Curriculum Vitae

Clausell Mathis

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General Information

University Address: Holmes Hall
Michigan State University
919 E. Shaw Lane
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Professional Preparation

2020	Ph.D., Florida State University, Curriculum and Instruction – Science Education. [Dissertation title: *Enacting A Culturally Relevant Approach to Physics: An Examination of Aspects and Dilemmas.*] Supervisor: Sherry A. Southerland
2005	Master's of Science Degree, University of Central Florida. Major: Physics
2003	Bachelor of Science, Florida A&M University. Major: Physics

Research Experience

2022-Present	Assistant Professor of Physics and Science Education - Michigan State University, Lyman Briggs College, Department of Teacher Education, Department of Physics (Courtesy). Conduct physics education research emphasizing culture-based pedagogical approaches focusing on curriculum development, student learning, and teacher identity.
2020-2022	Postdoctoral Research Scholar – University of Washington, Department of Physics. Conducted research on students' conceptual resources. Developed instructional materials designed to target students' conceptual resources. Researched physics teachers' merging of energy and equity in classroom instruction. Coordinated professional development of physics teachers towards culturally responsive instruction.

2020 – 2022	Consultant – National Alliance for Partnerships in Equity. Facilitated workshops for equitable practices for faculty, develop and provide recommendations for equitable based curricula
2017-2020	Graduate Research Assistant – School of Teacher Education, College of Education, Florida State University. Participated in research on examining science identity development among young women and examining how changes in an instructional unit focused on physical science impacts elementary teachers' self-efficacy, content knowledge, and views of science; mentored Noyce scholars, writing annual reviews, developing and coordinating annual Noyce conferences.
2009-2013	Research Assistant, Cellular and Molecular Biophysics Lab, University of South Florida Department of Physics. Examined effects of Na/K pumping rate due to AC electrical inputs on various cell types. Performed techniques on cells in vivo and in vitro. Techniques used were voltage clamp, two electrode micropipette techniques, micro puncture.
2004-2005	Research Assistant, University of Central Florida, Department of Physics. Worked on photoluminescence study of zinc oxide. Performed optical alignment. Used grading spectrometer. Operated Q-Switched YAG laser with SHG and THG. Used Xe arc lamp, Si photodiode, photomultiplier tube, boxcar average, oscilloscope, and Fourier transform spectrometer.

Research and Original Creative Work

Publications

Refereed Journal Articles

1. **Mathis, C.,** Southerland, S. A., & Jaber, L. Z. (2025). Tracing different forms of politicized care in teaching physics to students traditionally underserved in science. *Physical Review Physics Education Research, 21*(2), 020121. https://doi.org/10.1103/yvbc-n7vk

2. **Mathis, C.,** Mutegi, J., Carroll, T., Patel, M., & Wooley, A. (2025). Exploring physics teacher identity: Pathways toward equitable instruction among teachers. *Physical Review Physics Education Research, 21*(2), 020123. https://doi.org/10.1103/qmv3-jwm2

3. Miller, E. A., Reigh, E. V., & **Mathis, C**. (2025). Culturally relevant pedagogy in practice: A case study of a teacher's divergence from large‐scale science curriculum. Journal of Research in Science Teaching, 0(1), 1–16. https://doi.org/10.1002/tea.70017

4. **Mathis, C.** (2024). A Critical Race Theory analysis of lack of access and representation in physics education through counterstory. In *An Introduction to Critical Race Theory in Physics Education Research.* https://doi.org/10.1119/RevPERv3.1.5

5. Ibourk, A., & **Mathis, C**. (2024). Developing preservice elementary teachers' self-efficacy toward teaching science. *International Journal of Science Education*, 1–24. https://doi.org/10.1080/09500693.2024.2347154

6. **Mathis, C,** S. Southerland, Burgess, T. (2023). Physics Teachers' Dispositions Towards Culturally Relevant Pedagogy in the Classroom. *International Journal of Science Education* https://doi.org/10.1080/09500693.2023.2190850

7. **Mathis, C**., Daane, A. R., Rodriguez, B., Hernandez, J., & Huynh, T. (2023). How instructors can view knowledge to implement culturally relevant pedagogy. *Physical Review Physics Education Research*, *19*(1), 010105. DOI: https://doi.org/10.1103/physrevphyseducres.19.010105

8. Robertson, A., Huynh T., **Mathis, C.**, Bauman, L., Scherr, R. (2023). Teacher learning about the integration of energy and equity: A case study. Physical Review-Physics Education Research doi: https://doi.org/10.1103/PhysRevPhysEducRes.19.010136.

9. Hernandez, J., Skiba, J., German, M., Scherr, R., Huynh, T., **Mathis, C.**, & Araya, M. (2022). Exploring Sociopolitical Landscapes in Physics Education. *Sustainability and Climate Change*, *15*(4), 279-288. https://doi.org/10.1089/scc.2022.0023

10. Ibourk, A., **Mathis, C**., Wagner, L. (2022). Preservice Elementary Teachers' Explanations of Properties of Sound Using a Web-based Inquiry Science Environment (WISE). *Research in Science and Technological Education* DOI: https://doi.org/10.1080/02635143.2022.2066647

11. Ibourk, A., Hughes, R., & **Mathis, C.** (2022). "It is what it is": Using Storied Identity and intersectionality lenses to understand the trajectory of a young Black woman's science and math identities. *Journal of Research in Science Teaching*. https://doi.org/10.1002/tea.21753

12. Chen, W., Wang, L., Liang, P., Mast, J., **Mathis, C**., Liu, C. Y., ... & Liu, R. (2022). Reducing ischemic kidney injury through application of a synchronization modulation electric field to maintain Na+/K+-ATPase functions. *Science Translational Medicine*, *14*(635), eabj4906. https://doi.org/10.1126/scitranslmed.abj4906

13. **Mathis, C.**, & Southerland, S. (2022). Our Shifting Understandings of Culturally Relevant Pedagogy in Physics. *The Physics Teacher*, *60*(4), 260-265. DOI: https://doi.org/10.1119/5.0027583

14. **Mathis, C**., Robertson, A. (2021). An Examination of the Role of Physics Culture on In-Service Physics Teachers Relationship between Identity and Equity. *2021 Physics*

Education Research Conference Proceedings, 264-269 https://doi.org/10.1119/perc.2021.pr.Mathis.

