Benjamin B Wheatley

Department of Mechanical Engineering
302 Academic East
Bucknell University
1 Dent Drive
Lewisburg, PA 17837

b.wheatley@bucknell.edu
Office: 570-577-3883

EDUCATION

Ph.D., Mechanical Engineering
Colorado State University (Fort Collins, CO) 2017
Dissertation: Finite element analysis of skeletal muscle: A validated approach to modeling muscle force and intramuscular pressure.

B.S., Engineering 2011
Trinity College (Hartford, CT)

PROFESSIONAL APPOINTMENTS

Bucknell University (Lewisburg, PA) 2017 – Present
Assistant Professor
Department of Mechanical Engineering

JOINT APPOINTMENTS

Geisinger Commonwealth School of Medicine (Scranton, PA)
Adjunct Assistant Professor of Orthopedics 2021 – Present
Musculoskeletal Institute

PUBLICATIONS

Refereed Journal Articles

19. Trevor G Aguirre, T.G., Fuller, L.H., Ingrole, A., Seek, T.W., **Wheatley, B.B.**, Steineman, B.D., Haut Donahue, T.L, & Donahue, S.W. (2020). Bioinspired material architectures from bighorn sheep horncore velar bone for impact loading applications. *Scientific Reports*. 10, 18916. doi: 10.1038/s41598-020-76021-5

18. Wheatley, B.B. (2020). Investigating Passive Muscle Mechanics with Biaxial Stretch. *Frontiers in Physiology*. doi: 10.3389/fphys.2020.01021

17. Geswell, M., Sinha, N., Mandel, M., **Wheatley, B.B.**, Mirenda, W., & Seeley, M. (2020). Improving Resident Education Through Unstable Chicken Hips. *Journal of Pediatric Orthopaedics B*. 10.1097/BPB.0000000000000762

16. Grega, K.L., Segall, R.S., Vaidya, A.J., Fu, C., & **Wheatley, B.B.** (2020). Anisotropic and Viscoelastic Tensile Mechanical Properties of Aponeurosis: Experimentation, Modeling, and Tissue Microstructure. *Journal of the Mechanical Behavior of Biomedical Materials.* 110, 103889. doi: 10.1016/j.jmbbm.2020.103889

15. Mayers, A.J., Hayes, D., **Wheatley, B.B.**, Seeley, M.A., & Widmaier, J. (2020). Surgical/Technical Tips SCFE Screw Removal with Coring Reamer. *JPOSNA* 2(1).

14. Vaidya, A.J. & **Wheatley, B.B.** (2019). An experimental and computational investigation of the effects of volumetric boundary conditions on the compressive mechanics of passive skeletal

muscle. *Journal of the Mechanical Behavior of Biomedical Materials.* 102, https://doi.org/10.1016/j.jmbbm.2019.103526

13. Sinha, N., Cornell, M., **Wheatley, B.B.**, Munley, N. & Seeley, M. (2019). Looking Through a Different Lens: Patient Satisfaction with Telemedicine in Delivering Pediatric Fracture Care. *Journal of the American Academy of Orthopaedic Surgeons Global Research & Reviews*. 3(9), e(100). doi: 10.5435/JAAOSGlobal-D-19-00100

12. Wolynski, J., **Wheatley, B.B.**, & Haut Donahue, T.L. (2019). Finite Element Analysis of the Jaipur Foot: Implications for Design Improvement. *Journal of Prosthetics & Orthotics.* doi: 10.1097/JPO.0000000000000253

11. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2018). Modeling Skeletal Muscle Stress and Intramuscular Pressure: A Whole Muscle Active-Passive Approach. *Journal of Biomechanical Engineering*. 140(8), 081006. doi: 10.1115/1.4040318

10. Teater, R.H., Fischenich, K.M., **Wheatley, B.B.**, Abrams, L., Sorby, S.A., Singh Mali, H., Jain, A., & Haut Donahue, T.L. (2018). Assessment of the compressive and tensile mechanical properties of materials used in the Jaipur Foot prosthesis. *Prosthetics & Orthotics International*. doi: 10.1177/0309364618767143

9. Wheatley, B.B., Fischenich, K.M., Abrams, L.A., Sorby, S.A., Singh Mali, H., Jain, A. K., & Haut Donahue, T.L. (2017). An International Fellowship Experience for Engineering Undergraduates: Improving Technical, Teamwork, and Cultural Competency. *International Journal of Engineering Education.* 33(4), 1189-1198.

8. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., Haut Donahue, T.L. (2017). A validated model of passive skeletal muscle to predict force and intramuscular pressure. *Biomechanics and Modeling in Mechanobiology.* 16(3), 1011-1022. doi: 10.1007/s10237-016-0869-z.

7. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2017). A case for poroelasticity in skeletal muscle finite element analysis: experiment and modeling. *Computer Methods in Biomechanics and Biomedical Engineering*. 20(6), 598-601. doi: 10.1080/10255842.2016.1268132.

6. Drake, A.M., Haut Donahue, T.L., Stansloski, M., Fox, K., **Wheatley, B.B.**, & Donahue, S. W. (2016). Horn and horncore trabecular bone of bighorn sheep rams absorbs impact energy and reduces brain cavity accelerations during high impact ramming of the skull. *Acta Biomaterialia.* 136(11), 41-50. doi:10.1016/j.actbio.2016.08.019

5. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2016). How does tissue preparation affect skeletal muscle transverse isotropy? *Journal of Biomechanics.* 49 (13): 3056–3060. doi:10.1016/j.jbiomech.2016.06.034.

4. Wheatley, B.B., Pietsch, R.B., Haut Donahue, T.L., & Williams, L.N. (2016). Fully non-linear hyper-viscoelastic modeling of skeletal muscle in compression. *Computer Methods in Biomechanics and Biomedical Engineering*. 19(11), 1181-1189. doi:10.1080/10255842.2015.1118468

3. Wheatley, B.B., Morrow, D.A., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2016). Skeletal muscle tensile strain dependence: hyperviscoelastic nonlinearity. *Journal of the Mechanical Behavior of Biomedical Materials.* 53, 445-454. doi:10.1016/j.jmbbm.2015.08.041

2. Wheatley, B.B., Fischenich, K.M., Button, K.D., Haut, R.C., & Haut Donahue, T.L. (2015). An optimized transversely isotropic, hyper-poro-viscoelastic finite element model of the meniscus to evaluate mechanical degradation following traumatic loading. *Journal of Biomechanics*. 48(8), 1454-1460. doi:10.1016/j.jbiomech.2015.02.028

1. Pietsch, R., **Wheatley, B.B.**, Haut Donahue, T.L., Gilbrech, R., Prabhu, R., Liao, J., & Williams, L.N. (2014). The anisotropic compressive properties of porcine muscle tissue. *Journal of Biomechanical Engineering*. 136(11), 111003. doi:10.1115/1.4028088

Refereed Conference Papers

5. Wheatley, B.B. (2020) Appropriate Finite Element Analysis in Mechanical Engineering: Teaching Best Practices Through Simulation. *American Society of Engineering Education.* Virtual.

4. Wheatley, B.B., Miskioglu, E., Christou, E., Tymvios, N. (2020) Pre and Post Tenure: Perceptions of Requirements and Impediments for Mechanical Engineering and Mechanical Engineering Technology Faculty. *American Society of Engineering Education.* Virtual.

3. Buffinton, K. B., **Wheatley, B.B.**, Habibian, S., Shin, J., Cenci, B.H., & Christy, A.E. (2020) Investigating the Mechanics of Human-Centered Soft Robotic Actuators with Finite Element Analysis. *RoboSoft.* Virtual.

2. Wheatley, B.B., Fischenich, K.M., Abrams, L.A., Sorby, S.A., Singh Mali, H., Jain, A.K., & Haut Donahue, T.L. (2017) Improvement of an International Research Experience: Year Two. *American Society of Engineering Education.* Columbus, OH.

1. Wheatley, B.B., Haut Donahue, T.L., & Catton, K.B. (2017) An Active Learning Environment to Improve First-Year Mechanical Engineering Retention Rates and Software Skills. *American Society of Engineering Education.* Columbus, OH.

