# Skidmore College


## FACULTY STUDENT SUMMER RESEARCH PROGRAM

## SUMMER 2020

**FINAL PRESENTATIONS**
**AUGUST 6, 2020**

**Faculty Student Summer Research Program**
**Summer 2020**

## ***Index***



Since 1989, Skidmore College's Faculty Student Summer Research Program has given students a singular opportunity to work one-on-one with a faculty member. For periods ranging from five to ten weeks, students work with faculty on original research in disciplines ranging from biology to management and business, including classics and geosciences. Hands-on research with a faculty member allows students to become part of the research enterprise in a way that both complements and informs regular class work. In some cases, the collaborative research forms the basis for a senior's honors thesis or can lead to published articles in a peer-reviewed academic journal. Long-term, participation can help students gain admission to graduate schools and research careers. Skidmore alumni who have continued their education in graduate school have reported that experience as researchers has given them distinct advantages as scholars. For summer 2020, there are 55 students and 30 faculty members engaged in collaborative research projects in a wide range of disciplines funded by the Faculty Student Summer Research program, external grants, the S3M Program, indirect cost funds, start-up funds, and other funding sources.

## Funding Sources for Faculty Student Summer Research Programs

### ALUMNI, FAMILY, AND FRIENDS

**Marlene Oberkotter Fowler ’61**
**Christy Johnson ’90**
**Jim Lippman and Linda Friedman Lippman ’82**
**Richard A. Mellon ’87**
**Margaret Williams Page ’43**
**The Riederer Family**
**Mr. and Mrs. Kenneth Woodcock, Parents ’96**

**Axelrod-Porges Scholars**

Established in 2006 by Felicia Axelrod ’62 and Robert Porges to support faculty-student teams in the area of the sciences

**Schupf Scholars**

Established in 2008 by Sara Lubin Schupf ’62 to support summer faculty-student research with a preference given to students pursuing projects in the STEM disciplines. Schupf Scholars are selected beginning the summer after their freshman or sophomore year. Schupf Scholars may access additional funding for travel to meetings and conferences as well as for research supplies and expense during their continuing research with faculty during their academic career at Skidmore.

**Weg Scholars**

Established in 2010 by Carol Little Weg ’64 and Ken Weg and awarded with a preference for students pursuing projects in the sciences and social sciences.

### FOUNDATIONS AND GRANTS

**Arthur Vining Davis Foundation**
**France-Merrick Foundation**
**W.M. Keck Foundation**
**Rathmann Family Foundation**
**Caney Fork Farms**
**The Charles Slaughter Foundation**
**Dexter Senft**
**The Federal Emergency Management Agency**
**The GKV Foundation**
**Globetrotter Foundation (via Calhoun/Christiano Foundation Fund)**
**The Howard Hughes Medical Institute**
**The National Institutes of Health**
**The National Science Foundation**
**The Nature Conservancy**
**The Noble Research Institute**
**The Oak Spring Garden Foundation**
**The Skidmore Scholars in Science and Mathematics (S3M) Program**

**The Schupf Scholars Program**

Each year the Schupf Scholars Program funds students to participate in the Faculty Student Summer Research Program and to continue that research with their faculty mentor in the ensuing academic year. The Schupf Scholars Program focuses on science, technology, and mathematics, and pays special attention to interdisciplinary projects and to female students in fields where women are underrepresented. Each year these scholarships will provide students and a faculty partner with up to $10,000 for research beginning the summer after their freshman or sophomore year and continuing through the following academic year. Schupf Scholars will be able to use additional funding for travel to meetings and conferences as well as for research supplies and expenses during their continuing research with faculty during their academic career at Skidmore.

Trustee Sara Lee Schupf '62 established the $1.1 million scholarship fund for student research in an endeavor to inspire, cultivate, and support students' interest in science, because she sees it as an excellent avenue for exercising critical thought and shaping the progress of an idea from theory to practice. She says: this is what a Skidmore education is all about—getting involved in the process of discovery, which includes the satisfaction of success, failure, and mentorship. More broadly the Schupf Scholars Program seeks to help light an accessible pathway to science research and science career preparation. With such an early start on intensive research and continued work into their junior or senior year, Schupf Scholars will be well equipped to move on to graduate or professional school in the sciences.

**2020-21**
Selina Almasarwah, '23
Sarah Finnegan, '22
Heather Ricker, '22

**2019-20**
Anna Carhart, '22
Rachel Carrock, '22
Katie Rinaolo, '22
Jiayue Hong, '21
Saana Teittinen-Gordon, '22
Molly Cole, '21
Katie Yan, '22

**2018-19**
Acadia Connor, '21
Katherine Johnson, '20
Angelina Leonardi, '20
Claudia Mak, '20
Julia Danischweski, '20
Ella Long, '20
Jazmin Sepulveda, '20

**2017-18**
Beatriz Chavez, '18
Gabriella Gerlach, '19
Kyla Johnson, '20
Samantha Kenah, '19
Yutong Li, '19
Suzanne Zeff, '20

**2016-2017**
Claudia Bennett-Caso '19
Alexandra Cassell '19
Erin Mah '19
Erin Maloney '18
Emily O'Connor '19
Kari Rasmussen '18

**2015-2016**
Kelly Cantwell, '18
Jillian Greenspan, '17
Katherine Shi, '18
Deborah Kim, '18
Talia Stortini, '18
Hannah Schapiro, '17
Meggie Danielson, '17