15. Doucette D., Daane, A., Flynn A., Gosling C., Hsi D., **Mathis C.**, Morrison A., Park S., Rifkin M., Tabora J. (2021). Teaching Equity in Chemistry. *Journal of Chemical Education.* https://doi.org/10.1021/acs.jchemed.1c00415

16. Chang, H. Y., Kohler, J. N., Ard, J. E., & **Mathis, C**. (2018). Examining Reasons behind High School Students' Decisions to Enroll in Physics Courses. *Universal Journal of Educational Research*, *6*(11), 2492-2497. https://doi.org/10.13189/ujer.2018.061113

17. **Mathis, C**., Fang, Z., & Chen, W. (2014). In Vivo Study of Trans-epithelial Potential Difference (TEPD) in Proximal Convoluted Tubules of Rat Kidney by Synchronization Modulation Electric Field. *The Journal of membrane biology*, *247*(7), 601-609. https://doi.org/10.1007/s00232-014-9676-6

Conference Proceedings

1. **Mathis, C**., Assi, H., Neuhart, I., Kelly, J., & Azam, S. H. (2025). Cultural resources in physics sensemaking: What students reveal through formative assessment. *Physics Education Research Conference Proceedings,* pp. 264-26, https://doi.org/10.1119/perc.2025.pr.Mathis

2. Nonyelum, L., **Mathis, C**., Akcil-Okan, O., & Smith, M. (2025) Framing towards culturally relevant practice for physics education in Nigeria. *Physics Education Research Conference Proceedings,* pp. 320-325, https://doi.org/10.1119/perc.2025.pr.Nonyelum

3. Azam, S. H., **Mathis, C.**, & Brown, M. (2025). Teaching toward equity: The role of student conceptions in physics instruction. *Physics Education Research Conference Proceedings*, pp. 41-46, https://doi.org/10.1119/perc.2025.pr.Azam

4. **Mathis, C.**, Kiruma, J, Poulan P., Avalos J. (2025), Collaborative Professional Learning Communities for Culture-Based Physics Curriculum Development: Integrating Local Knowledge with NGSS Paper presented at 2025 ASEE Annual Conference & Exposition, Montreal, Quebec, Canada. https://peer.asee.org/56110

5. Patel, M. & **Mathis, C.**, (2024). Why are Culture-Based Approaches In Physics Needed?, *Physics Education Research Conference Proceedings,* pp. 312-317, https://doi.org/10.1119/perc.2024.pr.Patel

6. Smith, M., Dippre, J., Wooley, A., Chamberlain, L., Shirey, K., Levy, E., **Mathis, C**., & Daane, A. (2024). Decolonizing physics curricula: A case study about a kinematics lesson. *Physics Education Research Conference Proceedings,* pp. 387-392, https://doi.org/10.1119/perc.2024.pr.Smith
7. Smith M., Brown M., Daane A., **Mathis C.** (2023) Unlearning Indoctrination: Tensions Between Decolonizing Curricula and Characteristics of Whiteness. *Physics Education*

Research Conference Proceedings pp. 314-319, https://doi.org/10.1119/perc.2023.pr.Smith

8. Horak M., Nanthou D., Brown M., Daane A., **Mathis C.** (2023) Tour Guide, Coach, and Gardener: Teacher's Metaphors for Equitable Instruction. *Physics Education Research Conference Proceedings,* pp. 132-137, https://doi.org/10.1119/perc.2023.pr.Horak

9. Nanthou D., Gumale A., Brown M., Daane A., **Mathis C**. (2023) Grappling with the dominant narrative of physics: teachers rethink colonial roots together to reshape classrooms/instructors grapple with the dominant narrative of physics, reshaping classrooms. *Physics Education Research Conference Proceedings* pp. 236-241, https://doi.org/10.1119/perc.2023.pr.Nanthou

10. Bauman L., **Mathis C.,** McKagan S., Madsen A., Marvin K., Goodhew L., Robertson A. (2021). Centering Physics Faculty Ideas About Resources-Oriented Instruction. *2021 Physics Education Research Conference Proceedings,* 33-38 https://doi.org/10.1119/perc.2021.pr.Bauman

Manuscripts in Submission

Mathis, C., Leveraging Students' Cultural Resources for Disciplinary Sensemaking: A Framework for Science Teaching and Learning. *Cultural Studies in Science Education* (In submission)

Perriard, C.,, Assi, H., Ikram, M.., Kelly, J., & Azam, S. **Mathis, C,** (2026) Contextualizing Newton's Third Law: Examining the Impact of Problem Framing on Student Reasoning and Accuracy. (In submission) *Physics Education Research Conference Proceedings*

Carrol T., Fletcher, E., **Mathis, C.,** Black Male STEM Teachers' Culturally Relevant Pedagogies as a Catalyst for Positive STEM Identity Formation Among Black Boys. *Journal of Research in Science Teaching* (In submission)

Alesandrini, A., Heron, P., **Mathis, C.**, Robertson, A., Owen, J. (in submission). Instructional material design and students' feelings about their ideas. *Physical Review - Physics Education Research.* (In submission)

Mathis, C., Kiruma, J., Avalos, J (2026) A Protocol for Designing NGSS-Aligned Culturally Relevant Lessons. *The Science Teacher* (accepted, in press)

Mathis, C, Perriard, C., Assi, H., Ikram, M.., Kelly, J., & Azam, S. H (In Submission) Cultural Contexts as Catalysts for Learning: Integrating Students' Lived Experiences into Physics Assessments. International Society of the Learning Sciences (Accepted, in press)

Manuscripts in Preparation

Mathis, C. A Framework on Physics Teacher Identity Towards Equitable Instruction *Physical Review Physics Education Research*

Mathis, C., Nonyelum, L., Akil -Okan, O. Collaborative Professional Learning Communities for Culture-Based Physics Curriculum Development: Integrating Local Knowledge with NGSS

Invited Presentations and Workshops at Conferences and Symposia

1. **Mathis C**., (2026) Physics Teacher Retention and Induction. Physics Teacher Education Coalition National Conference

2. **Mathis C.,** Dubose D., Williams S. (2026) CESE: A Program that Transforms Science Classrooms. Mississippi State Science Teachers Association

