Andrea Jacobson

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EDUCATION

University of Michigan, Ann Arbor, MI 2023-2028
Ph.D., Biomedical Engineering
- Advisors: Jeffrey Fessler, Ph.D., and Jon Fredrik Nielsen, Ph.D.

University of Michigan, Ann Arbor, MI Graduated Dec., 2025
M.S., Biomedical Engineering
- Advisors: Jeffrey Fessler, Ph.D., and Jon Fredrik Nielsen, Ph.D.

Purdue University, Indianapolis, IN Graduated May, 2023
Formerly known as Indiana University, Purdue University - Indianapolis (IUPUI)
B.S., Biomedical Engineering
Minor, Mathematics

RESEARCH AND ACADEMIC WORK

Functional Magnetic Resonance Imaging (fMRI) and Fessler Labs *Graduate Researcher*
University of Michigan , Ann Arbor, MI *July 2023 - Present*
- Translating combined diffusion relaxometry (D-T2) MRI to ex vivo Michigan Alzheimer's Disease Research Center (MADRC) brain tissue to identify spectral biomarkers of white matter AD pathology and correlate findings with histology.
- Designed and conducted D-T2 phantom experiments to evaluate subvoxel feature resolution across acquisition parameters and spectral reconstruction methods.
- Designed simulations to quantify the impact of hardware and acquisition constraints (minimum TE, SNR) on recovery of myelin-associated D–T_2 components.
- Created a PEG 3350 + gadolinium phantom with known diffusion and T_2 coefficients to help validate D-T2 results.

Quantitative Imaging and Spectral Technologies Lab *Undergraduate Researcher*
Purdue University, Indianapolis *Dec. 2021 - Sept. 2023*
- Utilized self-taught multi-modal image processing techniques to study if ultra-short echo time (UTE) MRI can serve as an innocuous replacement for high resolution peripheral quantitative computed tomography (HR-pQCT) for assessing bone health.
- Co-authored a MATLAB 3D medical imaging registration script for use in a research core facility that corrects stack shifts in metatarsals from patient movement during clinical HR-pQCT imaging.

Socio-neural Physiology Lab *MOSAIC Project Volunteer Researcher*
Indiana University Bloomington *Aug. 2022 - Jan. 2023*
- Assisted in hosting focus groups to discover which aspects of acceptance and commitment therapy would be best to incorporate into a heart rate variability sensor (polar verity) controlled app that delivers therapeutic support to breast cancer survivors.
- Provided insight to UX designers and cancer survivors during the co-design app meetings to help develop a feasible product.

Bone Biology and Mechanics Lab *Undergraduate Researcher*
Purdue University, Indianapolis *Aug. 2021 - Aug. 2022*

- Planned and performed thermoneutral housing study for improved preclinical animal models for osteoporosis treatments.
- Utilized mechanical tester, micro-computed tomography (SKYSCAN 1172), image processing software (nRecon and DataViewer), and GraphPad Prism to understand how different housing temperatures impacted structure and mechanical function of trabecular bone in vertebrae.

PUBLISHED PAPERS

[J5] A. Murguia, S. Swanson, U. Scheven, **A. Jacobson**, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad. "Impact of Tissue Sample Preparation Methods on Myelin-Sensitive Quantitative MR Imaging," *Magn. Reson Med*, 94.5 (2025): 2071-2085.

[J4] **A. M. Jacobson**, X. Zhao, S. Sommer, F. Sadik, S. Warden, C. Newman, T. Siegmund, M. R. Allen, R. K. Surowiec. "A Comprehensive Set of Ultrashort Echo Time Magnetic Resonance Imaging Biomarkers to Assess Cortical Bone Health: A Feasibility Study at Clinical Field Strength," *Bone*, 181 (2024): 117031.

[J3] R. K. Surowiec, O. N. Reul, N. N. Chowdhury, R. K. Rai, D. Segvich, A. A. Tomaschke, J. Damrath, **A. M. Jacobson**, M. A. Allen, J. M. Wallace. "Combining Raloxifene and Mechanical Loading Improves Bone Composition and Mechanical Properties in A Murine Model of Chronic Kidney Disease (CKD)," *Bone*, 183 (2024): 117089.

