2019-2020 Grossman Interdisciplinary Research Team Fellowship Projects

The Grossman Interdisciplinary Research Team Fellowship program supports interdisciplinary and multidisciplinary projects that expand traditional notions of research through collaborative work. The program supports teams of 2 to 5 sophomores and juniors working on a semester or year-long project that requires some type of research and that results in a product or deliverable, broadly defined. Teams must be multidisciplinary but at least half of any team should be SAS students and supervising faculty must be from SAS.

Students may apply for any of the following Grossman IRT projects that our faculty are seeking students to work on. Supervising faculty work closely with their student-team to develop a “project management” plan for the semester. Each plan will clearly articulate the objectives of the project, provide a brief explanation of how each member of the team will contribute to the project, and establish a time-table. Faculty supervisors will ensure that their Grossman Team works cooperatively to produce the proposed project. Each Grossman Team will create a physical and digital poster to be presented at a campus poster session. Digital posters should be reproduced on a single Power Point slide so that they may be archived for web viewing. In addition to work on the project per se, Grossman fellows will also prepare a 3-5 page learning reflection, a one paragraph career narrative, and short SWOT analysis of the program based on their experience.

Students who are selected as Grossman fellows will register for 01:556:328:GT (1.5 credits) for each semester of the project. Students should expect to complete 5-7 hours of work per week over the course of the semester. Faculty are encouraged to meet with their team as often as is needed during the semester.

In support of their academic success, and their commitment to interdisciplinary scholarship, fellows will receive a $1250 award. Twenty percent of this award will be processed at the beginning of the semester and 80 percent at the end of the semester. Awards will be applied to fellows’ current term bill. Any amount exceeding their balance owed will be refunded to the student through the Financial Aid office. Limited funds are also available for supplies or travel required to execute the proposed project.

Learn more [here](https://sasoue.rutgers.edu/teaching-learning/girt) and view the Grossman IRT Shared Syllabus Appendix [here](https://sasoue.rutgers.edu/docman-docs/curriculum/885-grossman-syllabus-appendix) to learn more about overall learning objectives and assignments across all Grossman IRT projects.

PROJECT TITLE: Designing Tour for Visually Impaired Audiences at the Rutgers Geology Museum

SEMESTER: Fall 2019

TEAM SIZE: 3

PREFERRED MAJORS:

Earth and Planetary Sciences

Education with interest in special education

Biology with interest in human health

Engineering with interest in designing accessible spaces

PROJECT DESCRIPTION: The Rutgers Geology Museum is located in downtown New Brunswick in the heart of the Rutgers Historic Old Queens Campus. The Museum has been open since 1872, serving as home to many collections and artifacts relevant to geology and related fields. The museum receives thousands of visitors on yearly basis, most of them K-12 schools, boys and girl scouts, local families and groups with disabilities that come to enjoy the museum while learning about Science and Rutgers history. In an effort to make the museum more accessible, we have been working in the design of a variety of tours to better serve the different audiences that visit us. For example, we offer bilingual tours in Spanish for English as Second Language (ESL) groups and Story Time tours for preschoolers. We want to create a new version of the museum tour to serve our visually impaired audiences. Students in the group will have to research best practices in open spaces for the visually impaired and also get familiar with the museum space and exhibits. They will research how these kinds of tours have been implemented in other museums. Depending on the findings they might collaborate with the Makers Space at Rutgers to develop and implement technology for this tour. The group will be required to create a written script of the tour that will serve as a training tool for museum tour guides and also as final report for this project.

AVALABILITY NEEDS: The Rutgers Geology Museum is closed on Mondays. Students involved in this project should have availability to meet and work on this project Tuesday – Friday.

FACULTY AND DEPARTMENT: Lauren Adam, PhD and Patricia Irizarry, PhD (Museum Directors). Rutgers Geology Museum

PROJECT TITLE: Modeling Crowd Diversity to Design Inclusive Environments

SEMESTER: Full 2019-2020 Academic Year, 1.5 credits each semester

TEAM SIZE: 3 (One computer science major already identified.)

PREFERRED MAJORS: Psychology and Cognitive Science with skills in computer programming and statistical analyses.

