

Zachary Crawford

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PROFILE

I am deeply committed to teaching and passionate about both learning and helping students succeed. I am seeking a teaching professor position where I can share my love of physics with others through creating an engaging and inclusive learning environment. My primary goals are to help students overcome doubts about physics, develop their critical thinking skills, and gain an appreciation for the beauty of the mathematics that surrounds them in their everyday lives.

EDUCATION

University of California – Davis, Davis, CA

PhD in Physics

June 2025 (expected)

North Carolina State University, Raleigh, NC

B.S. in Physics

May 2020

Major GPA: 3.901/4.000

B.S in Chemical Engineering- Biomolecular Concentration

May 2020

Major GPA: 3.816/4.000

Cumulative GPA: 3.914/4.000

Biotechnology Minor

TEACHING EXPERIENCE

Math Methods Crash Course – Organizer

University of California – Davis, Davis, CA

September 2023, 2024

- Organized and led a comprehensive math methods crash course for incoming physics graduate students, enhancing their readiness for advanced coursework
- Developed curriculum by selecting key mathematical topics essential for graduate-level physics, ensuring alignment with students' academic needs
- Designed and implemented interactive exercises to reinforce conceptual understanding and application of mathematical methods
- Created educational videos to provide accessible, asynchronous learning materials that complemented in-person instruction

Associate Instructor

University of California – Davis, Davis, CA

January 2024 – March 2024

- Served as Instructor of Record for two large sections of a physics course for life science majors, each with 170 students, managing all aspects of instruction and course administration
- Designed and implemented the course structure, including creating the syllabus, scheduling topics, and determining key assessments (quizzes, final exams)
- Incorporated live demonstrations into lectures to illustrate key principles, fostering an interactive and engaging learning environment

- Connected abstract physics concepts to students' everyday experiences, enhancing understanding and making the material more relatable
- Managed course logistics through extensive communication and student support, ensuring smooth course operation and timely feedback

Graduate Teaching Community

University of California – Davis, Davis, CA

October 2023 – March 2024

- Discussed pedagogical research on a weekly basis with other graduate student instructors to improve our understanding of how to enhance student learning
- Reflected on perspectives of marginalized students in college classroom environments
- Collaborated with other instructors to implement good pedagogical practices

Lead Teaching Assistant

University of California – Davis, Davis, CA

September 2022 – December 2023

- Managed a team of 7 other graduate student teaching assistants overseeing a total of ~160-180 life science students per quarter
- Coordinated learning goals in discussion sections with lecturer
- Led discussion labs of 30+ students for 5 hours a week
- Led TA meetings twice a week for 1 hour each
- Helped students through in-person office hours each week and online question forums

Teaching Assistant – (Various Courses)

University of California – Davis, Davis, CA

September 2020 – Present

- Led discussion labs of 30+ life sciences students for 10 hours per week (6 academic quarters)
- Helped physics majors navigate Fourier transforms and complex analysis (1 academic quarter)
- Evaluated and provided feedback on assignments for life science majors, engineering majors, and physics majors (9 academic quarters)
- Created an inclusive classroom environment conducive to collaboration and experiential learning

Python Bootcamp – Volunteer

University of California – Davis, Davis, CA

September 2021

- Guided undergraduate and graduate students alike to explore the python programming language for the first time
- Answered questions and helped debug student programs

RESEARCH EXPERIENCE

Graduate Student Researcher

University of California – Davis, Davis, CA

January 2021 – Present

- Conducted collaborative research on solar cell technologies, driven by a passion for advancing clean energy solutions
- Applied molecular dynamics simulations (LAMMPS) to investigate the behavior of materials at the mesoscopic level, to reduce degradation in solar cells
- Utilized the Nudged Elastic Band method to determine energetic barriers for atomic motion to investigate degradation pathways

Undergraduate Researcher

June 2016–December 2019

North Carolina State University, Raleigh, NC

- Undertook my own individual research project for 3 years resulting in a recently accepted manuscript (1st of 2 authors-APL Bioengineering)
- Created a platform utilizing MATLAB which quantifies the response of *C. elegans* to exercise
- Gained experience with image processing, giving presentations, and research writing

PUBLICATIONS

Diggs, A., Crawford, Z., Goga, A., Zhao, Z., Stuckelberger, J., & Zimányi, G. T. (2024). Pinhole Formation by Nucleation-Driven Phase Separation in TOPCon and POLO Solar Cells: Structural Dynamics and Optimization. *ACS Applied Energy Materials*, 7(8), 3414–3423. <https://doi.org/10.1021/acsaem.4c00171>

Abelson, A., Qian, C., Crawford, Z., Zimanyi, G. T., & Law, M. (2022). High-Mobility Hole Transport in Single-Grain PbSe Quantum Dot Superlattice Transistors. *Nano Letters*, 22(23), 9578–9585. <https://doi.org/10.1021/acs.nanolett.2c03657>

Crawford, Z., & San-Miguel, A. (2020). An inexpensive programmable optogenetic platform for controlled neuronal activation regimens in *C. elegans*. *APL Bioengineering*, 4(1), 016101. <https://doi.org/10.1063/1.5120002>

Moon, D. H., Basak, R. S., Usinger, D. S., Dickerson, G. A., Morris, D. E., Perman, M., Lim, M., Wibbelsman, T., Chang, J., Crawford, Z., Broughman, J. R., Godley, P. A., & Chen, R. C. (2019). Patient-reported Quality of Life Following Stereotactic Body Radiotherapy and Conventionally Fractionated External Beam Radiotherapy Compared with Active Surveillance Among Men with Localized Prostate Cancer. *European Urology*, 76(3), 391–397. <https://doi.org/10.1016/j.eururo.2019.02.026>

POSTERS

2024 IEEE 52 nd Photovoltaics Specialists Conference (PVSC), Seattle	June 2024
2022 IEEE 49 th Photovoltaics Specialists Conference (PVSC), Philadelphia	June 2022
22 nd International <i>C. elegans</i> Conference Poster Presentation, UCLA	June 2019
26 th Annual Undergraduate Research Spring Symposium Poster Presentation, NCSU	April 2017

SKILLS

Communication, Python, LAMMPS, Quantum Espresso, C++/C, MATLAB, GPU computing, SOLIDWORKS, Video Editing

MEMBERSHIPS AND FELLOWSHIPS

American Association of Physics Teachers

Caldwell Fellow (NCSU)

Boy Scouts of America (Eagle Scout)