Conference Proceedings

34. Dyer, O.L. & Wheatley, B.B. (2021). Visual Characterization of Aponeurosis Microstructure. *Biomedical Engineering Society Annual Meeting*. Submitted.

33. Lorza, S.S., Seeley, M.A., & Wheatley, B.B. (2021). The Relationship Between Compression and Intramuscular Pressure of Skeletal Muscle. *Biomedical Engineering Society Annual Meeting*. Submitted.

32. Lee, J. & Wheatley, B.B. (2021). Inhomogeneous Finite Element Modeling of Passive Muscle Tissue Mechanics. *Biomedical Engineering Society Annual Meeting*. Submitted.

31. Wheatley, B.B. & Seeley, M.A. (2021). Modeling the Effect of Femoral Anteversion on Gait Dynamics. *Meeting of the American Society of Biomechanics & International Society of Biomechanics Technical Group on Computer Simulation*. Virtual (both).

30. Tully, E.E. & **Wheatley, B.B.** (2021). Location Dependent Mechanical Behavior of Aponeurosis Tissue Under Uniaxial Tensile Stretch. *Summer Biomechanics, Bioengineering, and Biotransport Conference*. Virtual.

29. Wheatley, B.B., Drake, A.M., Fuller, L.H., & Donahue, S.W. (2021). Modeling the Effect of Bighorn Sheep Horn Shape on Post-Impact Accelerations. *Summer Biomechanics, Bioengineering, and Biotransport Conference*. Virtual.

28. Vaidya, A.J. & **Wheatley, B.B.** (2020). Novel Volumetric Compression Relaxation Testing of Skeletal Muscles. *Biomedical Engineering Society Annual Meeting*. Virtual.

27. Gilmore, E.C., Fuller, L.H., Drake, A.M., Aguirre, T.G., Ingrole, A.A., Donahue, S.W., & **Wheatley, B.B.** (2020). Shape Characterization of Bighorn Sheep Horns for Bending and Impact Implications. *Meeting of the American Society of Biomechanics.* Virtual.

26. Wheatley, B.B. & Seeley, M.A. (2020). Modeling the Effect of Femoral Anteversion on Knee Extensor Muscle Force and Anterior Knee Mechanics. *Meeting of the American Society of Biomechanics.* Virtual.

25. Mandel, M., Woo, B., Young, A., Fabricant, P. **Wheatley, B.**, Seeley, M. (2020). Genu Valgum and Obesity in the Pediatric Patient. *American Academy of Pediatrics National Conference & Exhibition.* Virtual.

24. Vaidya, A.J. & **Wheatley, B.B.** (2020). Development and Implementation of Volumetric Compression Relaxation Testing of Skeletal Muscle. *Summer Biomechanics, Bioengineering, and Biotransport Conference.* Virtual.

23. Grega, K.L., Fu, C., & **Wheatley, B.B.** (2020). Biaxial Tensile Mechanics of Aponeurosis Tissue. *Summer Biomechanics, Bioengineering, and Biotransport Conference.* Virtual.

22. Wheatley, B.B. & Fu, C. (2020) The Role of Biaxial Stretch in Elucidating Passive Muscle Mechanics. *Summer Biomechanics, Bioengineering, and Biotransport Conference*. Virtual.

21. Wheatley, B.B., Yancey, M.E., & Seeley, M.A. (2020). A Musculoskeletal-Finite Element Framework for Modeling the Effect of Femoral Anteversion on Knee Extensor Muscle Force and Anterior Knee Mechanics. *CAMS-KNEE OpenSim Workshop and Conference*. Zurich, Switzerland. Poster Award Runner-Up.

20. Nester J., Torino D., Sylvestre D., Ney S., **Wheatley B.B.**, Seeley M. (2019). Risk of Reoperation After Primary ACL Reconstruction in Pediatric Patients. *Eastern Orthopaedic Association Annual Conference*, West Palm Beach, FL.

