TOM AND CAROL WILLIAMS FUND FOR UNDERGRADUATE EDUCATION
2025-26 Williams Instructional Proposal Application

Submission of a **Williams Instructional Proposal** requires short paragraph responses to the prompts below. The prompts are related to a description of the project, its significance, how you will evaluate the success of the project, the budget or resources needed, and the lasting impact of the project.

Please submit a completed version of this document to OtP@uoregon.edu.

Please write your answers to each of the questions below.

YOUR NAME	YOUR EMAIL ADDRESS
Valeri Sawiccy, Ph.D.	
YOUR DEPARTMENT(S) OR UNIT(S)	**YOUR TITLE**
Human Physiology (HPHY)	Career Faculty Instructor

PROPOSAL TITLE

CURE the Research Equity Gap: Introducing Course-Based Research Experiences in Human Physiology

PROJECT OVERVIEW

1. Provide a brief overview of the project you're proposing.

This project will implement a Course-Based Undergraduate Research Experience (CURE) within HPHY 212 (Scientific Investigation in Physiology), a prerequisite course offered each term, serving 1,100 Human Physiology (HPHY) and 300 Neuroscience majors. By embedding authentic research experiences into the HPHY curriculum, we will provide equitable access to research opportunities, ensuring that research participation is not limited to a select few. Through a phased approach, I will develop research-specific coursework, pilot the model in Spring 2026, and refine it through ongoing assessments and collaboration with Andy Karduna's Orthopedic Biomechanics Lab on proprioception research. This structured rollout will provide 550 students per year with hands-on experience with original research and, by 2027-28, the CURE will be fully integrated across all HPHY 212 terms, enhancing research skills, science identity, and self-efficacy. The project will also track long-term research engagement, assessing its impact on continued participation in research beyond the course.

PROJECT SIGNIFICANCE

2. Why is the project worth trying? What issues or gaps would this project resolve? What opportunities would it explore?

An increasing body of research highlights the value of research activities in enhancing student learning. Traditional undergraduate research opportunities, such as independent projects, internships, and Research Experiences for Undergraduates (REUs) and Summer Undergraduate Research Experiences (SUREs), are often have barriers to accessibility and vary in the quality of experiences. This can leave many students, especially those from underserved groups, with fewer opportunities to participate in original research. Course-based undergraduate research experiences (CUREs) offer a solution to this gap by embedding original research directly into coursework, ensuring accessibility for all enrolled students and providing a more structured, equitable experience.[1] CUREs allow students to explore unanswered scientific questions, work collaboratively, and engage in the scientific process, all while fulfilling their course requirements.[2,3] These experiences benefit not only the students but also instructing faculty and researchers, as CUREs support their ongoing research goals while concurrently fulfilling teaching responsibilities.

A major issue with traditional research experiences is that they are typically limited in capacity, leaving many students without access to these opportunities. This limitation often exacerbates equity gaps, as students with fewer social and academic advantages are less likely to participate in research. CUREs tackle this issue by offering research experiences to all students enrolled in the course, thereby democratizing access to research.[1] By integrating CUREs into the HPHY 212 course, we remove barriers like competitive selection and faculty resource constraints. This ensures that every HPHY 212 enrolled student (and Human Physiology major) can contribute to in-house original research and gain the professional skills that come with such experience.

This project reimagines teaching and research as synergistic activities, expanding student access to research while advancing faculty research goals. By integrating students into the research process, we can cultivate meaningful student-generated datasets and conduct replicative studies that advance ongoing research. The project uses a phased approach to ensure iterative refinement and long-term sustainability:

Phase 1: Initial Development & Pilot Implementation (2025-26)

Summer 2025:

- Develop research-specific coursework tailored to integrating CURE research project
- Develop assessment tools to evaluate CURE success (see Assessment/Evaluation)
- Coordinate experiment logistics with Andy Karduna's Orthopedic Biomechanics Lab (Karduna Lab)

2025-26 Academic Year

- Conduct pre- and post-assessments each term to acquire baseline data
- Pilot CURE in Spring 2026 with one course section
- Collect & analyze pre- and post-assessment data from pilot cohort and baseline cohorts

Phase 2: Expansion & Refinement (2026-27)

Summer 2026:

- Analyze & interpret both pilot survey data and student-generated data to enhance and refine the CURE model
- Collaborate with Karduna Lab to integrate student-generated CURE data into research
- Adjust experiment logistics for improved scalability
- Connect with the broader UO community interested in CUREs, building a network of support to promote the model's expansion and adoption in HPHY

Fall 2026:

- Expand CURE implementation to one HPHY 212 term (7-9 sections)
- Conduct pre- and post-assessments for comparison against baseline data

Phase 3: Full Implementation & Sustainability (2027-28)

Summer 2027:

- Further analyze & interpret both pilot survey data and student-generated data from expanded implementation
- Continue collaboration with Karduna Lab to integrate student-generated research
- Refine CURE experiment structure to facilitate adoption by other instructors

2027-28 Academic Year

- Scale up to full-year CURE integration across all HPHY 212 terms

By phasing the rollout, I can analyze both pre- and post-assessment data and student-generated CURE data, allowing iterative improvements before full implementation. This structured approach ensures that research-driven coursework becomes a sustainable and scalable component of HPHY 212.

