Faculty Professional Development Fund Grant Report

Justice, Diversity, Equity, and Inclusion Integration in Human Physiology 212

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Overview

This report summarizes the outcomes of Faculty Professional Development Fund support awarded to design Human Physiology 212 with an explicit Justice, Diversity, Equity, and Inclusion (JDEI) framework. I received this grant in Summer 2025 for HPHY 212, which I first taught in Spring 2026.

The funded work centered on rethinking not just what is taught, but how and why — asking whose knowledge is centered, whose experiences are reflected in the evidence, and who has access to the tools of science. This work is ongoing, and the funding provided a critical foundation for that continuing effort. After teaching the class once, I can now describe how I used the funds and how the changes functioned for the first cohort of students.

Important Context

When the funding was awarded, the challenge of integrating JDEI principles into a science methods and physiology course was not straightforward. Science courses are often framed as objective and value-neutral, a framing that itself raises JDEI concerns about who defines "objectivity" and which questions and communities are prioritized. The early work of this project consisted of reading, reflection, and consultation, and gradually recognizing that the most meaningful entry point was the course's foundational structure: its learning objectives.

The funding was pivotal because it bought time and intellectual space to work through that process rather than rush past it. Instead of adding a discrete "ethics week," I aimed to design the course so that justice, equity, diversity, and inclusion were threaded throughout the term.

Course Learning Objectives

The first major deliverable was a complete rewrite, or reimagining, of the course learning objectives (CLOs) with explicit JDEI language woven into each one. I wanted to embed justice, equity, inclusion, and diversity into the fabric of the course, and not have a stand-alone module. The revised CLOs are as follows, with the JDEI emphasis italicized.

- Describe the process of how new scientific knowledge is generated (scientific method) *with emphasis on inclusive and equitable research practices.*
- Critique experimental design and methodological concerns in research, and evaluate forms of evidence *including assessment of bias, representation, and community engagement.*
- Evaluate information collected from primary and secondary sources *while considering author perspectives, funding sources, and potential conflicts of interest.*
- Explain ethical considerations in conducting scientific research with humans and animals *through historical and contemporary social justice lenses.*
- Analyze data with appropriate statistical tests, describe results, and create effective data visualizations *with attention to accessibility and diverse audiences.*

- Discuss how biological and physiology knowledge is communicated to scientists and the general public *including considerations of health literacy and cultural competency.*
- Participate and work in groups as a member of a diverse professional team *developing skills for collaborative, inclusive scientific practice.*

These objectives became the scaffolding for all instructional materials, lab activities, and assessments developed under this grant. From there, I built three interlocking themes that structured how students encountered science throughout the term.

Course Design: the Art, Ethics, and Practice of Scientific Research with JDEI Lens

Unlike other 200-level courses in the sequence, this course does not introduce new biological content. Instead, it pauses on the "how to be a scientist." From the first day, I framed the class explicitly around three ideas:

The Art of Science focuses on the creativity, subjectivity, and craft embedded in scientific communication and design — including the decisions researchers make about what questions to ask, which populations to study, and how to frame findings. This theme helps students see science as a human endeavor shaped by culture, perspective, and power.

The Practice of Science grounds students in the technical and methodological skills of scientific inquiry: designing experiments, collecting data, applying statistical reasoning, and communicating results. Within this theme, we continually ask who does science, who has access to it, and how tools and training can be made more equitable.

The Ethics of Research examines the responsibilities scientists bear toward participants, communities, and the broader public — connecting procedural ethics (Animal Welfare Act, IRB processes, informed consent) to a deeper reckoning with the history and ongoing consequences of research that has harmed marginalized communities.

These three themes gave students a coherent framework that tied together the statistics, programming, literature evaluation, and ethics content across the quarter.

Examples of Classroom Teaching Deliverables

Below are some examples of the curriculum I developed as part of this class. These don't represent the whole curriculum but they're examples of the product and process that emerged from the JDEI funding and thinking that began in Summer 2025.