[J2] R. K. Surowiec, R. Saldivar, R. K. Rai, C. E. Metzger, **A. M. Jacobson**, M. R. Allen, J. M. Wallace. "Ex Vivo Exposure to Calcitonin or Raloxifene Improves Mechanical Properties of Diseased Bone Through Non-cell Mediated Mechanisms," *Bone*, 173 (2023): 116805.

[J1] **A. M. Jacobson**, C. A. Tastad, A. Creecy, J. M. Wallace. "Combined Thermoneutral Housing and Raloxifene Treatment Improves Trabecular Bone Microarchitecture and Strength in Growing Female Mice," *Calcified Tissue International*, 112.3 (2023): 359-362.

PAPERS IN PREPARATION

[J1] **A. M. Jacobson,** A. Murguia, S. Swanson, U. Scheven, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad. "Phantom- and Simulation-based Validation of Combined Diffusion Relaxometry Outcomes in Ex Vivo ADRD White Matter." *In preparation.*

INVITED TALKS

[T1] **Diffusion-T_2 for Investigating White Matter Components in ADRD Ex Vivo Brain Samples**

- Michigan Institute for Imaging Technology and Translation Lab (MIITT). January 2026.
- BIONICS and BME Student Seminar Series. March 2026.

CONFERENCE PROCEEDINGS, POSTERS, AND ABSTRACTS

[C10] A. Murguia, **A. Jacobson**, S. D. Swanson, U. Scheven, J. F. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad. "Comparison of myelin-sensitive quantitative MR and histological markers in Alzheimer's disease tissue samples." Accepted to the 34th Annual Meeting of the ISMRM. May 2026. Cape Town, South Africa.

[C9] **A. M. Jacobson**, A. Murguia, C. Najarian, S. D. Swanson, U. Scheven, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad "Characterizing White Matter in ADRD Tissue Samples With Advanced Quantitative Magnetic Resonance Imaging " *9th Annual Beyond Amyloid Research Symposium*, 2025.

[C8] **A. M. Jacobson**, A. Murguia, S. D. Swanson, U. Scheven, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad "Combined Diffusion Relaxometry: Phantom Validation and Ex Vivo Characterization of Alzheimer's Disease Lesions" *International Society of Magnetic Resonance in Medicine*, 2025. **qMRI Study Group Abstract Finalist**

[C7] A. Murguia, **A. M. Jacobson**, S. D. Swanson, U. Scheven, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad "Impact of Tissue Sample Preparation Method on Myelin-Sensitive Quantitative MR Imaging and Histological Analysis" *International Society of Magnetic Resonance in Medicine*, 2025. **Summa Cum Laude Merit Award**

[C6] **A. M. Jacobson**, A. Murguia, S. D. Swanson, U. Scheven, J. Nielsen, J. A. Fessler, N. Seraji-Bozorgzad "Characterizing Myelin Content in White Matter ADRD Tissue Samples With Combined Diffusion Relaxometry, Magnetization Transfer, and Multi-Echo Spin-Echo Sequences" *8th Annual Beyond Amyloid Research Symposium*, 2024.

[C5] **A. M. Jacobson**, X. Zhao, S. Sommer, F. Sadik, S. Warden, C. Newman, T. Siegmund, M. R. Allen, R. K. Surowiec. "An MRI-based Approach for Characterizing Bone Mineral Density and Cortical Porosity: Comparing Ultrashort Echo Time MRI with HR-pQCT," *American Society of Bone and Mineral Research*, 2023.

[C4] **A. M. Jacobson**, R. K. Surowiec. "Custom MATLAB Registration Script for Stack Shift Correction of Mult-stack HR-pQCT Scans of the Metatarsals," *American Society of Bone and Mineral Research*, 2023.

[C3] **A. M. Jacobson**, M. Holland, S. Miller, S. Petranek. " The Art of Imaging Exhibit at the 2022 RSNA Learning Center," *Radiology Society of North America*, Chicago, IL, 2022. Exhibit and Conference Talk.