3. **Mathis C.,** (2026), An Examination of Culture-Based Assessments for Undergraduate General Physics Students, presentation for the University of Washington - Department of Physics Education Group

4. **Mathis C.,** (2026), An Examination of Culture-Based Assessments for Undergraduate General Physics Students, presentation for the STEM DBER Alliance

5. **Mathis C.**, Krajick, J., Okan Akcil, O, Schnieder, B.(2026), Leveraging Students' Cultural Resources to Strengthen Disciplinary Learning, workshop for teachers presented at National Science Teachers Association Conference (Anaheim, CA)

6. **Mathis C.**, (2025), Culturally Responsive Science Learning: An Evidence-Based Approach in the Rural South, presentation for teachers presented at Mississippi Science Teachers Association Conference (Meridian, MS)

7. **Mathis C.**, Aviran, E., (2025), Crafting Engaging Science Environments - Professional Learning for Students, workshop for teachers presented at Carver High School (AL)

8. **Mathis C.**, Aviran, E., (2025), Crafting Engaging Science Environments - Professional Learning for Students, workshop for teachers presented at Blount High School (AL)

9. **Mathis C.**, Okan Akcil, O., (2025), Crafting Engaging Science Environments - Professional Learning for Students, workshop for teachers presented at Hazel Green High School (AL)

10. **Mathis C.**, Okan Akcil, O., (2025), Crafting Engaging Science Environments - Professional Learning for Students, workshop for teachers presented at Germantown High School (MS)

11. **Mathis C.**, Krajick, J., Okan Akcil, O., Aviran, E., Schnieder, B.(2025), Crafting Engaging Science Environments - Professional Learning for Students, workshop for teachers presented at Jackson State University

12. Smith, M., Akcil-Okan, O., Nonyelum, L., **Mathis, C**. (2025) *Enhancing Physics Understanding by Leveraging Cultural Resources in NGSS-Aligned Assessments.* presented at the American Association of Physics Teachers Summer Meeting.

13. Nonyelum, L, Smith, M., Akcil-Okan, O., **Mathis, C**. (2025). Framing towards Epistemic Decolonization. presented at the American Association of Physics Teachers Summer Meeting.

14. **Mathis, C.,** Assi A., Neuhart I., Kelly J., (2025) *Beyond the Formula: Exploring Cultural Epistemologies in Physics Learning.* presented at the American Association of Physics Teachers Summer Meeting.

15. Wooley, A., Kelly, J., **Mathis, C**., & Neuhart, I. (2025). *Researcher and teacher perspectives on integrating cultural resources in physics learning through formative assessments*. Paper presented at the AAPT Winter Meeting, St. Louis, MO.

16. **Mathis, C**., Kiruma, J., Avalos, J. (2025). Developing Culture-Based Approaches To Physics Instruction. Workshop presented at the AAPT Winter Meeting, St. Louis, MO.

17. **Mathis C.** (2024) - *Pedagogy for Our Times Series- Culturally Relevant and Equitable Pedagogy.* Invited Presentation for Sinclair Community College

18. **Mathis C.** (2024) *The Underrepresentation Curriculum.* Invited Presentation for the Art Institute of Chicago

19. **Mathis C.** (2024) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the American Association of Physics Teachers Workshop

20. **Mathis C.** (2024) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation, University of Colorado-Boulder

21. **Mathis C.** (2024) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation, 2024 Chicago Symposium Series on Excellence in Teaching Mathematics and Science: Research and Practice, Loyola University

22. **Mathis C.** (2024) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation, Penn State University Department of Physics

23. **Mathis C.** (2024) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation, University of South Alabama Conference on Teaching and Learning

24. Mathis C. (2024) *Culture-Based Approaches to Physics Instruction.* Invited Presentation University of Kansas Department of Physics

25. **Mathis C.** (2023) - *Culture-Based Approaches to Physics Instruction.* Invited Presentation, Northern California-Nevada Section of the American Association of Physics Teachers

26. Mathis C. (2023) *Culture-Based Approaches to Physics Instruction.* Invited Presentation Wake Forest University Department of Physics

27. **Mathis C..** (2023) *Doing Physics and Being Equitable.* Invited Presentation for the American Association of Physics Teachers Summer Conference

28. **Mathis, C.** (2023). *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the Society of Physics Students, Michigan State University

29. **Mathis, C.** (2023). *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the Physics Education Research Conference

30. **Mathis C. (**2023) *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the Concord Consortium

31. **Mathis C.** (2023) *Incorporating Culturally Responsive Teaching into Undergraduate Physics Courses.* Invited Presentation for the American Physical Society April Meeting

32. Daane, A., Flynn, A, **Mathis C.** (2022) *Teaching Physics Toward Social Justice.* Invited Presentation for the Pasadena College Faculty Workshop

33. Doucette D., **Mathis C.** (2022) *Teaching Physics Toward Social Justice.* Invited Presentation for the John O'Bryant High School Teacher Workshop

34. **Mathis, C.** (2022). *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the University of Washington - Seattle Physics Education Group

35. **Mathis, C.** (2022). *Realizing Potential with Mindset.* Invited Presentation for Front Range Community College Faculty and Administration Professional Development Workshop.

36. Daane, A., **Mathis C.** (2022) *Teaching Physics Toward Social Justice.* Invited Presentation for the Eckerd College School of Natural Sciences Faculty Workshop

37. Pollock, M., Fitzpatrick K., Langworthy A., **Mathis C**. (2021-2022; different dates) *Program Improvement Process for Equity Workshop*. Invited Presentation for the State of Kansas Department of Education.