PROJECT DESCRIPTION: The focus of this project is to identify, study, model and analyze how individuals with different motor, perceptual and cognitive abilities navigate built environments. The aim is to develop crowd simulations that will help architects, engineers and facility managers design and operate facilities that are cognizant of the needs and abilities of their intended inhabitants. Possible applications of the proposed crowd simulation approach include: (a) simulation-based building usability testing to determine how built environments perform under different conditions (e.g. limited resources, over-occupancy, etc.) (b) optimization of building designs and escape routes to improve evacuation efficiency, and (c) real-time management of crowds to improve safety conditions in case of emergency.

Outcomes: The proposed research holds promise to produce a transformative impact in the field of crowd simulations for the Architecture Engineering and Construction (AEC) industry since it will enable the design and operations of inclusive built environments that can guarantee the safety and well-being for all their inhabitants. The materials and insights developed during this project will contribute to a scientific publication in an established conference in the fields of Computer and Cognitive Science and will inform the drafting of a larger research proposal aimed at attracting substantial funding to further investigate this topic.

AVALABILITY NEEDS/GOALS AND EXPECTATIONS: The students participating in this project are expected to devote 5-7 hours of work per week. They will manage their work independently, collaborate with other team members, and participate in bi-weekly meetings to report their progress and discuss next steps. In the first semester, each team member will work on individual projects on the following topics:

•Identifying perceptual, motor, and cognitive disabilities

•Studying how disabilities affect human navigation in different types of settings

•Modeling the perceptual and cognitive abilities of virtual agents using a video game engine (Unity 3D)

In the second semester, students will draw on their individual research to work as a team to research and develop crowd models composed of members with a different spectrum of disabilities. The final deliverables of the project could include:

•A parametric model of virtual crowd members where users can dynamically adjust variables to represent different abilities (e.g. change visibility range, walking speed, etc.)

•A simulation experiment where we demonstrate the impact of diverse crowd configurations on evacuation procedures

•Design recommendations to improve the walkability of built environments

FACULTY AND DEPARTMENT: Mubbasir Kapadia, Computer Science

PROJECT TITLE: Rutgers Science Explorer Station: the on-campus tour experience!

SEMESTER: Fall 2019, 1.5 credits

TEAM SIZE: 3

PREFERRED MAJORS:

1 Physics

1 Chemistry

1 Biology

and/or any science education program, all with some interest in science outreach or in teaching sciences.

PROJECT DESCRIPTION: The Math and Science Learning Center is in the third floor of the ARC building in Busch Campus and it is home to a variety of scientific demonstrations to help students understand concepts and broad applications in the general physics, biology and chemistry. In addition to Rutgers undergraduate students, the MSLC hands-on demo area serves as a resource to K-12 schools that can book tours for an on-campus visit. Graduate students in the STEM fields along with undergraduate student-workers of the MSLC lead the tours and serve as role models to the younger audiences that visit the center. This present us with the challenge that tours guides vary from semester to semester based on graduation and course schedule of the students involved. Therefore, our goal is to increase the number of train tour guides that work at the MSLC. To achieve this, we have created a series of workshops to certify tour guides on science communication, body language and public speaking. In addition, we want to create a student manual for the different exhibits and would like also to brain storm about what kind of new exhibits will be possible and appropriate for the space. Student will do research about specific demonstrations and the best way to present it to the different audiences. The final product of this project will be to write the RSE Station - Tours Guide Student Manual. As an alternative option, student can also be involved on renovation projects for the demos that needs fixing or replacement.

AVALABILITY NEEDS: MSLC tours happen on Friday mornings. Group meetings happen on Mondays. Students with availability on Mondays and Fridays are preferred.

FACULTY AND DEPARTMENT: Patricia Irizarry, Ph.D., Math Science Learning Center

PROJECT TITLE:The Missing Bones

SEMESTER: Full 2019-2020 Academic Year, 1.5 credits each semester

TEAM SIZE: 4

PREFERRED MAJORS:

Anthropology (Evolutionary Anthropology branch) --familiar with the current debates in archaeological sciences or archaeology in general.