19. Vaidya, A.J. & **Wheatley, B.B.** (2019). Effects of Volumetric Boundary Conditions on the Compressive Mechanics and Modeling of Passive Skeletal Muscle. *Summer Biomechanics, Bioengineering, and Biotransport Conference.* Seven Springs, PA. BS Level Competition 3rd Place.

18. Grega, K. L. & **Wheatley, B.B.** (2019). Determination of the Linear Viscoelastic Behavior of Aponeurosis. *Summer Biomechanics, Bioengineering, and Biotransport Conference.* Seven Springs, PA.

17. Wheatley, B.B., Yancey, M.E., & Seeley, M.A. (2019) Patellofemoral Contact Mechanics in Nail-Patella Syndrome and High Femoral Anteversion Morphology – Finite Element Modeling. *The Orthopaedic Research Society*. Austin, TX.

16. Vaidya, A.J. & **Wheatley, B.B.** (2018). Effects of Boundary Conditions on the Stress Relaxation of Passively Compressed Skeletal Muscle. *Biomedical Engineering Society Annual Meeting*. Atlanta, GA.

15. Geswell M., Sinha N., **Wheatley B.B.**, Mirenda, W.M. & Seeley M.A. (2018) Teaching the infant hip exam: A novel approach. *Eastern Orthopaedic Association Annual Conference*. Amelia Island, FL.

14. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2018). Finite Element Analysis of Intramuscular Pressure in Passive *in Vivo* Human Skeletal Muscle. *World Congress of Biomechanics*. Dublin, Ireland.

13. Wheatley, B.B. (2018). Investigating the Variability of Passively Stretched Skeletal Muscle with a Functional Morphological Fiber Model. *World Congress of Biomechanics*. Dublin, Ireland.

12. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2017). Finite Element Analysis of Intramuscular Pressure in the Human Tibialis Anterior. *American Society of Biomechanics.* Boulder, CO.

11. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2017). Finite Element Modeling of Active Skeletal Muscle: Muscle Force and Intramuscular Pressure. *Summer Biomechanics, Bioengineering, and Biotransport Conference*. Tucson, AZ. PhD Level Competition Finalist.

10. Kaufman, K.R, Go, S. A., O'Connor, S.A., **Wheatley, B. B.**, Litchy, W. J., Haut Donahue,

T.L., Odegard, G.M., Ward, S.R., & Lieber, R.L. (2016). Quantitative Muscle Force Measurement using Intramuscular Pressure. *Biomedical Engineering Society Annual Meeting.* Minneapolis, MN.

9. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2016). A Novel and Validated Finite Element Model of Passively Stretched Skeletal Muscle. *European Society of Biomechanics.* Lyon, France.

8. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2016). Skeletal Muscle Permeability: Direct Experimental Evaluation and Modeling Implications. *Summer Biomechanics, Bioengineering, and Biotransport Conference.* National Harbor, MD.

7. Wheatley, B.B., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2016). Anisotropy and Rigor Effects of Skeletal Muscle. *The Orthopaedic Research Society.* Lake Buena Vista, FL.

6. Wheatley, B.B., Morrow, D.A., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2015). Predicting the Stress and Intramuscular Pressure Response of Whole Skeletal Muscle Through Optimized Finite Element Analysis. *Summer Biomechanics, Bioengineering and Biotransport Conference.* Snowbird Resort, UT.

5. Wheatley, B.B., Pietsch, R., Donahue, T.L., & Williams, L.N. (2015). Numerical Modeling of Skeletal Muscle Under High Strain and Stress Relaxation Compression Conditions. *Summer Biomechanics, Bioengineering and Biotransport Conference.* Snowbird Resort, UT.

4. Wheatley, B.B., Morrow, D.A., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2014). Inverse Finite Element Analysis for Poroelastic Material Properties of Excised Skeletal Muscle. *World Congress of Biomechanics.* Boston, MA.

3. Drake, A.M., **Wheatley, B.B.**, Kaufman, K.R., & Haut Donahue, T.L., (2014) Hydraulic Permeability of Rabbit Muscle Transverse to Contraction Direction. *Rocky Mountain Regional American Society of Biomechanics.* Estes Park, CO.