[1]Bangera G, Brownell SE. 2014. Course-based undergraduate research experiences can make scientific research more inclusive. CBE Life Sci Educ 13:602–606. doi:10.1187/cbe.14-06-0099.
[2]Auchincloss LC, *et al.* 2014. Assessment of course-based undergraduate research experiences: A meeting report. CBE Life Sci Educ 13:29–40. doi:10.1187/cbe.14-01-0004
[3]Brownell SE, Kloser MJ. 2015. Toward a conceptual framework for measuring the effectiveness of course-based undergraduate research experiences in undergraduate biology. Stud High Educ 40:525–544. doi:10.1080/03075079.2015.1004234.

3. How could this project improve the educational experience of undergraduates?

Students who participate in Course-Based Undergraduate Research Experiences (CUREs) gain many of the same benefits as those engaged in traditional independent research, including the development of research skills, self-efficacy, and persistence in STEM.[1-4] Compared to most traditional opportunities, CUREs offer a more inclusive and comprehensive research experience by involving students in every stage of the research process—from hypothesis development to data collection, analysis, and scientific writing—ensuring that all students can engage meaningfully in research. This project allows students to collaborate with the Andy Karduna's Orthopedic Biomechanics Lab on an authentic biomechanics study on proprioception.

[1] Brownell SE, Kloser MJ. 2015. Toward a conceptual framework for measuring the effectiveness of course-based undergraduate research experiences in undergraduate biology. Stud High Educ 40:525–544. doi:10.1080/03075079.2015.1004234
[2] Kloser MJ, et al. 2013. Effects of a Research-Based Ecology Lab Course: A Study of Nonvolunteer Achievement, Self-Confidence, and Perception of Lab Course Purpose. J Coll Sci Teach 42:90–99.
[3] Brownell SE, et al. 2012. Undergraduate Biology Lab Courses: Comparing the Impact of Traditionally Based "Cookbook" and Authentic Research-Based Courses on Student Lab Experiences. J Coll Sci Teach 41:37–45.
[4] Harrison M, et al. 2011. Classroom-based science research at the introductory level: Changes in career choices and attitude. CBE Life Sci Educ 10:279–286. doi:10.1187/cbe.10-12-0151

4. How does this proposal create a more inclusive teaching and learning culture on campus? For example, proposals might support student learning about difference, inequality, and agency or seek to enhance the social and emotional climate of the classroom.

Given the strong evidence supporting CUREs, national reports and funding organizations have increasingly called for their broader adoption in undergraduate education.[1-3] However, despite their potential to make research participation more equitable, CUREs remain relatively rare in undergraduate life sciences courses. Expanding their use, particularly in foundational courses like HPHY 212, presents an opportunity to make research participation a standard part of undergraduate education rather than an exclusive privilege for a select few.

HPHY is the third-largest major on campus, yet it faces the highest major to tenure track faculty ratio (90:1) within the College of Arts and Sciences (CAS)—a ratio that is, on average, 3.7 times higher than in other CAS departments.[4] This severe imbalance significantly limits access to research opportunities, making it critical to address this challenge and ensure more equitable access for students. HPHY 212 serves a diverse student population, with 27% of previously enrolled students receiving Pell Grants, 14% identifying as Black, Latinx, or Native American (BLNP), and 22% being first-generation college students.[5] Our donor-funded internship program has been an important and impactful step toward expanding research access in HPHY. Yet, with only 112 students benefiting over the past two years, we are still reaching just a small fraction of the nearly 1,100 students enrolled in HPHY 212.[6]

By embedding a CURE into HPHY 212, we minimize traditional barriers to research participation, ensuring that all students—including those from underserved groups—gain hands-on research experience. This initiative not only broadens participation but also fosters a more inclusive learning environment, empowering students to see themselves as active contributors to original research (i.e., science identity).

