

Please note: For summer 2021, GRAP is offered as a **remote** opportunity. If conditions change (Tufts allows international travel, and the country where the research takes place allows incoming student researchers), we will consider allowing students to travel internationally.

Faculty: Lenore Cowen, Professor, Department of Computer Science, School of Engineering

Project Locations: Remote work from home or at Tufts University/Medford, MA and island of Mo'orea, French Polynesia

Dates: May/early June – early August

Project Title: Bioinformatics Methods for Uncovering Mechanisms of Coral Reef Resilience

Project Details: Coral reefs are rapidly degrading as a result of global climate change and local-scale stressors which compromises these ecologically and economically important ecosystems. To better predict how reefs will respond to stress and the impacts on coastal communities, it is critical that we understand the molecular, physiological, and phenotypic responses of corals to a changing environment. Students will work at the NSF-funded Long-Term Ecological Research Center in Mo'orea, in French Polynesia for a 1-month field experience, supervised by a postdoc and graduate student in my collaborator's group, Hollie Putnam from the University of Rhode Island. They will then spend the remaining two months of the summer back at Tufts analyzing coral bioinformatics data with Dr. Cowen.

Tasks and Responsibilities of Research Assistant:

Remote work:

The Tufts component involves doing bioinformatics analysis of the RNAseq data to find the set of genes that are differentially expressed when the coral is exposed to different types of stress. If there is no international field component, Prof. Cowen will include an international collaborator in the remote bioinformatics work.

If international travel is allowed:

Field research in Mo'orea includes the following activities:

- coral husbandry, physiological assays
- temperature, light and seawater chemistry monitoring
- snorkeling for coral surveys and collection
- in water and wet-lab monitoring of coral spawning
- coral fertilization
- wetlab equipment maintenance
- use of PC and Mac computers, wetlab notebook generation and quality control
- coding and statistical analysis, for example, open online lab notebooks; reproducible statistical analyses; coding in R and bash, written and oral summary of results; report and publication writing; outreach and education; website Research at Tufts will involve: programming and data analysis in service of Bioinformatics analysis of coral transcriptomics data.

Qualifications: Tufts component: Comfort and familiarity with at least one programming language through the level of the Tufts comp 15 class; basic linux skills and some additional knowledge of either python or R would be helpful. Mo'orea field component: Able to swim & snorkel Able to lift & carry equipment, etc. (50lbs). Comfortable in a remote island location as well as working in a foreign country. Able to travel to foreign country.

Description of Field Site: The Richard B. Gump South Pacific Research Station is located on the island of Mo'orea, French Polynesia and is a hub for world-class science and research of coral reefs and tropical marine ecosystems. The Gump Station provides direct access for researchers to conduct research in the Mo'orea Coral Reef Long-Term Ecological Research (LTER) site within the network of the National Science Foundation LTER Network. To have access to field sites and the research community in Mo'orea, students will be housed at the Richard B. Gump South Pacific Research Station during the field research component. Access to Moorea is through air travel to Tahiti and ferry transit from Tahiti to Mo'orea. Once arrived at the airport in Pape'ete, Tahiti, students will take a taxi to the ferry terminal, which is the easiest, safest, and most cost effective mode of transportation to the ferry. Ferry service from Tahiti to Mo'orea is available daily and once arrived on Mo'orea, Gump Station staff or researchers will pick up students and provide transportation to Gump Station.

Housing in Mo'orea, French Polynesia: To have access to field sites and the research community in Mo'orea, students will be housed at the Richard B. Gump South Pacific Research Station during the field research component. Accommodations are on the research station property and is best for students and researchers conducting field work to stay in Gump Station housing in order to have easy access to all amenities and access to field research (ex: boats, laundry, wifi, laboratory and office spaces). Students will be placed in the bungalows or the student dormitory, depending on availability. Bungalows have single or shared bedrooms, shared bathroom, outside kitchen. Student Dormitory has 16 individual rooms, dormitory style, shared kitchen and bathrooms.