

# Idris Malik

PH.D. STUDENT · GRADUATE RESEARCH ASSISTANT

3012 9 1/2 St N, Apt 302, Fargo, ND, 58102

☎ (+1) (513) 526-4342 | ✉ idris.malik@ndsu.edu · idrismalik44@gmail.com | 🏠 idris-malik.com/ | 📱 idris-malik-8378b0264/

## Summary

---

I am a Physics Education Researcher interested in student thinking and experiences on the boundary of math and physics. I currently do qualitative research into how undergraduate students form conceptions of mathematics, physics, and math used in physics. I hope to pursue research that centers the voices of students and makes physics instruction and curriculum more accessible to all students.

## Education

---

### North Dakota State University

PHYSICS AND DISCIPLINE-BASED EDUCATION RESEARCH PH.D.

- **Advised by Dr. Warren Christensen:** PER on the boundary of Math and Physics

Fargo, North Dakota

August 2023 - Present

### The Ohio State University (College of Arts and Sciences Honors Program)

B.S. IN PHYSICS (MINOR IN MATHEMATICS) (3.838)

- **Advised by Dr. Andrew Heckler:** Student practice on STEM Fluency assignments

Columbus, Ohio

April 2019 - May 2023

## Research Experience

---

### Physics and Discipline-Based Education Research Ph.D. Program, North Dakota State University

(Dr. Warren Christensen)

GRADUATE RESEARCH ASSISTANT

- Exploring Physics Education Research literature, with emphasis on work regarding the boundary of Math and Physics
- Taking field notes during classroom Observations of a Calculus-Based Intro Physics course
- Designing an Interview Protocol and conducting student interviews about perceptions of Math in a Physics classroom
- Preparing for presentations at the 2024 Winter American Association of Physics Teachers and 2024 American Physical Society April Meeting conferences

Fargo, North Dakota

August 2023 - Present

### Undergraduate Research, The Ohio State University Physics Education Research Group

(Dr. Andrew Heckler)

PHYSICS EDUCATION RESEARCHER

- Worked with Dr. Andrew Heckler on analyzing topics and proposing hypotheses regarding Student Agency and motivators for student choice
- Cleaned and analyzed data sets using *Python* and *Microsoft Excel*, developed methods for specific analyses, and created graphs and tables for results
- Performed and assessed linear regressions, logistic regressions, Multilevel-Models, and Multi-level Structural Equation Models using *R*
- Compiled and developed summaries of research results using *Microsoft Word* and *Overleaf*
- Prepared *instructional images of 3-D objects*, along with writing corresponding *questions and descriptive text* for screen reader users, using *Wolfram Mathematica*

Columbus, Ohio

Feb. 2021 - Present

### Discipline Based Education Research REU, North Dakota State University

(Dr. Warren Christensen)

PHYSICS EDUCATION RESEARCHER

- Designed and conducted a *Semi-structured Interview Protocol* regarding *Meta-Representational Competence* in the context of *Quantum Mechanics*
- Performed Audio transcription of Interview and performed video/audio editing for a presentation video in *Adobe Premiere Pro*
- Attended *professional development seminars* on Scientific Communication through informal, formal, visual-focused, and audio-focused media
- Presented a research poster at the REU end-of-program seminar
- Research paper accepted for a 30 min presentation at the *2023 Research in Undergraduate Math Education conference*. This was funded with an REU Travel Grant from North Dakota State University

Fargo, North Dakota

May 2022 - Present

## Teaching Experience

---

## The Ohio State University, Mathematics and Statistics Learning Center

Columbus, Ohio

UNDERGRADUATE PEER TUTOR

Jan. 2021 - Apr. 2023

- Virtual tutoring of peers through weekly and one-time appointments in various math courses from Calculus 1 to Linear Algebra.
- In-Person tutoring of Calculus I, II, and III students in a drop-in room (~5 student interactions per hour)
- Tutoring focused on assessing and addressing specific student issues, through the directed conversation of ideas, while setting a productive meeting tone and initiating conversations on both specific and expansive topics
- Created materials to better explain problem setup, relevant equations, and solving techniques to students
- Participated in 18 interactive, small group-oriented, self-reflective *Professional Development Sessions*

## The Ohio State University, Department of Physics

Columbus, Ohio

STUDENT ASSISTANT / GRADER

Aug. 2021 - Apr. 2022

- Held weekly office hours (on Zoom and in person) for homework help and exam review for *Intermediate Mechanics I & II*
- Graded homework assignments and provided detailed written feedback to students on *Gradescope*
- Helped proctor midterm exams in 3-hour shifts

## Honors & Awards

---

### SCHOLARSHIPS AND GRANTS

2019-2023	<b>Maximus Scholarship (\$3000 a year for 4 years)</b> , The Ohio State University	Columbus, Ohio
2022	<b>REU Research Presentation Travel Grant (\$1600)</b> , For 2023 (RUME) Conference	Omaha, Nebraska
2022	<b>Growing Up STEM REU (\$5000)</b> , North Dakota State University	Fargo, North Dakota
2021	<b>Physics Summer Research Program (\$5000)</b> , Ohio State Department of Physics	Columbus, Ohio
2021	<b>Second-year Transformational Experience Program Grant (\$2500)</b> , Ohio State STEP Program	Columbus, Ohio
2019	<b>College Board National Merit Scholar Finalist</b> , Lakota East High School	Liberty Township, Ohio