[1]Brewer C, Smith D. 2011. Vision and change in undergraduate biology: a call to action. American Association for the Advancement of Science. Washington, D.C.
[2]National Research Council. 2003. BIO 2010: Transforming Undergraduate Education for Future Research Biologists. National Academies Press, Washington DC.
[3]President's Council of Advisors on Science and Technology. 2012. Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics. Executive Office of the President, Washington DC
[4]Data provided by Andy Karduna, HPHY department head
[5]Course Report data provided by Austin Hocker, Assistant Vice Provost for Data and Decision Support, via *Reducing Equity Gaps in STEM*
[6]Data provided by Amy Sibul, Director of Internships & Career Readiness for HPHY

5. How many undergraduate students would be directly affected?

We plan to implement the CURE in HPHY 212, a prerequisite course for approximately 1,100 Human Physiology (HPHY) and 300 Neuroscience majors that is offered each term during the academic year. With an annual enrollment of approximately 550 students (based on 1,103 students over two years[1]), this course would provide every student, including those from underserved groups, with access to authentic research experiences.

[1]Course Report data provided by Austin Hocker, Assistant Vice Provost for Data and Decision Support, via *Reducing Equity Gaps in STEM*

6. Does the project have implications for teaching and learning that extend beyond a single course or discipline? Are there aspects of this project that encourage students to make connections to areas of thought and experience beyond the context of a single course?

Yes. By integrating CUREs into HPHY 212, this project establishes a scalable model for incorporating research into large foundational courses at UO. The intended outcomes—such as the development of research skills and increased intent to persist in STEM (i.e., self-efficacy)—extend across disciplines, departments, and majors. By engaging in research early in their academic careers, students will build critical thinking and research skills that are transferable beyond the classroom. In addition, their research contributions will directly support faculty scholarship, fostering a stronger connection between teaching and research in meaningful ways.

7. We recognize that it is within the typical job expectations for faculty to design new courses or update current courses, and for the department to support regular curriculum changes. Based on this, how is the project you are proposing unique or in need of Williams Council funds to happen?

While faculty are expected to develop and refine courses as part of their regular responsibilities, implementing a CURE requires additional resources beyond routine course revisions. This project involves developing research-specific coursework, developing assessment tools to evaluate CURE success (see Assessment/Evaluation), and coordinating experimental logistics with the Karduna Lab. These elements go beyond routine course revisions and require dedicated time and funding to ensure successful implementation.

HPHY is committed to sustaining this initiative and has expressed willingness to provide additional summer support to its long-term integration. However, Williams Council funding is essential to launching this model, allowing us to establish a robust framework for research-based learning. By securing this support, we can develop the CURE structure, collect data on its effectiveness, and create a scalable model that can be expanded & sustained within HPHY 212.

ASSESSMENT/EVALUATION

8. Based on the specific problem you will address with this project, how and when will you assess whether or not you were successful? Will you include a pre-experience/post-experience assessment tool? Will you survey participants? What are your intended outcomes, and how will you measure your degree of success in meeting those outcomes?

We will evaluate the success of this project through multiple metrics, aligning with our goal of increasing equitable research access and strengthening student engagement in science.

Intended Outcomes:

1. Expand Research Access:
   - Increase the number of students participating in authentic research experiences through CUREs
   - Increase the number of students participating in research experiences while enrolled at UO and post-CURE, with a specific focus on first-generation and Pell-eligible students
2. Strengthened Self-Efficacy & Scientific Identity: Improve students' confidence in their research skills and sense of belonging in STEM fields
3. Faculty Research Contributions: Generate meaningful student-driven CURE data that contributes to ongoing in-house research investigations
4. Academic & Career Impact: Support student co-authorship, enhancing their competitiveness for post-CURE research experiences and postgraduate opportunities

Aligned Assessment Methods:

1. Access & Equity Tracking:
   - Track the total number of students engaged in CUREs over time
   - Compare research participation rates pre- and post-CURE implementation, tracking students for 3–5 years after participation
     - *Data will be collected by the Director of Internships & Career Readiness, Amy Sibul, who maintains a research participation database tracking HPHY and STEM research experiences, including first-generation and Pell-eligible student participation*
2. Pre- and Post-Course Surveys:
   - Create surveys to assess changes in self-efficacy and scientific identity
     - The CURE assessment survey questions will be based on *Shortlidge EE, Brownell SE. 2016. How to Assess Your CURE: A Practical Guide for Instructors of Course-Based Undergraduate Research Experiences. J Microbiol Biol Educ 17:399. doi:10.1128/JMBE.V17I3.1103.*
   - Analyze responses to measure student growth in confidence and preparedness for research-intensive careers.
3. Faculty Research Contributions:
   - Evaluate the quality of student-generated CURE data and its integration into Karduna Lab research
   - Document faculty-reported impact of CURE data on their research projects
4. Academic & Career Impact:
   - Track student co-authorship on conference presentations, research posters, theses, and peer-reviewed publications
     - *Ensure that course-generated research includes student names in the Acknowledgments section, providing students with a citable research contribution for their CVs*

Indicators of Success:

1. Increased number of students participating in CURE research experiences while enrolled at UO and post-CURE, with a specific focus on first-generation and Pell-eligible students
2. Statistically significant increases in self-efficacy and scientific identity scores
3. Generation of meaningful student-generated CURE data
4. Course co-authorship on conference presentations, research posters, theses, or peer-reviewed publications*. Enrolled student names will be listed in Acknowledgments in research output*

Data collection will occur annually, with adjustments made based on student feedback and assessment results. By integrating these evaluation methods, we will ensure that the CURE model remains impactful, equitable, and sustainable.