Chemistry—able to prepare in vitro experiments under a different range of conditions

Geology/Soil Sciences--contribute towards the analysis of the sedimentary record of the site

Biology/Structural biology/Material Sciences--interested in bone, bone formation, and the structure of bone at microscopic level.

PROJECT DESCRIPTION: One of the most important questions to ask in Archaeology is what is missing, and, more importantly, what is missing because it has never been there or because it has not been preserved. The answer can change completely the way we interpret an archaeological site.

El Abrigo de la Boja is a small rock shelter in Spain that contains the record of sporadic human activities during the Middle and Upper Paleolithic. The preservation of lithic tools, ornaments made of seashells, and delicate remains, such as ashes and charcoals, is excellent. The site characteristics indicate an environment favorable for bone preservation. Yet, only a limited number of bones have been recovered, most of them small fragments with no taxonomic value. If the conditions are favorable, why bones haven't preserved in this site? Is it possible that for thousands of years people didn't consume animals when visiting the rock-shelter? Answering these questions is critical to understand human adaptations and behavior during the last 40,000 years in Southern Iberia

This project aims to study bone preservation at El Abrigo de la Boja. The students will apply an interdisciplinary approach using a direct analysis of the archaeological record and in vitro experiments with modern bones. Each student will contribute with their individual skills towards the success of this project in a collaborative environment between peers from other disciplines.

This project represents an intersection between social and hard sciences. The students will be required to be familiarized with other disciplines that are not their majors. The students participating in this project should be aware that this is a cutting-edge research project. Although there is a good amount of literature describing bone preservation in archaeological sites no one has attempted to understand bone diagenesis in a dry alkaline environment. Therefore, most of the work we have to perform is uncharted territory. I expect a good amount of commitment and maturity from the students willing to participate in this project. Independence, critical thinking, and willingness to help others are expected.

You can find further information about Microarchaeology at Rutgers here: <https://sites.google.com/view/microarchaeology/home>

AVALABILITY NEEDS/EXPECTATIONS: The students are expected to work between 5 to 7 hours a week in the project. Meetings to evaluate the advance of the project will be held biweekly for the first two months, and on a weekly basis for the rest of the project. In this meeting the students will present the work carried out during the last week, the problems encountered, and how they intend to solve these problems. Feedback from their peers is expected.

FACULTY AND DEPARTMENT: Dan Cabanes, Anthropology, Biological Sciences Building, room 203A, 32 Bishop St. New Brunswick 08901.

PROJECT TITLE:Cryptozoology Project

SEMESTER: Spring 2020, 1.5 credit

TEAM SIZE: 4

PREFERRED MAJORS:

American Studies

Statistics

Business Analytics Technology

PROJECT DESCRIPTION: An interdisciplinary team of students will work with Professor Angus Kress Gillespie on a semester long project for the Spring of 2020. Cryptozoology, which literally means “the study of hidden animals,” is one of the newest life sciences, and certainly one of the most exciting. During the last half-century of the 20th century, interest in sightings and traditions dealing with “monsters” moved from a shadowy world of travelogues to academic respectability and beyond. Students will meet with Professor Gillespie as a group, individually, and online. Students will be expected to devote an average of four hours a week to the project over the course of the semester. The students will draw on their individual research to work as a team to develop three final products. First, each student will write a short research paper to be submitted for possible publication in the New Jersey Folklore Society Review. Second, each student will make an individual oral presentation at the annual Cryptozoology Conference at the Monroe Township Public Library. Third, each student will prepare an individual poster to be presented at the annual New Jersey Folk Festival in 2020.

FACULTY AND DEPARTMENT: Angus Kress Gillespie, American Studies, agillespie@americanstudies.rutgers.edu

PROJECT TITLE:Gender Differences in Competition: Competing for Influence

SEMESTER: Fall 2019, 1.5 credit

TEAM SIZE: 3

PREFERRED MAJORS:

Cognitive Science

Biological Sciences

Marketing

Economics

Psychology

PROJECT DESCRIPTION: Women have strengthened their position in the last few decades in the labor market; however, a gender wage-gap remains. Economists, explaining the gap as the result of different preferences for competition, have advanced the idea that women are less competitive and less risk tolerant than men. This view, seemingly supported by data from economic experiments, has become a mainstream explanation. With this research, we probe the idea that women are less competitive than men, suggesting that the hypothesis critically depends on how we elicit preferences. Our claim is that economists have developed tools that are fine-tuned to record (and amplify) competitive traits as they are expressed in males, but not necessarily in females. We advance the hypothesis that women are as competitive as men but are motivated by different incentive mechanisms: incentives that are socially mediated. Via a novel experimental design in which the rewards to competition include the possibility to influence outcomes—to be able to decide how these resources should be divided —-we have demonstrated that the competition gap closes.