**2014-2015**
Jaya Borgatta, '16
Meti Debela, '16
Glenna Joyce, '16
Jenny Zhang, '16
Stephanie Zhen, '16

**2013-2014**
Melanie Feen '16
Michele Fu '15
Kelly Isham '16
Angelica Newell '15
Rafaella Pontes '15

**2012-2013**
Jennifer Harfmann '14
Rafaella Pontes '15
Kara Rode '15
Carol Wu '14

**2011-2012**
Tim Brodsky '13
Andrea Conine '13
Brenda Olivo '14
Kathryn Stein '13

**2010-2011**
Rebecca Connelly '12
Ava Hamilton '12
Caroline Loehr '12
Taylor Moot '13

**Faculty Student Summer Research Program**

**Schedule of Final Research Presentations**

**Thursday, August 6, 2020**

Session 1 https://skidmore.zoom.us/meeting/91725239021

**9:00-9:15am 100 YEARS OF SKIDMORE WOMEN IN POLITICS ON CAMPUS, IN AMERICA, AND AROUND THE GLOBE**
Nicolett Laframboise, 2020
Clare McInerney, 2020
Kate Graney, Professor, Political Science Department
Natalie Taylor, Associate Professor, Political Science Department

**9:15-9:30am US-TALIBAN RELATIONS IN FOUR ACTS**
Marina Kalaw, 2022
Yelena Biberman-Ocakli, Associate Professor, Political Science Department

**9:30-9:45am SAMPLING SOIL CARBON FOR REGENERATIVE AGRICULTURE: A METHODS COMPARISON**
Miles Chandler 2020
Eli Hersh 2020
Kristofer Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program
Charles Bettigole, Director of the GIS Center for Interdisciplinary Research at Skidmore College

**9:45-10am SPATIAL ANALYSIS OF TREE SPECIES DISTRIBUTIONS AND PLANT-SOIL RELATIONSHIPS ON DOME ISLAND**
Eliana Colzani, 2022
Emme Tissue, 2023
Kristofer Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program

**10-10:15am RAPID SOIL CARBON ASSESSMENT ON THE CANEY FORK FARM**
Shaylan Kolodney, 2021
Sylvana Szuhay, 2022
Kris Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program

**10:15-10:30am THE SECOND MOST IMPORTANT BIOLOGICAL EVENT IN BIOLOGICAL HISTORY OF THE PLANET, THE EVOLUTION OF LAND PLANTS**
Jessey Kreinik, 2021
David Domozych, Professor, Biology Department

**10:30-10:45 SUCKER AVERSION AND PROSOCIAL BEHAVIOR**
Samuel I. Gartenstein, 2021
Sandra H. Goff, PhD, Assistant Professor, Economics Department

**10:45-11am CONTESTING OWNERSHIP: CRITICAL APPROACHES TO PROPERTY RIGHTS AND ECONOMIC DEVELOPMENT**
Cecilia Martinez, 2022
Olivia Dieterich, 2020
Feryaz Ocakli, Associate Professor, Political Science Department

Session 2 (Zoom link forthcoming)

**9:00-9:15am THE MICRO PROJECT: DEVELOPMENT AND DEPLOYMENT OF MICROFLUIDIC BASED LABS IN CHEMISTRY**
Sarah G. Finnegan, 2022
Destiny Donelson, 2021
Gregory Foley, 2021
Olivia Frechette, 2021
Jessica Gaetgens, 2022
Katie Rinaolo, 2022
Kimberly A. Frederick, Professor, Chemistry Department

**9:15-9:30am DECONSTRUCTING ECONOMIC SELF-SUFFICIENCY**
Pedro Wolfe, 2022
Kelly Melekis, Associate Professor, Social Work Department

**9:30-9:45am TRANSITIONING FROM FOSTER CARE TO EMERGING ADULTHOOD: EXPERIENCES AND PERCEPTIONS OF SUPPORT, HEALTH AND WELLBEING AMONG TRANSGENDER AND NONBINARY YOUTH OF COLOR**
Abby MacDonald, 2022
June Paul, Assistant Professor, Social Work Department

**9:45-10am THE EFFECT OF SUCCINIC ACID ON METABOLIC PROFILE IN HIGH FAT DIET INDUCED OBESITY AND INSULIN RESISTANCE**
Kendall Zaleski, 2022
Stephen Ives, Associate Professor, Health and Human Physiological Sciences Department

**10-10:15am CARDIOVASCULAR DISEASE IN FIRE SERVICE**
Eliza Abrams, 2022
Denise Smith, Professor, Health and Human Physiological Sciences Department

**10:15-10:30am EFFECT OF SALT ON AN SH3 DOMAIN**
Anna Carhart, 2022
K. Aurelia Ball, Assistant Professor, Chemistry Department

**10:30-11am ARKA12 PROLINE ISOMERIZATION**
Juan Alcantara, 2021
Katherine Huang, 2023
Ray East 2023
K. Aurelia Ball, Assistant Professor, Chemistry Department

Session 3 (https://skidmore.zoom.us/j/92276935521)

**9:00-9:15am COMPUTATIONAL MODELING OF FUZZY BLACK HOLES**
Jason Yao, 2021
Jeremy Wachter, Visiting Assistant Professor, Physics Department

**9:15-9:30am BACTERIAL COPPER RESISTANCE**
Shawn Sharifi, 2021
Sylvia Franke McDevitt, Associate Professor, Biology Department

