# Zachary Crawford

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## Education

**Ph.D in Physics,** *University of California, Davis*, Davis, CA June 2025

**B.S. in Physics,** *North Carolina State University*, Raleigh, NC May 2020
GPA: 3.914/4.000

**B.S. in Chemical Engineering,** *North Carolina State University*, Raleigh, NC May 2020
Biomolecular Science Concentration, Biotechnology Minor, GPA: 3.914/4.000

## Teaching Experience

**Associate Instructor,** *UC Davis*, Davis, CA Jan 2024 – Mar 2025

- Selected as Associate Instructor (Instructor of Record) for three large introductory physics courses (170+ students each) in recognition of outstanding performance as a Teaching Assistant and Lead TA, demonstrating excellence in instruction, leadership, and student engagement.
- Directed course logistics, administration, and designed curriculum for high-enrollment undergraduate physics courses, including scheduling and assessment creation.
- Communicated effectively, achieving an average evaluation of 4.4/5 from 179 students for successful delivery of material and concepts
- Engaged students in lectures on complex topics, receiving an average evaluation of 4.6/5 from 181 students for my enthusiastic approach

**Math Methods Crash Course – Organizer,** *UC Davis*, Davis, CA September 2023, 2024
Educational YouTube Channel - YouTube

- 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

**Graduate Teaching Community,** *UC 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,** *UC Davis*, Davis, CA September 2022 – December 2023

- Enhanced instructional quality for ∼185 life science students per quarter by managing and mentoring a team of 7 graduate TAs, improving consistency across sections
- Strengthened alignment between lab activities and lecture content by coordinating weekly learning goals with the course instructor
- Increased student engagement and retention in discussion labs of 30+ students by delivering 5 hours/week of active, inquiry-based instruction
- Improved TA preparedness and pedagogical coherence by leading two 1-hour team meetings weekly focused on content review and instructional strategy

**Teaching Assistant - Various Courses,** *UC Davis*, Davis, CA September 2020 – Present

- Taught over 200 students across 7 academic quarters by facilitating 10+ hours/week of lab and discussion sessions for life science majors, resulting in improved conceptual understanding
- Increased student confidence in mathematical problem-solving by supporting physics majors through advanced topics like Fourier transforms and complex analysis in dedicated upper-division courses
- Contributed to student learning outcomes across 10 academic quarters by grading assignments and delivering individualized feedback for life science, engineering, and physics courses
- Fostered a collaborative and inclusive classroom culture by designing activities that emphasized peer interaction and hands-on exploration

## Publications

- **Critical transport behavior in quantum dot solids**, (Expected 2025), **Z. Crawford**, A. Goga, M. Kovtun, and G. Zimanyi
- **Fermi Level and Light Driven Defect Generation in Silicon Solar Cells**, (2025), A. Diggs, Z. Zhao, A. Goga, **Z. Crawford**, and G. Zimanyi, *arXiv preprint arXiv:2501.06667*.
- **Pinhole formation by nucleation-driven phase separation in TOPCon and POLO solar cells: Structural dynamics and optimization**, (2024), A. Diggs, **Z. Crawford**, A. Goga, Z. Zhao, J. Stuckelberger, and G. Zimanyi, *ACS Applied Energy Materials, 7 (8)*.
- **High-Mobility Hole Transport in Single-Grain PbSe Quantum Dot Superlattice Transistors**, (2022), A. Abelson, C. Qian, **Z. Crawford**, G T Zimanyi, M Law, *Nano Letters, 22(23)*.
- **An inexpensive programmable optogenetic platform for controlled neuronal activation regimens in C. elegans**, (2020), **Z. Crawford**, A San-Miguel, *APL Bioengineering, 4(1)*.
- **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**, (2019), D. Moon, R. Basak, D. Usinger, G. Dickerson, D. Morris, M. Perman, M. Lim, T. Wibbelsman, J. Chang, **Z. Crawford**, J. Broughman, P. Godley, R. Chen, *J. Eur Uro, 76(3)*.

## Conferences, & Presentations

- **Pinhole Dynamics in Textured Passivated-Contact Si Solar Cells**, (2025), **Z. Crawford**, A. Diggs, A. Goga, Z. Zhao, G. Zimanyi, *Photovoltaic Specialists Conference - Oral (presenter)*.
- **Light Induced Degradation in Silicon Heterojunction Solar Cells**, (2024), Z. Zhao, A. Diggs, **Z. Crawford**, A. Goga, G. Zimanyi, *Photovoltaic Specialists Conference - Poster*.
- **TOPCon Solar Cell Degradation via Pinhole Nucleation**, (2023), A. Diggs, A. Goga, **Z. Crawford**, G. Zimanyi, *Photovoltaic Specialists Conference - Oral (non-presenter)*.
- **Critical transport behavior in quantum dot solids**, (2022), M. Kovtun, **Z. Crawford**, A. Goga, G. Zimanyi, *Photovoltaic Specialists Conference - Poster*.
- **An inexpensive automated optogenetic platform for controlled neuronal activation regimes in C. elegans**, (2019), **Z. Crawford**, A. San-Miguel, *22nd International C. elegans Conference - Poster*.
- **Studying Age-dependent Synaptic Function in C. elegans**, (2017), **Z. Crawford**, A. San-Miguel, *NCSU 26th Annual Undergraduate Research Spring Symposium - Poster*.

## Skills, Languages, and Techniques

**Systems and Platforms**: Canvas, Gradescope, Linux, Windows, Bash, OpenCL, CUDA, Embedded Systems

**Languages and Tools**: Word, Excel, Powerpoint, LaTeX, Python, C++, SQL, MATLAB, SOLIDWORKS

**Soft Skills**: Communication, Patience, Video Editing, Empathy, Curriculum Development, Universal Design for Learning