Faculty Member Contact Information

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Contact Info	
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Department	Biological Sciences

1 Funded, 4 Unfunded URCA Assistant

	This position is **ONLY** open to students who have declared a major in this discipline.	
	This project deals with social justice issues.	
	This project deals with sustainability (green) issues.	
	This project deals with human health and wellness issues.	
	This project deals with community outreach.	
	This mentor's project is interdisciplinary in nature.	

Are you willing to work with students from outside of your discipline? If yes, which other disciplines?

- No

How many hours per week will your student(s) be required to work in this position? (Minimum is 6 hours per week; typical is 9)

- 9

Will it be possible for your student(s) to earn course credit?

- Yes, 0-3 credit hours of Biol493

Location of research/creative activities:

- SW1020

Brief description of the nature of the research/creative activity?

One of the research projects in the Luesse lab focuses on the ggpps11 mutation in the model plant Arabidopsis thaliana. This mutant has variegated leaves, which means that the interior of the leaf is white while the exterior is green. While it looks like an ornamental plant, it is not at all understood WHY the leaves have this pattern. This goal of this research is to use genetic engineering, molecular biology, and bioinformatics to discover what is occurring to cause this phenotype from both a cell biology and play physiology perspective.

Specifically, the goal of this project is to use Recombinant DNA Technology to create a tool that the URCA student (and eventually other members of the lab) can use to control the activity of the GGPPS11 gene within both the green and white areas of the plant leaf. Specifically, the GGPPS11 gene will be put under the control of the Dexamethasone specific promoter which is normally only found in animals. By putting it in plants, it will allow the URCA student to activate the GGPPS11 gene in plants by spraying them with a mammalian hormone

Brief description of student responsibilities?

Students will be responsible for their own project. They will be expected to participate in experimental design, experimental execution, and data interpretation. While students are not expected to have any experience or knowledge of the techniques or project in advance, there is space for the student to take ownership of the project, push it to completion, and be a co-author when the research is published.

For this project, students will use PCR to amplify the GGPPS11 gene from plants, and utilize Golden Gate cloning technology to insert the gene into a plasmid. They will repeat this step as needed to fuse specific tags (such as an antibody recognition tag, or a GFP) to the GGPPS11 gene for identification. After the construct is completely formed within a plasmid, students will insert that bacteria into Agrobacterium tumefaciens, which can then be used to transform the newly created GGPPS11 fusion into plants. To wrap up this project, students will spray leaves with Dexamethasone hormone at various times during development and use computer imaging technology to assess its impact on leaf development and the size of the white area in the leaf.

URCA Assistant positions are designed to provide students with *research or creative activities* experience. As such, there should be measurable, appropriate outcome goals. What exactly should your student(s) have learned by the end of this experience?

My students should have gained skills in experimental design and data interpretation. If they are interested, this also includes the graphing and statistics software R. Functionally, they should

learn molecular biology techniques such as PCR, Gel Electrophoresis, Plasmid and Genomic DNA extraction, Bacterial and Arabidopsis transformation, and sterile technique. They will also learn some basic bioinformatics skills. Finally, and most importantly, they will learn to troubleshoot failed experiments and think critically about their results.

This is designed to be an educational experience for students to learn techniques while also gathering data that could be used for scientific publications. As such, training is a key component of this work. Students do not need previous experience in any of these fields. It is usually available for students to continue working on their project and employing their newly learned skills beyond the one-semester commitment of the URCA program.

Requirements of Students

If the position(s) require students to be available at certain times each week (as opposed to them being able to set their own hours) please indicate all required days and times:

- Early in semester, need to be available to meet and work between 7am and 4pm. After training, night/weekend work is possible.

If the location of the research/creative activities involves off campus work, must students provide their own transportation?

- Science West

Must students have taken any prerequisite classes? Please list classes and preferred grades:

- At least enrolled in Biol 150.

Other requirements or notes to applicants:

- N/A