[C2] **A. M. Jacobson**, C. A. Tastad, A. Creecy, J. M. Wallace. "Combined Thermoneutral Housing and Raloxifene Treatment Improves Trabecular Bone Microarchitecture and Strength in Growing Female Mice," *Biomedical Engineering Society*, 2022.

[C1] **A. M. Jacobson**, C. A. Tastad, A. Creecy, J. M. Wallace. "Combined Thermoneutral Housing and Raloxifene Treatment Improves Trabecular Bone Microarchitecture and Strength in Growing Female Mice," *Purdue Virtual Showcase*, 2020.

CONFERENCE PRESENTATIONS

[T2] **Combined Diffusion Relaxometry: Phantom Validation and Ex Vivo Characterization of Alzheimer's Disease Lesions**
- Power Pitch
- ISMRM, Honolulu, HI, 2025

[T1] **An MRI-based Approach for Characterizing Bone Mineral Density and Cortical Porosity: Comparing Ultrashort Echo Time MRI with HR-pQCT**
- Oral Presentation
- BMES, Seattle, WA, Oct, 2023

AWARDS

Graduate Assistance in Areas of National Need (GAANN) Fellowship 2025-2026
Awarded to assist graduate students with excellent records who plan to pursue the highest degree available in their course study in a field designated as an area of national need

NSF Graduate Research Fellowships Program Honorable Mention 2024
National Science Foundation

Derek Tat Memorial Award 2024
University of Michigan
Awarded to a second-year Ph.D. student who excels in research and mentoring others

William M. Plater Civic Engagement Medallion 2023
Purdue University, Indianapolis
Awarded for commitment to the community through activities such as volunteerism, social issue advocacy, and political engagement

IUPUI Top 10 Outstanding Student 2022
Purdue University, Indianapolis (formerly IUPUI)
Named a top 10 student (out of 17,700 undergraduates) for demonstrated excellence in academia, community service, and extracurricular activities

Women's History Month Recognition 2022
Office of Women, Purdue University, Indianapolis
Women providing healing, promoting hope

Coburn Place Volunteer Service Award 2022
Coburn Place Safe Haven, Indianapolis
For leading, funding, and organizing activity nights for families at Coburn Place

Biomedical Engineering Outstanding Service 2022
Purdue University, Indianapolis

Advocacy Leadership and Outstanding Community Service Student Organization Awards 2021
Division of Student Affairs, Purdue University, Indianapolis
For leading volunteer initiatives for the Domestic Abuse Prevention Student Organization

Jesse H. & Beulah Cox Scholarship 2019-2023
Purdue University, Indianapolis
Full-tuition scholarship awarded for commitment to education, civic engagement, and community service

TEACHING EXPERIENCE

Lectures, University of Michigan
BIOMEDE 211: Circuits and Systems
- Topic: General Second Order Circuit Analysis Nov. 12, 2025
- Topic: Circuits and Systems Concepts in MRI Research Dec. 3, 2025

Graduate Student Instructor (GSI), University of Michigan
Lab Portion - BIOMEDE 211: Circuits and Systems Aug.-Dec. 2025
- Served as the primary lab instructor, giving lab instructional presentations and hands-on support.
- Taught foundation skills for working with circuits, giving students the background required to measure, amplify, and filter biopotential signals from bicep muscle contractions.
- Graded lab reports, updated lab manuals, and preemptively created backup plans for predicted causes of students falling behind to ensure labs were completed within the allotted time while maintaining academic rigor.

Lecture - BIOMEDE 211: Circuits and Systems Aug.-Dec. 2025
- Assisted students in working through problems during the flipped class (required virtual lectures before class, practice problems during class period).
- Managed a team of undergraduate instructional assistants, primarily checking their work for homework problem creation and homework grading.
- Administrative tasks, such as managing the grade book, coordinating student accommodations, and directing students to relevant resources.

