

Matthew M. Grondin, M.S.

5811 Russett Rd, Madison, WI 53726
608-609-3919 · mgrondin@wisc.edu

EDUCATION

Ph.D. Mechanical Engineering and Educational Psychology-Learning Sciences

University of Wisconsin-Madison

Current
Madison, WI

M.S. Biomedical Engineering

University of Wisconsin-Madison

2018
Madison, WI

Thesis: "Correlations between Quantitative Magnetic Resonance, Frequency-Dependent Mechanical Properties, and Biochemical Concentrations: Towards Non-Invasive Estimation of Articular Cartilage Behavior"

Principal Investigator: Dr. Corinne Henak

B.S. Biomedical Engineering

University of Wisconsin-Madison

2016
Madison, WI

A.A.S. Mechanical Design and Technology

Northcentral Technical College

2011
Wausau, WI

TEACHING AND RESEARCH INTERESTS

- Biomechanics
- Statics
- Dynamics
- Mechanics of Materials
- Fluidics
- Heat Transfer
- Introductory Engineering Courses
- Engineering Education
- Educational Sciences
- Embodied Learning
- Gestural Analysis
- Pedagogical Methods
- Learning Sciences
- Qualitative and Quantitative Analysis

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RESEARCH EXPERIENCE

The MAGIC Lab

2021-Current

Principal Investigator: Dr. Mitchell Nathan

University of Wisconsin-Madison

- Drafted and implemented protocols for educational interventions in engineering
- Analyzed gestures for insight into the engineering student cognitive processes
- Created grounded gesture codes during analysis
- Submitted and published research findings to relevant journals and conferences

The Henak Lab

Principal Investigator: Dr. Corinne Henak

2016-2018

University of Wisconsin-Madison

- Performed experiments under the governance of human tissue biosafety protocols
- Formulated in-house data processing programs in MATLAB to analyze data post experiments
- Measured bulk and depth-dependent material properties of cartilage tissue
- Executed digital image correlation techniques to acquire depth-dependent strains
- Quantified biochemical composition of extracellular matrices using spectrophotometry
- Evaluated correlations between bulk and depth-dependent cartilage material properties to biochemical concentrations and MRI sequence parameters through cross-disciplinary collaboration
- Investigated multiple linear regression models to predict cartilage mechanical properties

The Occupational Ergonomics and Biomechanics Lab

2014-2016

Principal Investigator: Dr. Robert Radwin

University of Wisconsin-Madison

- Authored a protocol to examine the ergonomics of various shovel designs
- Spearheaded a human testing study to evaluate the ergonomics of a new shovel design
- Measured muscle activation using surface electromyography
- Assessed muscle fatigue from frequency phase shifts and peak amplitudes
- Surveyed power tools to detect hand force and displacement using an inertial testing device
- Analyzed magnetic resonance images to quantify lateral epicondyle edema

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TEACHING EXPERIENCE

Mechanics of Materials

2020

Supervisor: Matthew Grondin

University of Wisconsin-Madison

- Instructed engineering concepts from stress states to combined and impact loading
- Developed intuition-based quizzes to further hone student problem solving skills
- Created course content with a learning management system (Canvas)
- Delivered course content via online instruction due to COVID-19

Introduction to Mechanical Engineering

2018-2021

Supervisor: Dr. Gregory Nellis

University of Wisconsin-Madison

- Managed upwards of 15 undergraduate engineering student assistants
- Instructed necessary theoretical engineering concepts for lab completion
- Developed intuition-based problem-solving skills for incoming freshmen students
- Graded quizzes, assignments, lab write-ups, and final project reports
- TA rating of 4.8/5.0 (1.4 above department average)

Tissue Mechanics

2018

Supervisor: Dr. Corinne Henak

University of Wisconsin-Madison

- Graded biweekly assignments and exams
- Instructed the use of matrix mathematics to resolve soft tissue mechanical properties
- Provided weekly office hours to ensure understanding of course material
- TA rating of 4.3/5.0 (0.9 above department average)

Mechanics of Materials Lab

2016-2021

Supervisor: Dr. Kristofer Dressler

University of Wisconsin-Madison

- Supervised the use of mechanical testing systems
- Taught lab material to provide theoretical knowledge in mechanics of materials
- Authored weekly prelab quizzes and course exams
- Graded quizzes, assignments, lab write-ups, final project reports, and exams
- Provided weekly office hours to ensure understanding of course material
- TA rating of 4.9/5.0 (1.5 above department average)