BUDGET

9. What amount of financial support from the Williams Council would make this project possible, and for what purposes would the funding be used (e.g. travel, equipment, staff support etc.)? It should be clear that the funding requested goes beyond summer stipends for course preparation. If you are asking for funds to purchase equipment, please inquire into the availability of existing campus resources.

The budget includes faculty stipends for course preparation and continued project iteration, as well as necessary research equipment.

Faculty Stipends:

Phase 1 (Summer 2025): $4,000 (4 weeks)

This stipend will cover the time needed to develop research-specific coursework, design assessment tools, and coordinate experiment logistics with the Karduna Lab. This phase involves significant preparation to integrate the CURE into the curriculum and set up all necessary infrastructure.

Phase 2 (Summer 2026): $2,000 (2 weeks)

The stipend supports further refinement of the CURE model based on data and feedback from the pilot implementation. This phase includes analyzing pilot data and student-generated CURE data, enhancing the curriculum, and adjusting the research experiment logistics to ensure scalability across multiple course sections.

Phase 3 (Summer 2027): $2,000 (2 weeks)

This stipend will support continued refinement of the model, incorporating results from the expanded implementation, and ensuring it is ready for full integration across all HPHY 212 terms. Faculty time will also go toward creating a sustainable, long-term structure for CUREs in the department.

Research Equipment:

Smartphones: $200

Funding will cover the purchase of two Samsung Galaxy A series phones, used by students who do not have access to compatible devices. This is important for ensuring all students can participate in data collection for the research project.

ITEM DESCRIPTION	AMOUNT	NOTES	TOTAL
Summer Stipend – Phase 1	*$1000+33%OPE*	*4 weeks*	*$4000+33%OPE*
Summer Stipend – Phase 2	*$1000+33%OPE*	*2 weeks*	*$2000+33%OPE*
Summer Stipend – Phase 3	*$1000+33%OPE*	*2 weeks*	*$2000+33%OPE*
Other – Smartphone *Samsung Galaxy A series*	*$100*	*Quantity: 2*	*$200*
		TOTAL	*$8200 (+33%OPE)*

10. Are you seeking additional financial support or resources for this proposal? If so, please describe.

Yes, and no.

Yes, Karduna and I have discussed assigning a Graduate Employee (GE) from the Karduna Lab to collaborate on HPHY 212, assisting with research project logistics and student engagement. We may also consider an undergraduate Internship, by working with Amy Sibul, to help with research project logistics.

No, this research project is a collaboration with Karduna Lab, utilizing the Joint Position Sense (JPS) app to assess proprioception. Originally funded by a Williams Instructional Grant (2017) for a 100-level biomechanics course, the JPS app has since become a valuable tool for both teaching and research.[1] Students who do not have access to a compatible smartphone will have alternative options, such as going to Office Hours or collecting data in the Karduna Lab (see Budget). Any additional necessary equipment will be covered by the Principal Investigator.

[1]S. Edwards et al., "Joint Position Sense - There's an App for That," J Biomech., 2016. DOI: 10.1016/j.jbiomech.2016.07.033.

LASTING IMPACT

11. If this project proves successful, how could you foresee its continuation and persisting impact after the period of the Williams Council funding?

Post-Phase 3, I plan to continue collaborating with the Karduna Lab for an additional few years on CURE research projects focused on proprioception. Each year, we will explore a different key variable, allowing for curriculum replication while addressing a new, novel research question. For example, one year might center on shoulder proprioception, while the following year could shift focus to wrist proprioception. Within each academic year, the same experiment will be conducted across multiple terms, strengthening the dataset and providing students with valuable opportunities to engage in an iterative, hands-on research process. In the long term, I plan to sustain CUREs in HPHY 212, collaborating with new faculty members approximately every five years to fuse teaching and research, where students make meaningful contributions to original, in-house research.

DEPARTMENT HEAD SUPPORT

12. If this proposal involves developing a new course or adjustments to teaching assignments or curricula, have you initiated a conversation with your department head?

- [x] Yes; I have tentative approval.
- [ ] Not yet: if selected as a finalist, this is something I'd like to discuss with my head and the Council.