2. Wheatley, B.B., Fischenich, K.M., Haut, R.C., & Haut Donahue, T.L. (2014) Mechanical Properties of Healthy and Damaged Menisci through Finite Element Analysis of Indentation. *The Orthopaedic Research Society.* New Orleans, LA.

1. Wheatley, B.B., Morrow, D.A., Odegard, G.M., Kaufman, K.R., & Haut Donahue, T.L. (2013). Poroelastic Material Properties of Skeletal Muscle through Inverse Finite Element Method. *Rocky Mountain Regional American Society of Biomechanics.* Estes Park, CO.

PubMed:
https://www.ncbi.nlm.nih.gov/sites/myncbi/1vi_od97smYQJ/bibliography/45973042/public/?sortby=pubDate&sdirection=descending
Google Scholar:
https://scholar.google.com/citations?user=JOaYOUIAAAAJ&hl=en

HONORS AND AWARDS

Titles and Fellowships

Assistant Professor 2019 – 2020
Geisinger Musculoskeletal Institute
Visiting Assistant Professor
Stanford University, OpenSim Visiting Scholars Program 2019
John P. and Mary Jane Swanson Professor of Engineering and the Sciences
Bucknell University 2017 – 2020

Government of Ireland Postdoctoral Fellowship (Declined)
Irish Research Council 2017 – 2019

Awards

Best Poster Runner-Up
CAMS-Knee OpenSim Workshop 2020
PhD Competition Finalist - Tissue Mechanics and Characterization
Summer Biomechanics, Bioengineering, and Biotransport Conference 2017
Best Graduate Student Podium Presentation Award
Rocky Mountain American Society of Biomechanics 2017
College of Engineering Graduate Teaching Fellowship
Colorado State University 2016 – 2017
Global Impact Research Top Scholar
Colorado State University Graduate Student Showcase 2015
Shrake Culler Scholarship
Colorado State University 2015
Joseph L. Guire Memorial Scholarship
Colorado State University 2012

GRANTS

Bucknell University

6. National Science Foundation Engineering Research Initiation 2022 – 2023
ERI: An Experimental and Computational Approach to Establishing Multiscale, Multiphasic Material Properties of Skeletal Muscle
Role: PI Award Total: $199,261 (Pending)

5. Bucknell-Geisinger Research Initiative 2021 – 2022
A new approach to characterizing human motor control architecture for improved stroke rehabilitation
Role: PI Award Total: $19,738 (Awarded)

4. Toyota Research Institute 2019 – 2020
Subcontract to TRI-UM Project: "Don't Bite the Hand that Feeds You: Soft Robotics for the Eldercare II"
Role: co-PI Award Total: $30,055 (Awarded)

3. Bucknell-Geisinger Research Initiative 2019 – 2022
Characterization and Modeling of Miserable Malalignment Syndrome Lower Limb Biomechanics
Role: PI Award Total: $100,000 (Awarded)

2. National Science Foundation Major Research Instrumentation 2018 – 2019
Acquisition of a Planar Biaxial Material Testing System for Enhancement of Research and Teaching at Bucknell University
Role: PI Award Total: $123,789 (Awarded)

1. Bucknell-Geisinger Research Initiative 2018 – 2019
Computational Modeling of Pediatric High Femoral Anteversion and Knee Biomechanics
Role: PI Award Total: $19,947 (Awarded)

CAMPUS TALKS

External Invited Talks

Western Michigan University 2019
"From Computation to the Clinic"

Stanford University 2019
OpenSim Visiting Scholars Presentation at Neuromuscular Biomechanics Lab

TEACHING EXPERIENCE

Bucknell University

MECH 353 – Solid Mechanics
MECH 302 – Finite Element Analysis
MECH 401 & 402 – Senior Design
MECH 471 – Nonlinear Solid Mechanics
ENGR 100 – Exploring Engineering (Co-Coordinator)
ENGR 452 – Interdisciplinary Senior Design

