilm structure and surrounding extracellular polymeric substances.

The following faculty were awarded a 2015-16 Undergraduate Research Council Undergraduate Research Assistant Award

Leslie Eaton & Raymond Collings, Psychology
Helena Baert & Matthew Madden, Physical Education
Sharon Todd, Recreation, Parks & Leisure
Melisa Morris, Physics
Randi Storch, History
Michael Curry '11

“Cortland’s summer fellowship allowed me to develop long lasting research methodology skills that consistently translated to each new research environment. I find myself truly in debt to the unique fellowship that helped develop me as a researcher.”

Michael Curry received a 2010 URC Summer Fellowship to study the effects of polychlorinated biphenyls (PCBs) on rodent development. Under the guidance of Drs. John Lombardo and David Berger, Mike successfully created, managed, and completed the fellowship. After the fellowship, he continued to work with Drs. Lombardo and Berger on various projects until he graduated in 2011. The fellowship gave Mike the ability to develop and hone presentation, research methodology, and statistical skills.

Mike graduated from Cortland in 2011 with a BA in Psychology. After Cortland, he enrolled into an experimental psychology master’s program at Radford University. At Radford he completed and presented several research projects at international conferences. One of the projects he completed at Radford is going out for publication this fall. After this program Mike found his passion for statistics, and enrolled and into a biostatistics and epidemiology master’s program at Northwestern University. Currently, Mike is a Research Analyst at the United Network for Organ Sharing and is dedicated to improving the efficiency of organ transplantation and increasing the number of organ transplants in the US.

Mike contributes many of his successes to the fellowship and Drs. Lombardo and Berger for their support, guidance, and teaching.
2015
Transformations: A Student Research and Creativity Conference

The College’s annual Transformations conference was held April 25th in Sperry Center. The event focuses on student research, defined as an original investigation or creative activity through the primary efforts of a student or group of students. Seventy-six SUNY Cortland undergraduate student authors or co-authors presented their research and creative projects in either oral or poster format. Special sessions were devoted to last year’s Summer Research Fellows.

Wei Feng Zhen (undergraduate Chemistry Science student, 2014 SRF awardee) presenting his research on protein chemistry

Nicholas Ayvazian (undergraduate Biology student, 2014 SRF awardee) presenting his research on subspecies of Jack in the Pulpit (Arisaema triphyllum)
The first SUNY-wide symposium of undergraduate research and creative activities took place on Friday April 10, 2015, at SUNY Brockport. This research conference featured research, scholarly, and creative activities by undergraduate students from across all 64 SUNY institutions, including four-year institutions, community colleges, and research universities.

SUNY Cortland was well represented at the conference. Fourteen SUNY Cortland students from across nine departments were authors on 11 research presentations.

**2015**

**Innovative Exploration Forum: Undergraduate Research in New York State’s Public Higher Education System**

Shawn Taylor (Geology)

Karen Martinez (Exercise Science)

Adam Lowe (Exercise Science)
Outstanding Achievement in Mentoring Undergraduate Research Award

Frank Rossi

This award is established to recognize faculty who have demonstrated extraordinary commitment as mentors of Cortland’s undergraduate students in research, scholarship or creative activities.

This year’s awardee, Associate Professor of Chemistry Dr. Frank Rossi, has a long and sustained record of passion and dedication to mentoring undergraduate researchers. Beginning his first year as Assistant Professor in 2006, Dr. Rossi has shown an impressive and continual record of mentoring student researchers as evidenced by the numerous presentations made by his research students at professional conferences, their inclusion in peer-reviewed publications, and their success in getting into some of the nation’s top Chemistry PhD programs. He is always mentoring multiple research students, all academic year and all summer. He is always present, and available to his students, and, more often than not, in the lab himself. Dr. Rossi subscribes to the laudable notion that his role as a faculty mentor is to guide and transition students from consumers of knowledge to generators of knowledge — and he does this via a complex mixture of academic, professional, and personal advising and hands-on technical training. His student recommenders, in particular, have indicated their research experiences under Frank’s direction and his mentoring had a very positive and lasting impact on their professional and personal development.

“Prof. Rossi granted me the freedom to use my own creativity to address various goals of my research project, but also remained immensely helpful to provide direction when it was needed.”

Joshua Baccile
SUNY Cortland ‘11
Opportunities to Contribute to Undergraduate Research

Undergraduate research at SUNY Cortland remains strong due in part to the generosity of donors. Gifts are used to enrich our programs, provide direct support for important student-faculty research collaborations, and to recognize our top student researchers and their faculty mentors. Financial support at any level makes a statement and is appreciated.

Donations to the Undergraduate Research Fund can be made online or by mail. Please make your check payable to: Cortland College Foundation and indicate on check the name of the Undergraduate Research Fund. Mail to: Cortland College Foundation, Inc., P.O. Box 2000, Cortland, NY 13045. You can also make an online donation at: cortland.edu/giving and click the Give Now option on the right side of the page.
SUNY Cortland’s Undergraduate Research Council promotes SUNY Cortland as an institution fully committed to student research, scholarship, and creative pursuits. To this end, the Council will assure that faculty and students have easy access to information and resources on best practices, mentoring, student publishing, and other forums for the dissemination of students’ scholarly works. Through funding provided by the offices of the Provost’s and Sponsored Programs, partnerships with Office for Resident Life and Housing, Financial Aid Office and the generosity of donors to the College Foundation, the Undergraduate Research Council directly supports research projects through a number of competitive fellowships and grants.

**URC Director:** Christopher McRoberts  
**URC Members:** Cynthia Benton, Phil Buckenmeyer, Jeremiah Donovan, Terrence Fitzgerald, Jill Murphy, Richard Powell, Mark Prus, Sharon Steadman, and Orvil White  
**Administrative Support:** Haley Zurell

**GET YOUR hands on RESEARCH**

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