MENTORING EXPERIENCE

Private Tutor *Tutor*

Self-employed *Nov. 2024 - Present*

- Tutoring students in high school courses (e.g., geometry, algebra II, chemistry).
- Creating tailored lessons based on students needs.
- Helping students prepare for the SAT/ACT.

End The Cycle *Tutor & Mentor*

University of Michigan *Jan. 2024 - Dec. 2024*

- Provided tutoring to students who have struggled with homelessness and fell behind with coursework.
- Mentored students, focusing on helping them to build self-confidence and an understanding of higher education options

Graduate Application Assistance Program *Mentor*

University of Michigan *Aug. 2023 - Jan. 2024*

- Coached students from underrepresented backgrounds on how to construct resumes and personal statements for applying to graduate school.

INDUSTRY WORK EXPERIENCE

Roche Diagnostics *Commercial Education Intern*

May 2022 - Aug. 2022

- Authored benchmark guides for new, complex diagnostic instruments, such as the Ultra Plus and Ventana HE 600, in Adobe InDesign to guide new users on through procedures for instrument usage, maintenance, and troubleshooting.
- Drove utilization of the cobas 68/8800 online training platform by reviewing stakeholder feedback, creating an automated communication plan, and creating quick reference cards for account executives.

Helmer Scientific *Biomedical Engineering R & D Intern*

May 2021 - Aug. 2021 & Winter Break 2021

- Wrote and uploaded detailed technical reports to Helmer's testing bank in the secure approved server.
- Followed NSF vaccine standard protocol to compare refrigeration units.
- Researched, designed, and tested a bactericidal water filter for use in a plasma thawer.
- Performed comparative tests on compressors for implementation in future products.

INVOLVEMENT AND COMMUNITY SERVICE PROJECTS

Avalon Housing Tutoring *Personal Project*

Program Founder and Lead *Jan. 2025 - Present*

- Onboarding and recruiting tutors, advertising the program, working with Avalon Housing community coordinators to set kids up on a weekly tutoring schedule.
- Mentoring and tutoring children (grades 2-8) in core skills (e.g., reading, math) who have fallen behind from educational disruptions due to barriers to attendance, limited access to online learning during COVID-19, and early childhood housing instability blocking foundational learning.
- Tracking student progress thoroughly, and collaborating with community partners to keep lessons encouraging and engaging.
- Recruited a team and delegated roles to streamline routine aspects of the program.

BME Graduate Student Council Academic Affairs Committee *President*

University of Michigan *June 2024 - Present*

- Organized a GitHub personal website workshop to help interested students build a free website to promote their work.
- Lead monthly meetings with the committee of graduate students to plan events to assist graduate students' career and academic growth.
- Co-hosted qualifying exam information and practice sessions.
- Co-hosted writing and study sessions.

American Society of Engineering Education *President*

University of Michigan Chapter *Aug. 2023 - May 2025*

- Planned events and socials to introduce graduate students to inclusive teaching and research practices.
- Hosted monthly book clubs focused on engineering education.
- Helped to organize two of our annual events titled "The Teaching Side of Academia," which connects interested graduate students to teaching staff. In this event, the recruited staff participated an a panel where they gave an overview of their roles. Following this, students could meet with the staff who they wanted to ask career questions to over dinner.

BME Graduate Student Council DEI Committee *Mental Health Chair*

University of Michigan *Aug. 2023 - May 2024*

- Planned events for graduate students to connect with resources (ex: Counseling and Psychological Services) to better mental health and to foster community.

Domestic Abuse Prevention Student Organization *President and Founder*

Purdue University, Indianapolis *Nov. 2019 - May 2023*

- Founded and passed on a sustainable student organization (150+ members) that aimed to "support survivors of domestic abuse through volunteer work and advocacy."
- Collaborated with the IUPUI Assistant Director of Interpersonal Violence Prevention to form a coalition on campus to promote and fund volunteer efforts aiming to support survivors of domestic violence.
- Launched Activity Night Series (SOG Funded) with Coburn Place to provide struggling families with fun, relaxing yoga nights, a STEM fair, painting nights, and literature nights with book donations.
- Assembled a leadership team to help plan events faster, delegate organizational tasks, and sustain the organization.