38. **Mathis C**. (2021). *Strategies for Recruitment and Retention of Physics Students through Culture Based Equitable Approaches.* University of Delaware Department of Physics Colloquium

39. **Mathis C**. (2021). *Strategies for Recruitment and Retention of Physics Students through Culture Based Equitable Approaches.* Invited Presentation for American Institute of Physics TEAM-UP Workshop

40. Doucette, D., Daane, A., Flynn A., **Mathis C.** (2021) *Teaching Physics Toward Social Justice.* Invited Presentation for the American Association of Physics Teachers Workshop

41. **Mathis, C.** (2021). *Culture-Based Approaches to Physics Instruction.* Invited Presentation for the University of Washington-Bothell Research Experiences for Undergraduates Summer Group

42. **Mathis, C.** (2021). *Retention of African American students in your Physics/Astronomy departments-First Year Courses and Retention.* Invited Presentation for the American Institute of Physics Team-Up Implementation Workshop

43. **Mathis, C.** (2021). *A Look at Physics Teachers Searching for Cultural Relevance.* Invited Presentation for the Physics Education Research Conference Session on Reimagining Physics Curricula

44. **Mathis, C.** (2021). *Charting the Evolution of Our Understanding of Culturally Relevant Pedagogy in Physics*. Invited Presentation for the Florida State University School of Teacher Education

45. **Mathis, C.,** Brown M. (2021). *Realizing Potential with Mindset.* Invited Presentation for Northeast Iowa Community College Faculty and Administration Professional Development Workshop.

46. **Mathis, C.,** Brown M. (2021). *Realizing Potential with Mindset.* Invited Presentation for Santa Fe Community College Faculty and Administration Professional Development Workshop.

47. **Mathis, C.** (2021). *Culturally Relevant Pedagogy For Post Secondary Education*. Invited Presentation for the University of Pittsburgh Discipline-Based Education Research Group

48. **Mathis, C.** (2021). *Culturally Relevant Pedagogy For Post Secondary Education*. Invited Presentation for the American Association of Physics Teachers SEA Change Initiative

49. Ibourk A., Hughes R., **Mathis C**. (2021) *It is What It Is: Using Storied-Identity and Intersectionality Lenses to Understand What Shaped the Trajectory of a Young Black Woman's Science and Math Identities.* Invited Presentation for the Florida State School of Teacher Education Colloquium Series.

50. **Mathis, C.** (2020). *Culturally Relevant Pedagogy in the Time of COVID-19*. Invited Presentation for The Virtual Science Collaborative

51. **Mathis, C.** (2019). *Developing and Enacting Culture-Based Pedagogies in the Physics Classroom.* Invited Presentation at Buffalo State University Colloquium for School of Education and School of Natural and Social Sciences.

Contributed Presentations at Conferences

1. Nonyelum, L., Smith, M., Akcil-Okan, O., **Mathis, C**. (2026). *Framing Towards Culturally Relevant Practice in Nigerian Physics Education*. Paper presented at the annual meeting of the American Education Research Association Conference

2. **Mathis, C.**, Krajcik, J., Akcil Okan, O., Nonyelum, L., Van Luven, W., Valbuena Rojas, A., Aviran, E.,, Smith, M., Xiao, Daihui, Dubose, D., Williams, S. (2026). *Bringing Science to Life through Innovative Science Intervention for Chemistry and Physics High School Students.* Paper presented at the annual of the American Education Research Association Conference

3. **Mathis, C.**, Brown, M., Azam, H. (2026). *The Many Faces of Equity: Exploring Physics Teacher Identities,* Association for Science Teacher Education Conference

4. Neuhart I., **Mathis, C.,** Assi A., Kelly J., (2025) *Leveraging Cultural Resources in Physics Education: Enhancing Engagement through Pedagogies Culturally-Based.* presented at the Michigan State University Teaching Cohort Fellowship Showcase

5. **Mathis, C.,** Assi A., Neuhart I., Kelly J., (2025) *Leveraging Cultural Resources in Physics Education: Enhancing Engagement through Pedagogies.* APS Eastern Great Lakes Section (EGLS) Spring 2025 Meeting.

6. **Mathis, C.**, Krajcik, J., Akcil Okan, O., Nonyelum, L., Van Luven, W., Valbuena Rojas, A., Aviran, E., Schnieder, B, (2025). *Cultivating Inclusivity: Redesigning Physics and Chemistry Curricula for Diverse Classrooms.* National Association of Research in Science Teaching Conference.

7. **Mathis, C.,** Jaber, L., Southerland, S., (2025). *Politicized Care Dimensions in Physics Education: Pedagogical Practices and Engagement Case Study for Underserved Students.* National Association of Research in Science Teaching Conference.

8. **Mathis, C.**, Krajcik, J., Akcil Okan, O., Nonyelum, L., Van Luven, W., Valbuena Rojas, A., Aviran, E., Wooley, A., Tabb, J., (2025). *Cultivating Inclusivity: Redesigning Physics and Chemistry Curricula for Diverse Classrooms.* Paper presented at the annual of the American Education Research Association Conference

9. **Mathis**, **C.**, Jaber, L., Southerland, S., (2025). *Tracing Different Forms of Politicized Care in Teaching Physics to Students Traditionally Underserved in Science.* Paper presented at the annual of the American Education Research Association Conference

10. Wooley, A., Kelly, J., Neuhart, I., **Mathis, C.,** (2025). Researcher and Teacher perspectives on integrating cultural resources in physics learning through formative assessments. presented at the American Association of Physics Teachers Winter Meeting.

11. Levy, R., Persyn, F., Prenaj, L., Barnard, R., **Mathis, C.**, Masani, S., (2024). *STEM Undergraduate Learning Assistants' Ability to Notice Racialized Classroom Events.* Poster presented at the American Physiological Society Meeting.

12. Wooley, A., **Mathis, C.** (2024). *Looking at how student's use their cultural resources to understand physics.* Poster presented at the American Association of Physics Teachers Summer Meeting.

13. **Mathis, C.**, Wooley, A., Brennan, L., Schwarz, C., Smith, M., Collins, L., Dippre, J., Patel, M., Horak, M. (2024). *Examining Two Professional Learning Communities of Physics Teachers in Pursuit of Culturally Relevant Pedagogy.* Poster presented at the American Association of Physics Teachers Summer Meeting.

14. Levy, R., Masani, S., Barnard, R., **Mathis, C.**, Persyn, F., Prenaj, L. (2024). *Undergraduate Learning Assistants' Understanding and Practices of Equity.* Society for the Advancement of Biology Education Research (SABER) 2024 National Meeting

15. **Mathis, C.,** Schneider, B. (2024). *Evidence-Based Culturally Responsive Science Learning.* Second annual You Belong in STEM Convening, U.S. Department of Education

16. **Mathis, C.** (2024). *Culture-Based Approaches to Physics Instruction.* Presentation for the American Society for Engineering Education

17. **Mathis, C.**, (2024) *An Autoethnographic Examination of a Physics Faculty Through A CRT Analysis*. Paper presented at the annual of the American Education Research Association Conference

18. Patel, M.; Horak, M., Nanthou, D., **Mathis, C**. (2024) *A Look at the Spectrum of Physics Teacher Identity Among Physics Instructors*. Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference.