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CONFERENCE ABSTRACTS AND PROCEEDINGS

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|---|------|
| American Society for Engineering Education: ERM Division (Pending)
<i>Title: "Multimodal Communication in Engineering Discourse and Epistemologies: How Speech and Gesture Shape Expressions of Engineering Conceptualizations"</i> | 2024 |
| American Educational Research Association (Pending)
<i>Title: "Can Speech Ground Mechanical Reasoning During Engineering Discourse?"</i> | 2024 |
| American Society for Engineering Education: ERM Division
<i>Title: "Analogy and Imagery During Mechanical Reasoning: Use in Engineering Discourse"</i> | 2023 |
| International Society of the Learning Sciences
<i>Title: "Pose Detection: Towards Ubiquitous Embodied Interventions"</i> | 2023 |
| International Society of the Learning Sciences
<i>Title: "Scaffolding the Conceptual Salience of Directed Actions"</i> | 2023 |
| American Educational Research Association
<i>Title: "Embodying Students' Geometric Thinking in an Interactive Narrative Game"</i> | 2023 |
| American Educational Research Association
<i>Title: "Embodying Engineering Students' Knowledge Through Gesture"</i> | 2023 |
| International Conference on Computers in Education
<i>Title: "Grounding Embodied Learning Using Online Motion-Detection in The Hidden Village"</i> | 2022 |
| Learning Sciences Graduate Student Conference
<i>Title: "Positionality Matters: Diversifying Research Teams Can Affect Data Analyses"</i> | 2022 |
| International Society for Gesture Studies
<i>Title: "An Analysis of Gesture-Speech Mismatch in Engineering"</i> | 2022 |
| American Society for Engineering Education: ERM Division
<i>Title: "Assessing Engineering Students' Embodied Knowledge of Torsional Loading Through Gesture"</i> | 2022 |

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Learning Sciences Graduate Student Conference 2021
Title: "Educating Engineers Through Gesture: How Spontaneous Gesture Can Guide Educators"

International Society for Magnetic Resonance in Medicine 2020
Title: "Correlation Between Single-Component and Bi-Component T2 Parameters and Proteoglycan Content and Mechanical Properties of Cartilage"

Summer Biomechanics, Bioengineering, and Biotransport Conference 2019
Title: "Correlation Between Quantitative Magnetic Resonance and Physiological Relatable Mechanical Properties"

International Society for Magnetic Resonance in Medicine 2019
Title: "Comparison of Single-Component and Multi-Component T2 Parameters and Mechanical Parameters of Human Patellar Cartilage at 3.0T"

RESEARCH ARTICLES

Bi-Component T2 Mapping Correlates with Articular Cartilage Material Properties 2020
Journal of Biomechanical Engineering

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AWARD NOMINATIONS

Honored Instructor Department of Mechanical Engineering University of Wisconsin-Madison	2019
Innovation in Teaching-Nominee Department of Mechanical Engineering University of Wisconsin-Madison	2019
M.S. Student Paper Competition Finalist Summer Biomechanics, Bioengineering, and Biotransport Conference	2019
Early Excellence in Teaching-Nominee Department of Mechanical Engineering University of Wisconsin-Madison	2018

COMMITTEE AND ORGANIZATION INVOLVEMENT

Engineers Without Borders-Student Chapter Grant Committee Chair Ecuador Project University of Wisconsin-Madison	2019
Education Innovation Committee Ad Hoc Graduate Student Member University of Wisconsin-Madison	2019/2021-2022

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AUTHORED GRANTS, SCHOLARSHIPS, AND FELLOWSHIPS

Interdisciplinary Training Program Fellowship School of Education, UW-Madison Awarded: \$34,000/year	2021
Kemper K. Knapp Engineers Without Borders-Student Chapter Awarded: \$8,000	2020
Wisconsin Idea Fellowship Engineers Without Borders-Student Chapter Awarded: \$7,000	2020
Piper Servant Leadership Fellowship Engineers Without Borders-Student Chapter Awarded: \$2,500	2020

PROFESSIONAL DEVELOPMENT

Undergraduate Research Mentee Training DELTA, UW-Madison	2023
Interdisciplinary Training Seminar ITP Fellowship, UW-Madison	2021-2022
Education Policy Across the Disciplines ITP Fellowship, UW-Madison	2021
Teaching in Science and Engineering: The College Classroom DELTA, UW-Madison	2019
Leveraging Tech to Teach DELTA, UW-Madison	2019
Informal Science Education for Scientists and Engineers DELTA, UW-Madison	2019