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Teaching Philosophy

Physics often appears to pre-med and engineering students as an impersonal "stepping stone" course. I have always enjoyed engaging less-motivated learners through **compassionate, student-centered instruction that nurtures relationships** as much as it teaches physics. Significant learning rarely occurs without a meaningful relationship, and my methods reflect that belief. I apply strategies in two teaching contexts: small groups and large lectures.

One-on-one tutoring sessions and **small classes** (15 to 25 students) taught me that **learning is inherently social and contextual**. Working with diverse students (nurses, pre-med, physics, engineers, art) I found that informal rapport often unlocks engagement. Even reluctant learners become more receptive when they sense their instructor values them. This approach may reduce content time, but it enables deeper engagement and content retention.

Scaling rapport from small tutorials to **large sections** requires deliberate design. In classes over 100 students, I use lab sections to collect informal surveys on backgrounds, construct name tents, and intentionally create positive micro-interactions. I combine personal gestures - learning names and holding approachable office hours - with structured mechanisms such as anonymous polling and think-pair-share. Prompt and thoughtful responses to discussion boards builds trust. These techniques encourage participation and reveal misconceptions. I adjust the balance between connection and content based on course objectives.

In honors sections of twenty-five to thirty students, I adopted a **flipped-classroom model** under my advisor's mentorship. Preparatory videos or readings introduce core concepts, and class time focuses on collaborative problem solving, lab explorations, and concise lectures for key derivations. Short quizzes and brief recaps ensure preparation. Inquiry-based tutorials, group projects, demonstration days, and simulations let students wrestle with ideas and explore parameters beyond typical labs.

Teaching is inseparable from service. I participated in **organizing demonstration days** that brought experiments to local schools and collaborated with our volunteer observatory. These events reinforce that teaching deepens learning and connect campus and community. Outreach demands extra logistics and time but enriches students' sense of purpose, civic responsibility, and student retention with community.

Clarity and explicit expectations guide every class. Each lesson plan answers four questions:

1. **Outcome:** What should students do by the end?
2. **Evidence:** How will I measure mastery?
3. **Activities:** Which tasks develop the skills?
4. **Feedback:** How will I collect timely assessment data?

I see teaching as a dialogue: I share the physics curriculum and learn from student's unique perspective. My objectives are to teach core concepts, inspire application in their careers, and cultivate the humility to accept not having all the answers.

Looking forward, I would like to continue evolving my classrooms and try new things. However, this must be done methodically and carefully, ensuring **the purpose of any change is to improve student outcomes** and to iterate deliberately based on assessment data and feedback.

I will **continue to form peer-instruction groups** early in the semester, structuring diverse teams that remain intact for much of the course. These teams collaboratively tackle in-class questions and clarify misconceptions. Long-standing groups risk entrenching inequitable dynamics, so to prevent dominance by a single voice I will rotate groups based on personalities and performance, and cold-call groups rather than individuals so that every member contributes.

Extending the active-learning strategies I have piloted, I will establish a consistent Design Your Own Problem (DYOP) component: students will author and solve an original problem tied to each unit. Through this, they bring their individual interests and backgrounds into the physics classroom, reinforcing their problem-solving skills. DYOP fosters creativity, but some students may freeze without direction. To support them, I will provide examples and encourage collaborative brainstorming, ensuring the students still receive the intended course outcomes.

Predict-Observe-Explain (POE) demonstrations will remain central to lectures. Students will predict outcomes, observe a live experiment, and then explain any discrepancies. POE prompts curiosity and corrects misconceptions, but preparation demands time and materials. To keep demonstrations sustainable, I will build a reusable kit, incorporate student-led demos, and leverage simple household items whenever possible.

At the start of each course, I will continue polling students about their majors and interests and begin actively using that data to tailor examples and contexts. Connecting homework and lecture material to fields such as biology or education shows students the relevance of physics beyond the classroom. This strategy risks reinforcing stereotypes about certain majors; to counteract that, I will vary contexts over the term and invite students to propose examples themselves.

Finally, **I will continue and expand community involvement** by collaborating with department colleagues who host or partner with local schools and science centers for public demo nights where students can volunteer. Building connections with local schools and designing demos is not trivial; it requires significant work from myself, other staff, and volunteers. Therefore, this goal is highly collaborative and depends on leveraging existing programs to keep the workload sustainable.

Collectively, these initiatives fulfill my goal that a classroom teaching-style should iterate like the science we aim to teach.