19. **Mathis, C.**, Wooley, A., Patel, M., Horak, M., Collins, L., Daane, A. (2024) An Examination of Two Professional Learning Communities of Physics Teachers Developing Culture-Based Approaches to Instruction. Poster presented at the American Association of Physics Teachers Winter Meeting.

20. Chamberlain, L., **Mathis C.,** Brown, M., Daane, A. … et al (2023). *Reimagining Curricular Content To Reach Equity-Oriented Goals In Astronomy.* Paper presented at the Astronomy Education Conference

21. Smith M., Brown M., Daane A., **Mathis C.** (2023) *Unlearning Indoctrination: Tensions Between Decolonizing Curricula and Characteristics of Whiteness.* Paper presented at the American Association of Physics Teachers Summer Meeting.

22. Horak M., Nanthou D., Brown M., Daane A., **Mathis C.** (2023) *Tour Guide, Coach, and Gardener: Teacher's Metaphors for Equitable Instruction.* Paper presented at the American Association of Physics Teachers Summer Meeting.

23. Nanthou D., Gumale A., Brown M., Daane A., **Mathis C**. (2023) *Grappling with the dominant narrative of physics: teachers rethink colonial roots together to reshape classrooms/instructors grapple with the dominant narrative of physics, reshaping classrooms.* Paper presented at the American Association of Physics Teachers Summer Meeting.

24. **Mathis C.,** Brown, M., Daane, A. … et al (2023). *An Examination of how "Decolonizing" Physics Curricula Impacts Physics Teacher Identity Towards Equity.* Paper presented at the annual of the American Education Research Association Conference

25. **Mathis C.,** (2023). *The Impact of Professional Development on A Physics Teachers Identity Towards Equitable Instruction.* Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference

26. Alesandrini, A., **Mathis C.,** Heron, P., Robertson, A. Daane A., (2023). *Investigating Students' Perceptions of How Instruction Impacts Their Ideas.* Paper presented at the American Association of Physics Teachers Winter Meeting.

27. Goodhew, L., Robertson, A., Heron, P., Bauman, L., **Mathis, C**., (2022) *Designing and testing Attending to Conceptual Resources in Physics (ACORN-Physics) tutorials.* Paper presented at the American Association for the Advancement of Science conference on Improving Undergraduate STEM Education Initiative.

28. **Mathis C.,** Daane A., (2022). *How Perceived Objectivity in Physics Impacts Cultural Relevance in Teaching.* Paper presented at the American Association of Physics Teachers Summer Meeting.

29. **Mathis, C.**, Hernandez, J. (2022). An Examination of the Influence of Physics Culture on Teachers' Experience with Stereotype Threat and Imposter Syndrome. *Physics Education Research Conference*

30. **Mathis, C.,** Goodhew, L., Heron, P. (2022) *How Students use their Conceptual Resources and Mechanistic Reasoning to Sensemake about Electric Circuits.* Paper presented at the American Physical Society April Meeting

31. **Mathis C.,** Daane A., (2022). *How Perceived Objectivity in Physics Impacts Cultural Relevance in Teaching.* Paper presented at the American Association of Physics Teachers Winter Meeting.

32. **Mathis, C.,** Goodhew, L., Heron, P. (2022). *Exploring Students Mechanistic Reasoning Within the Context of Resource-Oriented Instructional Materials.* Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference

33. **Mathis C**., Southerland S. (2022). *A Select Physics Teachers Use of Empathy While Engaging in Culturally Relevant Practices*. Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference

34. **Mathis C**., Southerland S. (2022). *An Examination of Physics Teachers Use of Empathy Using Culturally Relevant Pedagogy*. Paper presented at the annual of the American Education Research Association Conference

35. **Mathis, C.,** Goodhew, L., Heron, P. (2021). *Mechanistic Reasoning in the Context of Resource-Oriented Instructional Materials.* Paper presented at the American Association of Physics Teachers Summer Meeting

36. **Mathis, C.,** Robertson, A. (2021). *The Role of Physics Culture in Shaping In-Service Physics Teacher Identities and Framings of Equity: Two Case Studies.* Paper presented at the annual meeting Physics Education Research Conference

37. **Mathis, C.,** Hernandez J., Bauman L., Neunzert A., Huynh T. Robertson, A. (2021). *Teachers' Ideas about Integrating Equity into Energy Instruction in High School Physics.* Paper presented at the American Association of Physics Teachers Winter Meeting

38. **Mathis, C**., Ibourk, A., Hughes, R. (2020). *Examining Under-represented Young Women's STEM Identities.* Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference

39. **Mathis, C.,** Kasper, V., Southerland S. (2020). *Discourse Moves and a Teacher's Dilemmas: Using a Sociopolitical Topic in Physics*. Paper presented at the American Association of Physics Teachers Winter Meeting

40. **Mathis, C.,** Southerland S., Akubo M. (2019). *Examining the Dilemmas Emerging from a Culturally Relevant Approach to Physics Instruction***.** Paper presented at the American Association of Physics Teachers Summer Meeting

41. **Mathis, C**., Southerland S., Akubo M. (2019). *Examining Students Epistemic Agency When Implementing Culturally Relevant Practices in the Physics.* Paper presented at the annual of the American Education Research Association Conference

42. **Mathis, C**., Southerland S., Akubo M. (2019). *Exploring Student-Centered Active Learning Environment in Undergraduate Physics (SCALE-UP): Epistemic Agency in Small Group Interactions.* Paper presented at the annual meeting of the National Association of Research in Science Teaching Conference

43. **Mathis, C**., Southerland S., Akubo M. (2018). *A Study of Select Physics Teachers' Beliefs on Implementing Culturally Relevant Practices in the Classroom.* Paper presented at the American Association of Physics Teachers Summer Meeting

44. Chang, H., **Mathis, C.** (2018). *Examining Physics Education in Taiwan*. Paper presented at the American Association of Physics Teachers Winter Meeting