Colorado State University

The Institute for Learning and Teaching – Teaching Certificate Program 2016 – 2017
MECH 103 – Introduction to MECH (Graduate Teaching Fellow) 2016 – 2017
MECH 495 – Independent Study, The Jaipur Foot (Graduate Instructor) 2016 – 2017

RESEARCH EXPERIENCE

Bucknell University 2017 – Present
Principal Investigator, Mechanics and Modeling of Orthopaedic Tissues Laboratory

Colorado State University 2012 – 2017
Graduate Research Assistant, Soft Tissue Mechanics Laboratory

480 Biomedical, Inc. (Watertown, MA) 2011 – 2012
Engineering Intern, Design Team

SERVICE TO PROFESSION

Conference Moderator

Meeting of the American Society of Biomechanics 2020

Journal Peer Reviewer

Acta Biomaterialia
Journal of Biomechanics
Journal of the Mechanical Behavior of Biomedical Materials
Journal of Biomechanical Engineering
Clinical Biomechanics
IEEE Transactions on Biomedical Engineering
PLOS ONE

Conference Peer Reviewer

Summer Biomechanics, Bioengineering, and Biotransport Conference	2017 – Present
American Society of Engineering Education Annual Conference	2016 – Present
American Society of Biomechanics East Coast Meeting	2020

Outreach

Board Member, Central Pennsylvania Girls on the Run	2020 – Present
Lewisburg Children's Museum Engineering Camp	2019 – Present
American Society of Biomechanics National Biomechanics Day	2016

SERVICE TO UNIVERSITY

Bucknell University

Residential Colleges Steering Committee	2021 – Present
Committee on Campus and Student Life	2021
Working Groups for an Inclusive Engineering Community	2020 – Present
College of Engineering Graduate Committee	2018 – Present
Team Mentor – Men's and Women's Cross Country	2018 – Present

Colorado State University

Graduate Student Council, VP of Finance	2015 – 2017
Mechanical Engineering Graduate Ambassador	2016 – 2017
Colorado State University Graduate Showcase Moderator	2015 – 2016

MENTORED RESEARCH STUDENTS

Bucknell University

Kyle Young – Mechanical Engineering '24
Sabrina Lorza – Mechanical Engineering '23
Minhaj Bhuiyan – Biomedical Engineering '23
Jacob Schaefer – Mechanical Engineering '24
Jaden Lee – Mechanical Engineering '22
Emily Tully – Mechanical Engineering '21
Olivia Dyer – Cell Bio/Biochemistry '22
Thomas Matsumura – Neuroscience '22
Kristen Fu – Mechanical Engineering '20
Ruth Segall – Cell Bio/Biochemistry '21
Elyssa Penson – Mechanical Engineering '21
Anurag Vaidya – Biomedical Engineering and Computer Science Minor '21
Keith Grega – Biomedical Engineering '21
Sai Pranav Rallabhandi – Mechanical Engineering '21
Joelle Andres-Beck – Mechanical Engineering '21
Margo Yancey – B.S., Mechanical Engineering '19
Christine Bendzinski – B.S., Cell Bio/Biochemistry '18

Geisinger Commonwealth School of Medicine

Nathan Chaclas '24
Calum Wallace '23
John Coulter '23

Sundeep Kahlon ‘23
Mark Mandel ‘22

Colorado State University
Aaron Drake – BS, MS, Mechanical Engineering
Alex Tomsick – BS, Mechanical Engineering

Other Institutions
Emma Gilmore – Biomedical Engineering ‘21, UMASS Amherst

Bucknell University Honors Thesis Committee
Anurag Vaidya – Computer Science ‘21

Bucknell University MS Committee
Lucas Rankin – Chemical Engineering ‘21
Soheil Habibian MS – Mechanical Engineering ‘19

Geisinger Commonwealth Medical Research Honors Program
Jessica Koshinski ’24

PROFESSIONAL MEMBERSHIPS

Council for Undergraduate Research	2020 – Present
American Society for Engineering Education	2018 – Present
Orthopaedic Research Society	2018 – Present
American Society of Biomechanics	2014 – Present
Association of Mechanical Engineers	2012 – Present
European Society of Biomechanics	2016 – Present