**9:30-9:45am PROCESSSING NMR DATA WITH PYTHON**
AJ Adkins, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

**9:45-10am CONFORMATIONAL EFFECTS OF A POINT MUTATION ON THE HIV-VIF COMPLEX**
Acadia Connor, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

**10-10:15am PARALLEL TRAVERSAL OF GRAPHS STORED IN RDBMSs**
Matthew Clark, 2021
Christine Reilly, Assistant Professor, Computer Science Department

**10:15-10:30am A COMPARISON OF RELATIONAL AND GRAPH DATABASES FOR A BUSINESS APPLICATION**
Selina Almasarwah, 2023
Christine Reilly, Assistant Professor, Computer Science Department

**10:30-10:45am PHOTOCHEMISTRY IN THE OCEAN-ATMOSPHERE INTERFACE: MATLAB DATA PROCESSING FOR THE ELUCIDATION OF ALTERNATIVE FORMATION PATHWAYS OF ClNO AND HONO**
Heather Ricker, 2022
Angelina Leonardi, 2020
Juan G. Navea, Associate Professor, Chemistry Department

**10:45-11am QUANTUM CHEMICAL CALCULATONS OF THE OXIDATION OF SURFACE BOUND ORGANIC COMPOUNDS WITH FREE RADICALS**
Angelina Leonardi, 2020
Heather M. Ricker, 2022
Juan Navea, Associate Professor, Chemistry Department

**Project:**

## PROCESSSING NMR DATA WITH PYTHON

AJ Adkins, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

The binding between the common SH3 protein domain and the intrinsically disordered peptide ArkA is studied by our lab mainly through molecular dynamics simulations. While computer simulations provide crucial insight into this binding mechanism, experimental data plays a vital role in our research, especially that obtained by nuclear magnetic resonance (NMR) spectroscopy. The conventional method for analyzing NMR data involves outdated and cumbersome software, so a series of command-line-executable programs have been developed to automate the processing of NMR data. These scripts, written in Python, are able to convert data between file formats, apply data processing (e.g. fourier transform), plot the NMR spectrum, and identify coordinates of spectrum peaks. Our hope is that these scripts will streamline the process of working with NMR data.

**Project:**

## ARKA12 PROLINE ISOMERIZATION

Juan Alcantara, 2021
Katherine Huang, 2023
Ray East, 2023
K. Aurelia Ball, Assistant Professor, Chemistry Department

Proteins are flexible molecules made up of amino acids, and proline is the only amino acid that can isomerize (change shape) around its omega angle. Many proteins involved in cellular signaling are flexible and contain multiple proline residues. We study ArkA, which contains 5 prolines and binds to an SH3 domain involved in cytoskeleton regulation. We aim to use computer simulations to study ArkA binding, but due to the short timescale of these simulations we normally do not observe proline isomerization. To observe this isomerization, we employed the enhanced sampling method 'GaMD' and lowered the energy barrier between the cis and trans conformations of proline. Using these methods in conjunction allows us to observe proline isomerization in flexible proteins with multiple prolines, such as ArkA.

**Project:**

## EFFECT OF SALT ON AN SH3 DOMAIN

Anna Carhart, 2022
K. Aurelia Ball, Assistant Professor, Chemistry Department

SH3 domains are common molecular interaction domains that foster cellular communication through protein-protein interactions. They are often negatively charged and bind to positively charged partners. Salt stabilizes the yeast SH3 domain AbpSH3 by screening negatively charged residues. We used computer simulations to study this interaction and found sodium ions spend more time in contact with negatively charged residues compared to chloride ions with positively

charged residues. To determine whether this difference is related to the size of the ion, we ran simulations with the larger potassium ion. Results showed potassium ions spent less time in contact with AbpSH3 compared to sodium, demonstrating the effect of ion size. In the future, we will examine the electrostatic interactions in the SH3 domain that are impacted by salt.

**Project:**

**CONFORMATIONAL EFFECTS OF A POINT MUTATION ON THE HIV-VIF COMPLEX**

Acadia Connor, 2021
K. Aurelia Ball, Assistant Professor, Chemistry Department

HIV is able to infect human cells using the accessory protein Vif, an intrinsically disordered protein. When Vif forms a complex with human proteins, this complex begins to tag anti-viral proteins for degradation, thereby disrupting the cell's virus response. We used computer simulations to determine the conformational effect of a Vif point-mutation, that was experimentally shown to disrupt the formation of the complex. To determine the effects of the mutation on global and local dynamics, principle component analysis and atomic fluctuations were performed. Currently, we are also investigating possible allosteric pathways to understand the mechanism behind this mutation. Understanding how the mutation affects the structure and dynamics of the Vif complex could help future development of a therapeutic treatment that blocks Vif's function.

**Project:**

**NEW VISIONS MAPPING COLLABORATIVE**

Andrew Klein, 2021
Emily Egan, 2020
Ruthann Richards, 2021
Charles Bettigole, Director of the GIS Center, Scribner Library
Adam Tinkle, MDOCS Director, Documentary Studies Department

We formed the New Visions Mapping Collaborative (NVMC), which has tasked itself with creating a platform to share the Skidmore community's ideas for change. This was inspired by the knowledge that the campus needs to make adjustments due to COVID-19 and a wider breadth of creative thought is necessary. However, the focus is to seek out any ideas of how Skidmore can change in the near and far future. Our website provides blank maps and floor plans of Skidmore that participants can annotate. Across digital platforms, NVMC created an open call to students, alumni, faculty, staff and Saratoga community members. With the results from two-weeks of map creations, NVMC will summarize the data in an ArcGIS Story Map to be shared with the community.