45. Akubo, M., Southerland, S., Smith, C., **Mathis, C**. (2018). *Development of the Classroom Observation Protocol for Epistemic Agency*. Paper presented at the Winter meeting of the American Association of Physics Teachers Conference

46. **Mathis, C**., Southerland, S. (2017). *A Study of Select Physics Teachers' Beliefs on Diversity, Equity, and Multiculturalism in Physics and Implementing Culturally Relevant Practices*. Paper presented at the annual meeting of the Physics Education Research Conference and International Journal of Arts and Sciences Academic Conference

47. **Mathis, C**., Southerland, S. (2017). *The Impact of Research Experience for Teachers on Science Teachers Pedagogical Discontentment and Self-Efficacy*. Paper presented at the annual meeting of the American Education Research Association Conference

48. **Mathis, C.** (2012). *Using an AC Electric Field for Synchronization of Na/K Pumping Steps Along with Study of Renal Function.* Paper presented at the annual meeting of the McKnight Mid-Year Research and Writing Conference

49. Chen, W., **Mathis, C**., Fang, Z., Mast, J., Hamidi, K., Kelly, P., & Eve, M. (2012). *Physical control of carrier-mediated ion-transporters by entrainment of their turnover rate*. Paper presented at the annual March meeting of the American Physical Society.

50. Eve, D., **Mathis, C.,** & Chen, W. (2012). *Physical Manipulation of the Na/K Pump.* Paper presented at the annual March meeting of the American Physical Society.

51. Weatherford, C., Wynn III, A., Red, E., & **Mathis, C**. (2004). *Application of Designer Polynomials to the Soft-Coulomb Potential.* Paper presented at the annual meeting of the American Physical Society Division of Atomic, Molecular and Optical Physics Meeting.

Grant Submissions

1. **Mathis, C.,** Stokes, D, Assi, H., Morris, E., Vazquez, I., (2025). Responsive and Adaptive Assessments in University Physics: A Faculty Learning Community Approach. NSF IUSE ($750,000; Proposal Submission).

2. Hickey, D., **Mathis,** (2025) *Generative AI for Culturally Sustaining AND Sustainable STEM Curricula.* Spencer Vision Grant Award ($74,734.96; Proposal Submission).

3. Hickey, D., **Mathis,** (2024) *Physics Teachers' Recognition and Utilization of Student Cultural Resources in Formative Assessments.* NSF DRK-12 Grant Award ($99,886; Proposal Submission).

4. **Mathis, C.**; Schwarz, C.**,** Alweiss, A., (2024) *Advancing Equity in Physics Education: Addressing Systemic Racism through Culture-Based Approaches.* NSF DRK-12 Grant Award ($2,198,241; Proposal Submission).

5. **Mathis, C.,** (2024) Equity in Physics: Unpacking Systemic Racism and Empowering Inclusive Pedagogy. Diversity Research Alliance Launch Award Program. ($3965.40; Proposal Submission)

6. **Mathis, C**., (2024) *Examining a Professional Learning Community of Physics Teachers Develop Culture-Based Approaches to Instruction* College of Education Research Enhancement Grant ($3000 award; Proposal Submission)

7. **Mathis, C.,** Stokes, D, Kelly, J., Morris, E., Vazquez, I., (2024) Empowering Diversity in STEM: Culturally Relevant Pedagogy for Introductory Physics Courses, NSF IUSE ($703,603; proposal submission)

8. **Mathis, C.**; Finkelstein, N.**,** (2024) *Physics Teachers' Recognition and Utilization of Student Cultural Resources in Formative Assessments* NSF IUSE ($400,000; Proposal Submission).

9. **Mathis, C.**; Schwarz, C.**,** (2023) *Exploring the Impact of Professional Learning Communities on the Development of Culture-Based Physics Curricula.* NSF Racial Equity Grant Award ($1,125,385.19; Proposal Submission).

10. Schneider, B., **Mathis, C.**, Krajcik, J., Williams, S. (2023) *A Culturally Responsive Project-Based Learning Intervention in Secondary Science in Alabama and North Carolina.* U.S. Department of Education - Education Innovation and Research (**Awarded: $7,722,448.00**).

11. Masani, S., **Mathis, C.**, Barnard, R. (2023) *The Advancing undergraduate learning assistant Critical Consciousness for Equitable Leadership and Student Success (ACCESS) Fellowship Program.* Michigan State University (**Awarded: $15,000**)

12. **Mathis, C., (2023)** *An Analysis of Identity Shifts and Teacher Practice of a Professional Learning Community of Physics Teachers' Meeting to Develop Culture-Based Approaches.* Spencer Racial Equity Grant Award ($75,000; Proposal Submission).

13. **Mathis, C**., (2023) *Examining a Professional Learning Community of Physics Teachers Develop Culture-Based Approaches to Instruction* College of Education Research Enhancement Grant (**Awarded: $6000; two $3000 awards**)

14. **Mathis, C.** Daane, A; Schwarz C.**, (2023)** *An Analysis of Physics Teachers' Identity Towards Culture-Based Equitable Instruction and its Influence on Curriculum Development and Student Learning.* NSF Racial Equity Grant Award ($1,553,825.12; Proposal Submission).

15. **Mathis, C., (2022)** *An Analysis of Physics Teachers' Identity Towards Culture-Based Equitable Instruction and its Influence on Curriculum Development and Student Learning.* Spencer Small Grant Award ($50,000; Proposal Submission).

16. **Mathis, C., (2022)** *An Investigation of Physics Teacher's Identity Towards Culture-Based Equitable Instruction and its Impact on Curriculum Development and Student Learning of Physics Ideas*. College of Education Seed Grant Initiative. ($7,000; Proposal Submission)

17. **Mathis, C.,** (2022) *An Investigation of Physics Teachers' Identity Towards Culture-Based Equitable Instruction*. Diversity Research Alliance Launch Award Program. (**Awarded: $3843**)

18. **Mathis, C**., (2022) *Examining the Approaches Physics Teachers Use to Decolonize Physics Curricula.* College of Education Research Enhancement Grant (**Awarded; $1991.00**)

19. Krajcik J., Schneider, B., **Mathis, C**., Zhai X. (2022) Expanding Crafting Engaging Science Environments to Scale: An Intervention to Improve Science Academic, Social and Emotional Learning in High School Chemistry and Physics Classes. USDA Proposal Submission

20. Krajcik J., Zhai X., Miller, E. **Mathis, C.** (2022) *Expanding Crafting Engaging Science Environments to Scale: An Intervention to Improve Academic, Social and Emotional Learning Science in High School Chemistry and Physics Classes.* NSF Proposal Submission

Invited Panels

1. **Mathis, C.** *Faculty of Color in PER* (Panel Leader). American Association of Teachers Conference.