We are extending this line of research to investigate whether, given a choice, women will voluntarily enter—and actually prefer—competitive environments characterized by the possibility of being prosocial and sharing some of the resources with those who lose. This will allow us to learn whether a competitive, yet prosocial option, not only reduces the gender gap once individuals are exogenously placed in such environments, but also increases the share of women choosing to enter such competitive situations. A closing gender gap under the new treatments would further erode the argument that inequality may be due to differences in preferences for competition among men and women.

Members will assist in a workshop for undergraduates on negotiation strategy at Rutgers. Providing such training is one of the recommendations for helping close the gender gap in earnings. This will be worked on from the beginning of the semester, culminating in a workshop at the end of the semester.

AVALABILITY NEEDS/EXPECTATIONS: Fellows will be active contributors in all aspects of the current and on-going research project. They are expected to dedicate 5-7 hours per week to this project and attend bi-weekly meetings to report on progress, troubleshoot, and discuss next steps. They will analyze and graphically present the data from the online and laboratory experiment and assist with conducting experimental sessions in DESL. Additionally, they will complete research on a related topic.

FACULTY AND DEPARTMENT: Mary L. Rigdon, Center for Cognitive Science, [mrigdon@rutgers.edu](mailto:mrigdon@rutgers.edu)

PROJECT TITLE:Music and memoir as expressions of participatory art

SEMESTER: Fall 2019, 1.5 credit

TEAM SIZE: 3

PREFERRED MAJORS:

Open, with an interest in Spanish

PROJECT DESCRIPTION: In the days following the terrorist attacks of 9/11, people across nations and faiths came together in meditation, prayer, song, candlelight vigils, and other forms of artistic expression, to promote peace and solidarity through non-violent practices. Senseless violence has grown exponentially, creating a new normal in our collective memory in the US and abroad. Hate and intolerance seem to be emboldened on a global scale as houses of worship, university campus, public schools, and music concerts, among other venues, have become primary targets for such horrific attacks. Yet, in the midst of such experiences, there has been a surge in artistic manifestations, underscoring what is common to the human spirit while highlighting the potential for change through personal initiatives and creative endeavors. This project examines how creative activism is seeking to create awareness of the political implications harnessed by individuals who believe in the power of art, poetry, music, prayer, performance, photography, among others, to create communities bonded by respect, tolerance, justice and equality. Our goal is to confront the feelings of discomfort produced by these practices within academic settings in the hopes for intelligent and serious debate to better understand collective and personal transformation through participatory art. To this end, students in this project will engage specifically with music and the genre of the memoir.

FACULTY AND DEPARTMENT: Dámaris M. Otero-Torres, Spanish and Portuguese, [dotero@spanport.rutgers.edu](mailto:dotero@spanport.rutgers.edu)

PROJECT TITLE:Indigenous Languages in/of New Jersey

SEMESTER: Fall 2019, 1.5 credit

TEAM SIZE: 3

PREFERRED MAJORS:

Anthropology

English

Linguistics

Asian Studies

Sociology

PROJECT DESCRIPTION: Students will conduct a study of indigenous languages spoken by students at Rutgers as well as analyze and present their findings at a symposium being organized in honor the United Nation’s Year of Indigenous Languages. The study will involve an online and in-person survey of students on campus to find out a) what they think an indigenous language is, b) whether they know anyone who speaks/understands one, and c) if they themselves know or know someone in their family who speaks/understands one. Students will then follow up with and ask to interview students who know an indigenous language about a) their knowledge of the language, b) their feelings about this inheritance, and c) whether their knowledge of this language has had any impact on their experiences of life at Rutgers. Students will be expected to be fully involved in constructing the survey and interview schedule, applying for IRB clearance, conducting the survey and interviews, analyzing the data, and presenting their findings at the symposium in November and as a co-authored paper submitted at the end of the semester.