**Project:**

**US-TALIBAN RELATIONS IN FOUR ACTS**

Marina Kalaw, 2022
Yelena Biberman-Ocakli, Associate Professor, Political Science Department

The United States and Afghanistan have had a tumultuous relationship since the Cold War. This project examines the complex historical and political dynamics of US-Taliban relations that have affected the political and economic trajectory of Afghanistan. Using archival documents, interviews, memoires, and scholarly writings, we are developing a play to provide a working understanding of those relations for informed citizenship. This play seeks to engage audiences with the history of US-Taliban relations, as well as to convey concepts and theories from the field of International Relations. The play will comprise four acts based on real history from the Reagan Administration and the mujahideen to the current peace talks between the US and Taliban that are taking place today.

**Project:**

**WRITING IN DIASPORA: IDENTITY, WRITING, AND LANGUAGE IN CHINESE IMMIGRANT LITERATURE**

Bridget Wong, 2021
Mao Chen, Professor, World Languages and Literatures Department

In a time marked by globalization and migration, it is impossible to understand the world without understanding the written and lived experiences of immigrants and minorities. In the United States, Chinese-Americans have a long history, but their experiences and literature still have much to be studied. Therefore, we decided to research the question, "How are Chinese-American experiences expressed through the context and linguistic choices of Chinese-American writing?" By reading and analyzing Chinese-American works and other articles related to the topic, we were able to explore the dynamics of immigrant life and the ways in which identity and linguistic choices intertwine. This research will help us better understand the lives and literature of Chinese-Americans and paint a fuller picture of the complexities of human experiences.

**Project:**

**SAMPLING SOIL CARBON FOR REGENERATIVE AGRICULTURE: A METHODS COMPARISON**

Miles Chandler, 2020
Eli Hersh, 2020
Kristofer Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program
Charles Bettigole, Director of the GIS Center for Interdisciplinary Research

Regenerative agriculture aims to introduce sustainable land management practice to improve soil health while sequestering atmospheric carbon. Our research was conducted using pre-existing soil carbon data from Caney Fork Farms in Carthage Tennessee, Oak Spring Garden in Upperville, Virginia, Stone Barns Center for Food and Agriculture in Pocantico Hills, New York, and the Noble Research Institute in Oklahoma. Subsampling this data, we compared the power and accuracy of grid, simple random, conditioned latin hypercube, stratified k-means, and carbon

biased sampling methods to observed carbon values at research sites. By standardizing accurate, cost effective soil sampling methods, we hope to create more complete inventories of soil carbon, and facilitate smarter implementation of regenerative practices.We also contribute our analysis to the development of the Stratifi web app, a user-friendly tool which uses soil surveys and environmental covariates to assign optimal carbon sampling locations.

**Project:**

**SPATIAL ANALYSIS OF TREE SPECIES DISTRIBUTIONS AND PLANT-SOIL RELATIONSHIPS ON DOME ISLAND**

Eliana Colzani, 2022
Emme Tissue, 2023
Kristofer Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program

Dome Island, a glacial drumlin in Lake George protected by The Nature Conservancy, presents an opportunity for exploration of a forest undisturbed by physical anthropogenic disturbance. Building upon previous research on soil properties, this team has worked to create a high resolution stem map for all 4269 trees on the island, a platform to share the story of Dome Island to the public, aged and measured the growth of 250 trees. We gained insight into ecosystem dynamics by integrating the following information: relationships between the overstory community and soil biophysical properties through geospatial analysis, statistical spatial patterns, and disturbance history as shown by tree growth. This work will provide a basis for scientific quantification of ecosystem dynamics and popular understanding of conservation practices.

**Project:**

**RAPID SOIL CARBON ASSESSMENT ON THE CANEY FORK FARM**

Shaylan Kolodney, 2021
Sylvana Szuhay, 2022
Kris Covey, Visiting Assistant Professor, Environmental Studies and Sciences Program

Soil sequesters carbon from the atmosphere, aiding in the mitigation of climate change. However, currently, soil carbon inventory is cost prohibitive. This team's research aims to contribute to developing a model for rapid in-field soil carbon assessment. The sampling team used the Stratifi web application to select 360 sample points at Caney Fork Farms in Carthage, TN. At each location, soil was extracted from two depths (0-15 cm and 15-30 cm), the sample was scanned using an opensource pocket-sized spectrophotometer, and all samples were sent for commercial carbon analysis. At 120 of the sample locations, a hammer probe was used to extract soil for bulk density analysis. These samples will be used to understand the spatial patterns and variation in bulk density on the farm. 0

**Project:**

**THE SECOND MOST IMPORTANT BIOLOGICAL EVENT IN BIOLOGICAL HISTORY OF THE PLANET, THE EVOLUTION OF LAND PLANTS**

Jessey Kreinik, 2021
David Domozych, Professor, Biology Department

Approximately 500 million years ago, Earth saw the rise of land plants. This momentous feat in evolutionary history paved the way for earth as we know it, providing primary production on land that would become the foundation of the terrestrial food chain, and making major changes in the Earth's atmosphere which allows for life as we know it on earth. Scientists believe these land plants evolved from fresh-water green algae. Our work in the Domozych lab focuses on how these microalgae evolved into land plants. Our guiding questions in this work are: What challenges do plants face in the transition from fresh water to land? And what physical and molecular attributes allowed for this transition?