2. **Mathis, C.,** Rodgers, A., Bracey, Z.B. (2026) *Crafting Your Professional Digital Profile* Science Educators for Equity, Diversity, & Social Justice.

3. **Mathis, C.,** Alonzo, A., Sweeder, R., Long, T., Henderson, R. (2025) *CREATE for STEM Mini Conference Panel*

4. **Mathis, C.,** Kelly, A., McNeill, T., Ruiz-Sanchez, C., Wlasiuk, J., (2024) *New LBC Faculty & Advisor Panel*, Michigan State University

5. **Mathis, C**., (2024) *Education and Physics Panel* participant at the Annual McKnight Fellows Meeting, Tampa, FL

6. **Mathis, C.**, (2024) *Teacher Institute* at the San Francisco's Exploratorium, San Francisco, CA

7. **Mathis, C**., (2024) *Education and Physics Panel* participant at the Annual McKnight Fellows Meeting, Tampa, FL

8. **Mathis, C.,** (2024) *Supporting Physics Grad Students from Underrepresented Racial/Ethnic Groups*, University of Connecticut Department of Physics

9. **Mathis, C.,** Daane, A. (2023) *Exploring Culture in Physics* at the Physics Education Research Conference (PERC), Sacramento, CA

10. **Mathis, C.** (2023) *Experiences of a Black Physicist* at the University Preparatory High School, Seattle, WA

11. **Mathis, C**., (2023) *Education Panel* participant at the Annual McKnight Fellows Meeting, Tampa, FL

12. **Mathis, C.,** Wade, T., Schellinger, J., Smith J. (2022) Panel on *Professional Skills for Graduate Students*, Florida State University

13. **Mathis, C**., Conic, F (2021) *The State of Education*. Panel participant at the Annual McKnight Fellows Meeting

14. Caballero, M., Goodhew, L., **Mathis C.** (2021) *Professional Skills Post PhD.* Panel participant at the PERCoGS invited panel series.

Teaching Experience

2022-present Assistant Professor of Physics and Science Education - Michigan State

	University, Lyman Briggs College, Department of Teacher Education, Department of Physics (Courtesy). Teach mainly Physics I and II, Senior Capstone course, and senior level and internship level courses for teacher preparation.
2021-2022	Adjunct Faculty, College of Education, University of Washington. Co-Taught, undergraduate-graduate course on culturally responsive STEM teaching.
2015-2019	Graduate Teaching Assistant, School of Teacher Education, Florida State University. Taught undergraduate education courses.
2013-2015	High School Physics Teacher, Chamberlain High School, Tampa, FL. Taught Honors Physics with lab. Assisted students with problem solving skills. Mentored advanced placement students in the Chamberlain Advanced Placement Scholars (CAPS). program.
2013-2015	Adjunct Instructor, Hillsborough Community College. Taught Conceptual Physics with lab. Assisted students with problem solving skills
2010-2012	Adjunct Instructor, Barry University (Tampa Campus). Taught Probability and Statistics. Assisted students in developing problem-solving skills.

Courses Taught

2027
- Senior Seminar (LB 492; 1 section) - Michigan State University, East Lansing, MI, Spring 2027

2026
- General Physics II (LB 274; 1 section) – Michigan State University, East Lansing, MI - Spring 2026
- General Physics I (LB 273; 1 section) - Michigan State University, East Lansing, MI, Fall 2026

2025
- General Physics II (LB 274; 2 sections) – Michigan State University, East Lansing, MI - Spring 2025
- General Physics I (LB 273; 1 section) - Michigan State University, East Lansing, MI, Fall 2025
- Senior Seminar (LB 492; 1 section) - Michigan State University, East Lansing, MI, Fall 2025

2024
- Seminar in Science Education (TE 422) - Michigan State University, East Lansing, MI - Fall 2024

2023
- Teaching Subject Matter to Diverse Learners (TE 407) - Michigan State University, East Lansing, MI - Fall 2023
- General Physics II (LB 274) – Michigan State University, East Lansing, MI - Spring 2023

2022
- Teaching Subject Matter to Diverse Learners - Secondary (TE 407) - Michigan State University, East Lansing, MI - Fall 2022
- General Physics I (LB 273) – Michigan State University, East Lansing, MI - Fall 2022

2021
- Culturally Responsive Math and Science Teaching – University of Washington - Seattle - Fall 2021

Introduction to Education – Florida State University, Tallahassee, FL - Fall 2015, Fall 2016, Fall 2017
General Physics Lab 1, 2 – University of Central Florida, Orlando, FL
Conceptual Physics and Lab – Hillsborough Community College, Tampa, FL
Probability and Statistics – Barry University – Tampa Campus
Honors Physics – Chamberlain High School, Tampa, FL

Mentoring

Graduate Student
- Lucky Nonyelum, Michigan State University (2024 - present)
- Hassaan Azam, University of Hiroshima (2024 - present)
- Andrea Wooley, Michigan State University (2023 - 2025)
- Ian Neuhart, Michigan State University (2024-2025) **SUTL Fellow
- Maruf Ikram, Michigan State University (2025-present)**SUTL Fellow

Postdoctoral Associate
- Ozlem Akcil Okan, Michigan State University (2024 - present)
- Michelle Brown, Pennsylvania State University (2022 - 2023)

Post-Baccalaureate
- Mathilda Smith, Michigan State University (2024 - 2026)
- Collette Periard, Michigan State University (2026-present)

Undergraduate Students
- Hailey McGrath, Michigan State University (2026-present)
- Collette Periard, Michigan State University (2025-2026)
- Maria Horak, Michigan State University (2023 - 2024)
- Mathilda Smith, Michigan State University (2023 - 2024)
- Matthew Gagea, Michigan State University (2023)
- Maya Patel, Michigan State University (2023 - 2024)

