STEP 1) Faculty, lab staff and other qualified leaders are encouraged to outline a one-semester project below. Please include the following 1-2 paragraph summary to allow students a broad understanding of how this project may align with their interests and skill development:

- **Fellowship Mentors**: Ruth Hufbauer (professor) and Lily Durkee (graduate student)
- **Title**: Can Rapid Evolution to a Degraded Environment Save Populations from Extinction?
- **Justification**: Populations facing changing and degrading environments must adapt or else risk going locally extinct. We are studying how to facilitate adaptation under stressful environmental conditions, which can allow declining populations to avoid extinction. Learning how to best facilitate adaptation can also guide methods to restrict population growth to manage invasive species and pest populations. We use a small beetle as a model system to study these situations that would be difficult or unethical to study with populations in the wild. Our study system is easy to manipulate and due to the beetle’s high reproductive rates and short generation time, we can measure rapid population dynamics and even evolutionary change over the course of a semester. This work is crucial to informing effective long-term conservation, invasive species, and pest management.
- **Tasks**: The tasks will include rearing experimental populations of beetles, creating beetle populations with different levels of genetic diversity (i.e. bottlenecked and non-bottlenecked), and measuring their fitness (ability to survive and reproduce) in different environments. Day to day work will include beetle care, planning and executing experiments, and collecting, managing, and analyzing data. Students will work both independently and as part of a team.
- **Major skills and competencies that will be developed during the project execution**: Working with these beetles involves an immense amount of planning, attention to detail, quick decision making, and teamwork. Learning from past mistakes and appropriately modifying the protocol is critical to maximizing both efficiency and precision. Students will gain experience in shaping and then executing experimental protocols that are geared to answer specific research questions. Students will also learn how to develop measurable and novel research questions in response to past and ongoing research. After data have been collected, students will learn to appropriately analyze them using both Excel and R to create informative and sharable figures. These, along with a summary of the relevant literature, experimental protocol, and discussion, will be showcased in a poster and verbal presentation. Students will gain experience sharing their research with the public at an undergraduate research conference. If the Fellow is interested and the fit is good, there will be an opportunity to apply for an undergraduate hourly position to stay in the lab at the end of the fellowship.

STEP 2) Please share the following to best describe how the Fellowship Mentor plans to support the Fellow throughout the Fellowship:
What training will the new Fellow receive to on-board them to community practices? The Fellow will be taught all the basic protocols for working with live beetles, propagating beetle colonies, maintaining genetically distinct beetle strains, and collecting precision phenotype data. They will also be given relevant and informative readings about past rescue experiments using this model system, the importance and applications of evolutionary rescue, and more broadly about the field of evolutionary ecology.

Who will the Fellow be working with directly? The Fellow will work directly with Lily, and occasionally with Dr. Hufbauer as well. Additionally, other undergraduate hourly employees and one other fellowship recipient will work closely with this new Fellow.

Are there weekly/monthly group meetings that may provide additional training and/or connection for the Fellow with the other student employees working on related projects? Lab meetings are held weekly, jointly with another lab. As this project ramps up, we will also hold meetings every other week about the work on this project in particular. The Fellow will be welcomed to other departmental events to learn about the research interests of other labs.

What specific mentorship is the Fellowship Mentor willing to provide the Fellow (for example, an introduction meeting and two additional meetings throughout the Fellowship)? Both Lily and Dr. Hufbauer are passionate about working with undergraduates in the lab. The fellow can expect at minimum three meetings per semester with Dr. Hufbauer, and weekly work, including mentoring, with Lily directly.

Are you interested in receiving a copy of Critical Mentoring: A Practical Guide by Torie Weiston-Serdan from the CAS Student Success Team to access current best practices for mentoring undergraduates? We would love to have a copy!