**Project:**

**DECOLONIZING THE LATIN AMERICAN HISTORY SURVEY**

Quinn Campbell, 2021
Jordana Dym, Professor, History Department; Director, Latin American and Latinx Studies Program

This project aims to consider and rethink the Latin American history survey/introductory course within its context of neoliberal, colonial and imperial narratives. Whose stories usually get told in a survey course? Whose stories have been erased or missed? How can history pedagogy and curriculum become more aware and centered on inclusivity and diverse voices especially at predominantly white, liberal arts institutions? Methods to guide conversations around course content and classroom climate include syllabi from several higher education institutions, textbooks commonly used in Latin American history survey courses, assignments from such courses, interviews with professors at six U.S. colleges/universities, and a forthcoming student survey.

**Project:**

**THE MICRO PROJECT: DEVELOPMENT AND DEPLOYMENT OF MICROFLUIDIC BASED LABS IN CHEMISTRY**

Sarah G. Finnegan, 2022
Destiny Donelson, 2021
Gregory Foley, 2021
Olivia Frechette, 2021
Jessica Gaetgens, 2022
Katie Rinaolo, 2022
Kimberly A. Frederick, Professor, Chemistry Department

COVID-19 and the abrupt transition to distance learning formats have radically challenged the STEM higher education community, often leaving laboratory instructors to resort to videos of themselves conducting experiments or providing data sets from previous semesters. The MICRO project was created to develop a set of materials to support a more engaged pedagogical approach to traditional analytical chemistry lab courses which could also be conducted by students learning from a distance. The microfluidics platform of the project allows students to perform experiments safely at home with minimal waste, equipment, and exposure to reagents, all at a low cost. Eight analytical experiments have been developed, ranging from titrations to electrochemistry, along with the materials for students and instructors to successfully implement the labs in their courses. The MICRO labs and accompanying materials were created with an emphasis on accessibility for all students as well social justice and equity. These labs will engage students in experiments that have all the features of good analytical science: blanks, replicate measurements, internal and external controls, and calibration curves, while focusing on competencies that are broadly transferrable. Although this project was developed to offer an alternative to traditional remote learning during the COVID-19 pandemic, the versatility of the technology allows it to be implemented in "on-campus" teaching laboratories while still offering students greater flexibility, exploration, and autonomy.

**Project:**

**SUCKER AVERSION AND PROSOCIAL BEHAVIOR**

Samuel I. Gartenstein, 2021
Sandra H. Goff, PhD, Assistant Professor, Economics Department

Our work uses two randomized control trials (RCTs) to understand the relationship between sucker aversion and responsibility aversion in the context of prosocial decision-making, with an emphasis on the impact that these can have on willingness to give to others and to charity. In Study 1, participants were happier when their decision in a dictator game aligned with the recommendation of a non-binding coin flip. This result occurred for both those who made the selfish choice (mitigating responsibility aversion) and those who made the generous choice (mitigating second-order sucker aversion). Study 2 examines whether people use the possibility (no matter how miniscule) that an undeserving other (a country club) might get their contribution as an excuse to forego donating to charity.

**Project:**

## 100 YEARS OF SKIDMORE WOMEN IN POLITICS ON CAMPUS, IN AMERICA, AND AROUND THE GLOBE

Nicollet Laframboise, 2020
Clare McInerney, 2020
Kate Graney, Professor, Political Science Department
Natalie Taylor, Associate Professor, Political Science Department

In 1920, only 9 years after the establishment of the Saratoga Springs Young Women's Industrial Club, which in 1922 became Skidmore College, American women earned the right to vote. Our project examined the involvement of Skidmore women in politics over the last century via archival and interview research. The information and archival materials collected will be displayed in a Tang museum exhibit on the ways Skidmore women—students, faculty, and alumni—have engaged in politics on campus, on the national level, and on the international level. As we worked to collect and curate historical materials, we challenged ourselves to broaden common conceptions of politics and create an engaging and accessible museum display. With the help of Rachel Seligman, the Tang's Assistant Director of Curatorial Affairs, we explored new areas for creativity and flexibility in terms of presentation, like digital and audio formats. Overall, this inquiry has allowed us to gain perspective on the broad reach of what is considered political, and how Skidmore women throughout history have been involved in the political sphere on all levels.

**Project:**

## THE EFFECT OF SUCCINIC ACID ON METABOLIC PROFILE IN HIGH FAT DIET INDUCED OBESITY AND INSULIN RESISTANCE

Kendall Zaleski, 2022
Stephen Ives, Associate Professor, Health and Human Physiological Sciences Department

Obesity, insulin resistance, and poor metabolic profile are hallmarks of a high fat diet (HFD), with adverse health consequences. Therefore, we sought to determine the effect of succinic acid (SA) on metabolism in HFD-induced obesity. Animals were assigned to either: low fat diet (LFD)+vehicle, LFD+SA (0.75 mg/ml), HFD+vehicle, or HFD+SA. Body weight, food and water intake, were tracked weekly. After 6 weeks, insulin, glucose, and pyruvate tolerance, and physical activity were assessed. After euthanasia, epididymal white adipose tissue mass and *in vitro* measurements of oxidative skeletal muscle respiration were obtained. In HFD-induced obesity, we found no favorable effect of succinic acid on glucose regulation, but observed reduced adiposity. In muscle, mitochondrial respiratory capacity was increased, owed to greater content, suggestive of a SA-induced mitochondrial biogenesis.