- Lauren Collins, Michigan State University (2023 - 2024)
- Delwrick Nanthou, University of Washington-Bothell (2023)
- Jackie Dippre, Michigan State University (2024 - 2024)

Masters Committee
- Regan Levy, Michigan State University (2023 - 2024)

Doctoral Committee
- Jessica Randolph, Michigan State University (2026-present)
- Jasmine Jones, University of Illinois-Chicago (2025-present)
- Cami Monslave, Michigan State University (2022 - 2026)
- Camille Coffie, University of Central Florida (2023 - 2024)
- Debbie Andres, Rutgers University (2023 - 2025)
- Kate Miller, Michigan State University (2022 - 2024)

Guest Teaching

Perspectives on Science and Mathematics - Florida State University (2022, 2021)
Integrated Methods of Teaching Science and Mathematics - High Point University (2021)

Service to the University

- Committee on Awards (2025); Michigan State University - Department of Teacher Education

- Dissertation Completion Fellowship Committee, 2024; Michigan State University Department of Teacher Education

- Lyman Briggs College Representative for the Spartan Bus Tour, Fall 2024

- Committee on Comprehensive Exam (2023-2024); Michigan State University Department of Teacher Education

- Committee on Awards (2023-2024); Michigan State University Lyman Briggs College

Service to Professional Associations

1. Reviewer, *Education Sciences* (2025 - present)

2. Reviewer, *Diaspora, Indigenous, and Minority Education* (2025 - present)

3. Reviewer, *Discover Education* (2025 - present)

4. Chair-Elect of Forum of Education, American Physical Society (2025)

5. Reviewer, Spencer Foundation Small Grants (2025 - Present)

6. Diversity, Equity, and Inclusion Board Member, American Association of Physics Teachers (Name changed to Belonging and Access Council; 2024 - Present);

7. Committee on Education, American Physical Society (2025-Present)

8. Co-Chair, Special Interest Group (SIG), Science Teaching and Learning, American Education Research Association (2024-present)

9. Vice Chair of the Forum of Education, American Physical Society (2024)

10. Committee member on the Membership & Benefits Committee, American Association of Physics Teachers (2024-present)

11. Committee chair on Diversity for the American Association of Physics Teachers (2023-2024)

12. Reviewer, *The Physics Teacher*, (2022-present)

13. Reviewer, *Journal of Chemical Education*, (2024-present)

14. Reviewer, *Chemistry Teacher International Journal,* (2024-present)

15. Reviewer, *Research in Science Education*, (2024-present)

16. Reviewer, Science Education (2023-present)

17. Selection Committee Member (Chair) for the American Physical Society Physics Education Award, APS (2022)

18. Committee member on Diversity for the American Association of Physics Teachers (2022-2023)

19. Editorial Team for the Underrepresentation Curriculum Project (2020-present)

20. Selection Committee Member (Vice-Chair) for the American Physical Society Physics Education Award, APS (2021)

21. Facilitator, Annual Meeting of National Association of Research in Science Teaching, NARST, (2021, 2025)

22. Facilitator, Annual Meeting of American Association of Physics Teachers AAPT, (2021, 2022, 2023, 2024, 2025)

23. Facilitator for the Inclusive Curriculum Workshop from the American Association of Physics Teachers, AAPT, (2021)

24. Proposal Reviewer, Annual Meeting of American Educational Research Association, AERA (2017, present).

25. Proposal Reviewer, Annual Meeting of National Association of Research in Science Teaching, NARST, (2019- present).

26. Reviewer, *Science Education*, (2019-present)

Current Membership in Professional Organizations

- American Education Research Association (AERA)
- National Association for Research in Science Teaching (NARST)
- National Science Teachers Association (NSTA)
- American Association of Physics Teachers (AAPT)
- American Physical Society (APS)
- American Society for Engineering Education (ASEE)
- Association of Science Teacher Education (ASTE)
- Physics Teacher Education Coalition (Phystec)
- Inclusive Environments and Metrics in Biology Education and Research (iEMBER)

Media

- *MSU physics education professor recognized with prestigious national fellowship* - (2025) News and Events - Lyman Briggs College/MSU News - https://lbc.msu.edu/news-and-events/lbc-news/msu-physics-education-professor-recognized-prestigious-national-fellowship

- *Why US schools need to shake up the way they teach physics.* - The Conversation (2024) - link: https://theconversation.com/why-us-schools-need-to-shake-up-the-way-they-teach-physics-231255

- *MSU takes new science teaching approach to the rural South* - MSU Today - link: https://msutoday.msu.edu/news/2024/msu-takes-new-science-teaching-approach-to-the-rural-south

- *Bringing Better STEM Education to the Rural South* - EdSurge (2024) - link: https://www.edsurge.com/news/2024-04-19-bringing-better-stem-education-to-the-rural-south

- *Equitable Physics Learning* - Michigan State University College of Education (2023) - link: https://www.youtube.com/watch?v=vFq8TVdsFs0&t=1s

- *Making Physics Instruction More Equitable* (2022) - link: https://phys.org/news/2022-03-physics-equitable.html

- *Culturally Relevant Pedaogy in Post-secondary Education* - AAPT Physics Teachers/SEA Change (2021) - link: https://www.youtube.com/watch?v=0w2_JJarZ20&t=241s

- "*It is What It Is: Using Storied-Identity and Intersectionality Lenses to Understand What Shaped the Trajectory of a Young Black Woman's Science and Math Identities*" (2021) - Florida State University College of Education - link: https://www.youtube.com/watch?v=InCoz95I-NQ

Awards

- Fellow, American Association of Physics Teachers, 2025-present
- Dr. Israel Tribble Award for Outstanding Alumni Support (2024); McKnight Fellowship Program, Florida Education Fund.
- PERC proceedings Notable Papers (2024); "*A Look Physics Teacher Identity Around Equitable Instruction: The Tour Guide, Coach, and Gardener"*
- NSTA/NARST Research Worth Reading award (2023); *"It is what it is": Using Storied-Identity and intersectionality lenses to understand the trajectory of a young Black woman's science and math identities*"
- Editors Pick - The American Association of Physics Teachers (2022); "*Our Shifting Understandings of Culturally Relevant Pedagogy in Physics*"
- 2021 Jhumki Basu Scholar Award
- Mcknight Fellowship - 2015-2020