## Publications

---

### Preliminary Paper submission for RUME conference 2023

Peer reviewed

MAIN AUTHOR

Fall 2022

- Malik, Idris I., Christensen, Warren M. "Investigating Student Use of Representation in Quantum Mechanics Change of Basis Problems" *RUME XXV Conference Proceedings*. <http://sigmaa.maa.org/rume/Site/Proceedings.html>
- Collaborated with Dr. Warren Christen from North Dakota State University on a 5-page peer-reviewed conference proceedings paper

## Presentations

---

### Presenter for Ohio State Research Project (April, July. 2023)

American Association of Physics

Teachers 2023 Summer Meeting

Sacramento, California

- Malik, Idris I., Heckler, Andrew F., *Which Basic STEM Skills do Students Choose to Practice?* Contributed Talk at the 2023 Summer Meeting of the American Association of Physics Teachers, Sacramento, California, July 17, 2023
- Malik, Idris I., Heckler, Andrew F., *When given the choice, which basic STEM skills do students choose to practice?* Contributed Poster at the 2023 Summer Meeting of the American Association of Physics Teachers, Sacramento, California, July 17, 2023
- Malik, Idris I., Heckler, Andrew F., *When given the choice, which basic STEM skills do students choose to practice?* Contributed Poster at The Ohio State University 2023 Spring Undergraduate Research Festival, Columbus, Ohio, April 6, 2023
- Introduced the STEM Fluency framework and how student performance data can be analyzed with logistic regressions.
- Characterized student choice behavior trends within a class and across semesters.
- Presented possible explanations for student behavior and proposed future directions to explore deeper research questions.

### Presenter for NDSU Summer Research Project (Feb. 2023)

Research in Undergraduate

Mathematics Education Conference

Omaha, Nebraska

- Malik, Idris I., Christensen, Warren M., *Investigating Student Use of Representation in Quantum Mechanics Change of Basis Problems* Contributed Talk at the 25th Research in Undergraduate Mathematics Education Conference, Omaha, Nebraska, February 25, 2022

- Malik, Idris I., Christensen, Warren M., *Investigating Student Use of Representation in Quantum* Contributed Poster at The North Dakota State University Summer Research Programs Poster Session, Fargo, North Dakota, August 5, 2022
- Introduced the Math Education Theoretical Framework of Meta-representational Competence, and its recent introduction into Physics Education
- Related Quantum Mechanics Spin Change-of-Basis questions to Eigentheory and Linear Algebra concepts
- Presented preliminary coding, analysis, and conclusions from 2 hour-long student interviews, with a Q & A regarding future analysis focus

## Involvement & Outreach

---

### North Dakota State University Grad Phi

Fargo, North Dakota

MEMBER

Aug. 2023 - Present

- Planned and volunteered in science outreach activities with other NDSU Physics Graduate Students

### Ohio State University Polaris Mentorship Program

Columbus, Ohio

UPPERCLASSMAN MENTOR

Aug. 2022 - Dec 2022

- Mentored a non-traditional physics undergraduate student in a large group and 1 on 1 setting
- Provided guidance on how to best access and use resources for fulfilling academic and career goals
- Participated in discussions about experiences in Physics and Astronomy centered around holistic perspectives

### Ohio State University Athletic Band

Columbus, Ohio

ATHLETIC BAND ADVISORY COUNCIL: LIFE SKILLS COMMITTEE

Nov. 2022 - May. 2023

- Performing member in the Clarinet section since January 2020
- Served as Section Leader of the Clarinet section and representing the voices of the band at large with directing staff
- Life Skills Committee member: coordinating presentations on Title IX, Alcohol, and Social Media policies

### Ohio State Society of Physics Students (Sigma Pi Sigma)

Columbus, Ohio

TREASURER

Apr. 2022 - Apr. 2023

- Helped plan professor talks, physics demonstrations, mini competitions, and other general meetings
- Treasurer: wrote programming fund requests, organized catering orders, and fulfilled reimbursement forms

### The Sundial Humor Magazine (Ohio State University)

Columbus, Ohio

EDITOR-IN-CHIEF, SOCIAL MEDIA OFFICER, EDITOR

Apr. 2022 - Apr. 2023

- Editor in Chief (April 2022-April 2023): Planned and ran general body meetings and writing workshops, submitted space request forms, and delegated responsibilities to other officers
- Social Media Officer (April 2020-April 2022): Managed club social media accounts, created promotional images, and updated general membership on club information
- Editor (October 2020-April 2023): Provided positive feedback and optional constructive revisions for submitted articles

### Ohio State University Sci-Access Zenith Mentorship Program

Columbus, Ohio

UPPERCLASSMAN MENTOR

Aug. 2020 - Dec. 2020

- Worked as a virtual mentor (over Zoom) for blind and visually impaired (BVI) students (grades 8-12) from across the country
- Worked one-on-one with a student (including helping them prepare a short astronomy presentation), and in a full group setting, on a weekly basis Communicated encouragingly and contributed to large group meetings through support and interest in student perspectives

## Skills

---

<b>Programming</b>	Python (Jupyter), R (RStudio), Excel, Mathematica, Ohio Super Computer, LaTeX
<b>Languages</b>	English (fluent), Spanish (5 years of High School / College instruction)
<b>Media Editing</b>	Print: Canva, Photoshop, <i>Audio and Video</i> : Audacity, Adobe Premiere Pro
<b>Organizational</b>	Student Organization Meeting Planning and Presentations, <i>Treasurer responsibilities</i> : Tax forms, Programming fund and reimbursement requests, budgets, bank account management
<b>Additional</b>	B-flat Clarinet (10 years), Certified in RCR Social and Behavioral & HSP Social and Behavioral (Stage 1) (6 Feb 2021), Strong Interpersonal communication skills (peer instruction and collaboration)