**Project:**

**FIRST THINGS FIRST: FREQUENCY, REGULARITY, AND SERIAL LETTER PROCESSING EFFECTS IN CHILDREN AND ADULTS**

Elizabeth Druke, 2022
Grace Wehrle, 2022
Katia Aguirre, 2023
Jhan Oriach, 2023
Rebecca Johnson, Professor, Psychology Department

The current study tested the predictions of the Dual-Route Cascaded (DRC) model (Coltheart et al., 2001) regarding how written words are processed. A naming task was conducted in which words were presented to children and adults either (1) serially from left to right, (2) serially from right to left, or (3) with the beginning letter first, followed by the others from right to left. The results indicated that the facilitation of the left-to-right letter presentation was driven by the presence of the first letter of the word, rather than a strict serial scan of letters. Furthermore, although reaction times were influenced by word frequency, and accuracy rates were influenced by word regularity, the letter position effects did not differ as a function of word type.

**Project:**

**QUANTUM CHEMISTRY OF TRYPTOPHAN FLUORESCENCE**

Sebastian Caparas, 2023
William W. Kennerly, Senior Teaching Professor, Chemistry Department

Tryptophan, a naturally occurring amino acid, is very sensitive to its surroundings allowing scientists to observe it to learn about its environment. Tryptophan absorbs UV light and fluoresces which does not damage the surrounding proteins. The study uses a computational chemistry software package called Gaussian to optimize indole, the important part within tryptophan that absorbs and emits light. An essential component of this behavior is the shift between excited energy states. The two lowest energy states can be confused by the program, causing it to bestow one state's characteristics to the other in a calculation. The two energy states can switch position and indicate fluorescence when they should not. Characteristics like dipole moment and oscillator strength are key to verifying the identities of the states.

**Project:**

**GRAPH THEORY OF HÜCKEL MOLECULAR ORBITS VIA MATHEMATICA**

Suzanne O'Hara, 2021
William W. Kennerly, Senior Teaching Professor, Chemistry Department

Chemical structures of hydrocarbon molecules can be interpreted and analyzed by the mathematical field of graph theory. We can calculate energy levels for specific molecules through the Hückel approximation, which has a one-to-one relationship with the eigenvalues of a graph's adjacency matrix. Some of these matrices give analytically exact answers, while others yield only approximations. While these approximations are useful, we want to determine why certain graphs generate analytic solutions while others do not. We are accomplishing this through computing

graphical attributes in Mathematica and then categorizing the data in R. We have found that graph symmetry is an important factor in determining if a graph has an exact or approximate answer.

**Project:**

**PROVIDING FRESH FOOD TO LOW INCOME COMMUNITIES: A CASE OF CAPITAL ROOTS**

Enid Gallaghar, 2021
Elzbieta Lepkowska-White, Professor of Marketing, Management and Business Department

Capital Roots is a non-profit organization that aims to provide nutrition education and access to locally grown and healthy food for low income communities in Albany, Rensselaer and Southern Saratoga Counties. The organization effectively addresses barriers that low income communities face in obtaining fresh food by bringing fresh produce directly to them with programs such as Veggie Mobiles, Healthy Stores and Squash Hunger. They engage people in gardening with free of charge Community Garden programs and young people in farming through their Produce Project. Their educational programs reach inner city students as young as pre-kindergarten. In this undergraduate case study we investigate stereotypes that people hold about food preferences in low income communities, describe operations of Capital Roots and challenges they face to help students learn about successful organizations addressing the needs of people living in food deserts.

**Project:**

**BACTERIAL COPPER RESISTANCE**

Shawn Sharifi, 2021
Sylvia Franke McDevitt, Associate Professor, Biology Department

Macrophages utilize heavy metals (such as copper and zinc ions) in addition to destructive enzymes and chemicals, to kill pathogens they engulfed as part of our non-specific immune response. A 20 gene sequence on the genomes of several bacteria of the family Enterobacteriaceae allows them to survive under immediate copper stress. Our research studies this copper resistant gene cluster, Copper Homeostasis and Silver Resistance Island (CHASRI). This specific gene cluster has also been shown to be present on several plasmids allowing for Horizontal Gene Transfer. CHASRI is composed of two key component systems, *pco* (plasmid-borne copper resistance system) and *sil* (silver resistance) systems. Using plasmids containing CHASRI we can research the potential benefit it might give the bacteria when attacked by their host's immune system.

**Project:**

**COLLABORATIVE POVERTY REDUCTION INITIATIVES: EVALUATING OUTCOMES AND IMPACT**

Danny Edlin, 2021
Kelly Melekis, Associate Professor, Social Work Department

This project was part of an evaluation of a program implemented by a coalition of community agencies to meet basic needs and increase financial self-sufficiency among individuals and families living in poverty and requesting support in Northeast Dutchess County, NY. Given the purpose of the initiative to increase financial self-sufficiency, this project aimed to scope and map

'economic self-sufficiency' in the literature to identify how it is defined and measured, and strategies utilized to facilitate it. We developed a scoping review protocol that includes three levels of literature searches in multiple databases. The first level resulted in 2,436 potential papers and we are currently engaged in the second level of review for data extraction. This presentation will focus our scoping review process and preliminary findings.