- **R programming and access to tools**. A major course-development commitment under this grant was the adoption of R programming for data analysis activities, implemented through Posit Cloud so that no software installation or cost is required. This was my first time teaching R to students! R was chosen deliberately for two reasons that align with JDEI values: (1) R is free and open-source, removing financial barriers that tools like SPSS or other proprietary software create, and (2) R is widely used across research, public health, ecology, biomedicine, and data science. For students entering health professions, research labs, or graduate programs, foundational R skills represent a meaningful credential; for our transfer students, comfort with R can provide an

advantage when applying to research experiences at the University of Oregon and Oregon State University.

- **Ethics case studies.** Students applied modern day Institutional Review Board standards to historical and contemporary examples. The ethics module was developed around four case studies that anchor abstract principles of research ethics in documented examples of real harms and contested practices. In each case, students used IRB language and core principles (respect for persons, beneficence, justice) to analyze what went wrong and how future research could be more just and equitable.

    - Facebook/Cornell "Emotional Contagion" Study: Students examined the 2012–2014 collaboration in which Facebook altered the News Feed content of hundreds of thousands of users to test whether emotional states could be influenced by exposure to more positive or negative posts. We discussed the controversy around conducting psychological research without explicit informed consent, the role of corporate platforms in human subjects research, and what responsibilities universities have when partnering with private companies.
    - Havasupai Tribal DNA Case: In this case, blood samples collected from members of the Havasupai Tribe in Arizona for a diabetes study were later used without their consent for unrelated research on schizophrenia, migration, and inbreeding. Students considered tribal sovereignty, community-level consent, and the limits of "broad consent" language in genetic research, and how IRBs might better protect Indigenous communities.
    - He Jiankui and the CRISPR "Designer Babies": We discussed the 2018 case in which a Chinese researcher used CRISPR-Cas9 to edit the germline of human embryos, leading to the birth of gene-edited children outside any widely accepted regulatory framework. Students evaluated questions of global governance, scientific accountability, and how risk is distributed when powerful technologies are tested on already vulnerable populations.
    - Tuskegee Syphilis Study: Finally, students studied the U.S. Public Health Service's 40-year syphilis study in which Black men with syphilis were not offered effective treatment and were misled about the nature of their care. This case anchored discussions of informed consent, deception, structural racism, and the long-term impact of research abuses on trust in the medical and research systems.

- **Levels of evidence and bias in wearable devices**: A newly developed module on the hierarchy of scientific evidence used wearable health technology as a concrete, contemporary case study in how research design choices have real consequences for health equity. I focused on pulse oximeters and smartwatch-based oxygen saturation sensors, devices now ubiquitous in clinical and consumer settings, and examined evidence that they systematically overestimate oxygen levels in patients with darker skin tones. Studies and systematic reviews over the last several years have documented less accuracy in dark-skinned individuals at lower oxygen saturations, prompting FDA warnings and calls for regulatory changes. In class, students worked through a sequence of sources about this problem: a single primary research article, a literature review, a meta-analysis, and finally an opinion piece and emerging FDA guidance proposing new standards for how pulse oximeters must be tested across diverse skin tones. This allowed us to discuss "levels of certainty" in scientific claims, how confidence grows as evidence accumulates across study types, and how inequities in study design

can motivate regulatory changes intended to protect patients with darker skin from delayed or inaccurate care.

- **Accessibility in lab reports:** Just like instructors are being asked to create documents that meet accessibility standards for screen-reading technologies, I included these standards in the course-long research experience and final report. The final lab report rubric now includes an explicit accessibility criterion that asks students to consider whether their data visualizations, written communication, and scientific arguments are legible and meaningful to audiences beyond a narrow expert readership. This includes attention to colorblind-friendly figure design, clear labeling and captions, plain-language summaries, and awareness of health literacy levels in the intended audience. Students were asked to imagine their figures being read both by a scientific peer and by a community partner or patient, and to revise accordingly.

Work in Progress

The work supported by this grant is not finished. In Spring 2026, 15 students enrolled in the inaugural offering of HPHY 212, and the course went reasonably well, with clear room for improvement in pacing and assessment refinement. This grant provided the time, resources, and intellectual permission to begin the process of creating a learner-centered, justice-orientated class. The trajectory it set in motion will continue to shape the course — and the students who move through it — in future terms.