AVALABILITY NEEDS/EXPECTATIONS: Fellows will meet Tuesdays from 12:35-1:55 in the Anthropology Department.

FACULTY AND DEPARTMENT: Becky Schulthies, Kathleen C. Riley, and Pilar Rau, Anthropology, [kcr58@anthropology.rutgers.edu](mailto:kcr58@anthropology.rutgers.edu) [bls125@anthropology.rutgers.edu](mailto:bls125@anthropology.rutgers.edu)

PROJECT TITLE:How Do We Know What They Know

SEMESTER: Full 2019-2020 Academic Year, 1.5 credits each semester

TEAM SIZE: 3

PREFERRED MAJORS:

Engineering, Computer

Biomedical Engineering

Cell Biology and Neuroscience

Public Health

Psychology

PROJECT DESCRIPTION: Animal models are needed to study the brain basis of sensory, neuro- cognitive and social disorders (e.g. speech processing deficits, ADHD, and autism). Assessing experimentally-induced deficits and evaluating interventions requires better ways of assessing animal cognition. The focus of this project is to design, construct and implement novel behavioral paradigms that enable evaluation of performance on perceptual, cognitive, and social recognition tasks. This will require approaches from the fields of engineering, neuroscience, psychology and biology, as reflected in the student team.

The team proposes to develop apparatus, software and analytic methods that will reliably assess what an animal has learned and remembered about its auditory, visual and social environment. Current methods often consist of training animal subjects to discriminate between two stimuli on a task in which an animal has to emit a response to a correct sensory stimulus and inhibit responding to an incorrect sensory stimulus. Human subjects performing similar tasks verbally report that this discrimination task is challenging, although it can be completed with high levels of performance and confidence. However, animal subjects are often unable to perform the correct behavioral responses and thus can’t communicate what they know. This may in part be due to behavioral training that presents a conflict between the drive to always make a response (to receive a reward) and the need to contingently inhibit a response. Paradigms that rely on natural orienting behaviors (like head turning) and allow a choice between two alternatives will offer more nuanced assessment tools to measure what animal subjects know about the task and environment. The current project will build low cost, easily scalable hardware and develop analytical tools to improve upon existing paradigms. This approach will be coupled with electrophysiological assessments of neural responses to the same stimuli in order to provide a multi-level understanding of how organisms use what they have learned and remembered about environmental, sensory and social cues to guide behaviors.

The current project aims to produce a comprehensive methodological package of hardware and software for robustly and accurately measuring acquisition and performance on cognitive, perceptual and social recognition tasks despite the limited communicative ability of animal subjects. Redesigning and improving on tasks that require little training (such as the head turning task) and capitalizing on unlearned behaviors will allow for more effective use of animal subjects. This package will contribute to both basic and translational research that depends on animal models. In addition, some human subjects, such as infants and brain damaged patients, are often unable to indicate their needs or knowledge about testing stimuli. These new tools may also provide useful methodology to assess what these subjects know and remember about their environment, despite a communication barrier.

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AVALABILITY NEEDS/EXPECTATIONS: The students assisting in this project are expected to devote at least 5-7 hours of work during the week. Students will work independently and collaboratively with team members, as well as produce progress reports that will be presented bi-weekly. Tasks will be divided amongst the team members on the basis of their academic background and current needs. These include, but are not limited to:

•Identify limiting factors related to perceptual learning tasks that are used in academic and clinical settings

•Design and construct hardware and software to study perceptual learning and social interaction tasks

•Implement two methodologies to assess perceptual learning: Two-Alternative Forced- Choice and Head-Tracking Paradigms

•Develop computer programs that track behavioral performance and devise analytical procedures to assess changes in performance over time

•Explore parameters, related to our learning and behavioral paradigms, that may facilitate learning

•Employ electrophysiological methods to find correlates between performance and neural activity

•Provide a framework for studying perceptual learning in non-verbal animals/humans in academic and clinical settings

FACULTY AND DEPARTMENT: David Vicario, Psychology; Mimi Phan, Psychology