**Project:**

**DECONSTRUCTING ECONOMIC SELF-SUFFICIENCY**

Pedro Wolfe, 2022
Kelly Melekis, Associate Professor, Social Work

This project developed out of an ongoing evaluation of NEDCorps, a program implemented by a coalition of community agencies to meet basic needs and increase financial self-sufficiency among individuals and families living in poverty and requesting support in Northeast Dutchess County, NY. We began with a scoping review to scope and map 'economic self-sufficiency' in the literature to identify how it is defined and measured, and strategies utilized to facilitate it. This process led to the current project, which involves a critical analysis of the concept of 'economic self-sufficiency' in social work discourse and practice. In this presentation we will discuss the construction of the term and its applications as well as implications for both social work practice and social welfare policy.

**Project:**

**QUANTUM CHEMICAL CALCULATONS OF THE OXIDATION OF SURFACE BOUND ORGANIC COMPOUNDS WITH FREE RADICALS**

Angelina Leonardi, 2020
Heather M. Ricker, 2022
Juan Navea, Associate Professor, Chemistry Department

Non-thermal plasma is an alternative source for the selective generation of free radicals. Here we present a low-pressure plasma generated in a reaction chamber that allows a two-dimensional analysis: UV-Vis spectroscopy for the study of oxygen free radicals, and FTIR spectroscopy to study the oxidation of chemisorbed organic compounds on surfaces. The oxidation of chemisorbed hydrocarbons in this state-of-the-art system allows for the in-situ investigation of the kinetics of free radical reactions on photoactive compounds in the absence of light. Quantum mechanical calculations are used to correlate calculated vibrational frequencies of reactants and expected products to experimentally obtained IR frequencies. The large-scale impacts of this work could include increasing the efficiency of and reducing the toxic waste generated by the petroleum refinement process.

**Project:**

**PHOTOCHEMISTRY IN THE OCEAN-ATMOSPHERE INTERFACE: MATLAB DATA PROCESSING FOR THE ELUCIDATION OF ALTERNATIVE FORMATION PATHWAYS OF ClNO AND HONO**

Heather Ricker, 2022
Angelina Leonardi, 2020
Juan G. Navea, Associate Professor, Chemistry Department

Many important heterogeneous processes occur at the ocean-atmosphere interface, including the role of marine chromophoric dissolved organic matter (m-CDOM) as a photosensitizer of the common atmospheric trace gas $NO_2$. Here, we show that humic acid, a proxy of m-CDOM, can transform $NO_2$ and generate nitrous acid (HONO), $N_2O$, $NO_x$, and nitrosyl chloride (ClNO) through thermal and light-induced pathways. We present new findings in the production of ClNO under acidified conditions and the presence of chlorine ions. We also developed an improved system of data processing through a MATLAB script, allowing simultaneous integration of large spectral data sets. The large-scale impacts of this work would include improving climate modeling and understanding anthropogenic climate impacts.

**Project:**

**CONTESTING OWNERSHIP: CRITICAL APPROACHES TO PROPERTY RIGHTS AND ECONOMIC DEVELOPMENT**

Cecilia Martinez, 2022
Olivia Dieterich, 2020
Feryaz Ocakli, Associate Professor, Political Science Department

This project explores the alternative modalities of what it means to "own." It critically evaluates the concepts of ownership and property rights from historical and empirical perspectives. In doing so, it aims to shed light on a fundamental oversight in the studies of long-term economic development: that ownership is an unstable legal, social, and economic concept that has been shaped by historical and political processes. In this presentation, we discuss the mainstream conceptualization of property rights in the field of political economy. Then, we present how advances in genetics, information technology, and financial instruments challenge this conceptualization. We conclude by suggesting paths for further research to advance our understanding of ownership relations and how they influence the way we think about economic development.

**Project:**

**TRANSITIONING FROM FOSTER CARE TO EMERGING ADULTHOOD: EXPERIENCES AND PERCEPTIONS OF SUPPORT, HEALTH AND WELLBEING AMONG TRANSGENDER AND NONBINARY YOUTH OF COLOR**

Abby MacDonald, 2022
June Paul, Assistant Professor, Social Work Department

This study uses a series of semi-structured, in-depth interviews to develop an initial understanding of the support networks, health, and wellbeing experiences of a small cohort of transgender and

nonbinary (T/NB) former foster youth of color (N=5), aged 19-21, following their exit from foster care in a midwestern state. The purpose is to begin to build a body of knowledge about how these youth are faring 12-24 months post exit from foster care in order to facilitate more positive outcomes for this population. Primary research aims include: (1) identifying who provides support for T/NB youth of color post exit from care and the types of support they provide, (2) exploring any health and wellbeing-related successes and/or challenges they are having, and (3) providing recommendations for addressing corresponding issues and concerns.

**Project:**

**UNDERSTANDING MINDFULNESS IN THE CONTEXT OF SMARTPHONE USAGE BEHAVIOR**

Zoe Beals, 2022
Aarathi Prasad, Assistant Professor, Computer Science Department

We designed a smartphone app called ScreenSnooze in the spring semester that uses mindfulness to help smartphone users better manage their screen time. The motivation for tackling this problem is rooted in finding a more effective way of making a user aware of their phone usage without the additional stress and anxiety that are caused by existing screen time management tools such as Apple's Screen Time. In this talk, we present our findings from the four focus groups we conducted last month to better understand what a smartphone user considers to be good and bad smartphone usage behavior and to get initial feedback on our app design.

**Project:**

**CARRIED AND DELIVERED: MAPPING THE CONTOURS OF GLOBAL COMMERCIAL SURROGATE MOTHERHOOD**

Morgan Emanuele, 2022
Pushkala Prasad, Professor, Management & Business

Global commercial surrogacy is a multi-billion dollar business that is practiced in many different countries. Given the recency of this phenomenon and its planetary reach, existing research is highly fragmented and grounded in different disciplinary fields. Our objective here is to map the terrain of global commercial surrogate motherhood (GCSM) with a view to grasping the economics, ethics, legality and institutional aspects governing it. We have gathered data on (a) demographics of surrogates and clients, (b) costs and compensation patterns, (c) socio-medical processes, (d) nature of opposition versus support, (e) the regulatory landscape, and (f) media representations. Our map of these processes and positions provides the backdrop for future focused scholarship on the racialization of GCSM.

**Project:**

**A COMPARISON OF RELATIONAL AND GRAPH DATABASES FOR A BUSINESS APPLICATION**

Selina Almasarwah, 2023
Christine Reilly, Assistant Professor, Computer Science Department

The question of our research is: what are the benefits and drawbacks of using a RDBMS versus using a graph database? In this project, we are studying two approaches for managing the data

typically used by a business that sells products: a relational database and a graph database. During the summer, we focused on generating data, the experiment design, and the relational database approach. We adapted an existing data generation program and generated datasets for our experiments. The results from our work using a relational database demonstrate how the size of the database impacts the time it takes to run a typical business transaction. Our next step is to run experiments using relational and graph databases to compare results to answer our research question.

**Project:**

**PARRALLEL TRAVERSAL OF GRAPHS STORED IN RDBMSs**

Matthew Clark, 2021
Christine Reilly, Assistant Professor, Computer Science Department

In Computer Science information about relationships between data items is represented using a data structure called a graph. Graphs are used in countless applications including online social networks (i.e. Facebook, Twitter), online maps, supply chain management, healthcare applications, and many other fields. Traditional databases are notoriously slow at running the types of queries that are often required with graph data. Our research proposes a novel approach of using parallel programming for fast operations on graph data combined with running fast queries to retrieve portions of the graph from the database. We evaluate our approach using a comparison with the traditional types of queries on graph data in a database.

**Project:**

**THE PREVALENCE AND PROGRESSION OF CARDIOVASCULAR DISEASE IN U.S. FIREFIGHTERS**

Eliza Abrams, 2022
Denise Smith, Professor, Health and Human Physiological Sciences

Cardiovascular disease (CVD) is the leading cause of on-duty fatalities in the fire service (45% on-duty deaths) and a significant contributor to on-duty disability and early retirement. Further study of CVD over the past decade has advanced understanding of the risks of shift work patterns, physical fitness and diet leading to obesity, hypertension, as well as autopsy evidence of heart enlargement and coronary artery disease (CHD). Increases in CVD risk factors among firefighters, particularly those with CHD history, including high cholesterol, smoking, and diabetes remain significant. Based on the current knowledge of CVD risk factors, implementation of periodic medical and fitness evaluations, wellness programming, and integrative communication with physicians are vital components to fighting the CVD crisis among US firefighters to the benefit of not just firefighters but the public they serve.

**Project:**

***DAMNATIO MEMORIAE***
Claire Maske, 2021
Nicky Zhong, 2021
Sarah Sweeney, Associate Professor, Art Department

*Damnatio Memoriae* is a series of photographs and animations concerning cancel culture. What does it mean to cancel someone? Is it an act of violence or liberation? What is leftover once someone has been cancelled? These are all questions we thought about as we crowdsourced testimonies from participants and digitally "cancelled" someone of their choice from a photograph. Using what we learned from these still cancellations we then created longer animations of people we ourselves were thinking about cancelling.

**Project:**

**COMPUTATIONAL MODELING OF FUZZY BLACK HOLES**
Jason Yao, 2021
Jeremy Wachter, Visiting Assistant Professor, Physics Department

We used Matlab to generate random polygons to simulate "fuzzy" black holes made of tightly wound comic string loops, known as fuzzballs. We explored various ways to generate random polygons. To efficiently generate spherically confined random polygons, we selected a method adapted from an algorithm with strong theoretical support. After we created the fuzzballs, we uploaded them to a computer cluster where their self-interactions were simulated. We then studied the result of these self-interactions, which produce mini-loops that contribute to fuzzballs' temperature-related light emission (blackbody radiation, a.k.a. Hawking radiation). We study various parameters of these mini-loops, such as their velocities, lengths, and emission intervals. It is assumed that the production of mini-loops is a consistent (Poisson-distributed) process. Currently, our data only somewhat matches this prediction.

**Project:**

**TRANSCRIPTION OF SHIPPING LOG C 875**
Nicole Wong, 2021
Adrienne Zuerner, Associate Professor, World Languages and Literatures Department

Continuing last summer's research, we dedicated this summer to transcribing, modernizing, and annotating the entire shipping log C 875, which recounts a voyage from France, past the southern tip of Africa, to what is now South and Southeast Asia. With an emphasis on annotating and modernizing this unique, handwritten manuscript from 1712-1714, we delved into nautical vocabulary, portolans, and early modern maps to retrace the ship's journey. The log's physical condition, its 18$^{th}$-c. French, and antiquated place names make it inaccessible to modern French audiences and scholars. Our modern, annotated version of this shipping log will shed light on the early era of French travel to sub-Saharan Africa and beyond, which paved the way for France's entry into the 18$^{th}$-c. Atlantic triangular slave trade.