

Curriculum Vitae

Eric A. Nauman, Ph.D.

Dane A. and Mary Louise Miller Professor of Biomedical Engineering
University of Cincinnati

Director, Human Injury Research and Regenerative Technologies (H.I.R.R.T.)
Laboratory

March 2025

Education

2000 Ph.D. University of California, Berkeley, California
Mechanical Engineering (Major: Bioengineering, Minors: Dynamics,
Mathematics)
Dissertation Title: The Analytical Design of a Hybrid Bone Substitute.
Dissertation Committee: Tony Keaveny (Advisor), Bernard P.
Halloran, Lisa A. Pruitt, Carolyn R. Bertozzi



1998 M.S. University of California, Berkeley, California
Mechanical Engineering (Major: Bioengineering, Minors: Dynamics,
Mathematics)
Thesis Title: Dependence of Inter-Trabecular Permeability on Flow
Direction and Anatomic Site. Advisor: Tony Keaveny

1995 B.M.E. University of Delaware, Newark, Delaware
Mechanical Engineering (Minors: Japanese, Mathematics)
Thesis Title: State Space Identification and Control of Chaotic
Dynamics. Thesis Advisor: R. V. Roy



Professional Experience

University of Cincinnati

1/22-Present Dane A. and Mary Louise Miller Professor of Biomedical Engineering
8/23-Present Associate Head of Biomedical Engineering
3/24-Present Secondary Appointment in Mechanical Engineering

Entrepreneurship and Board Membership

6/09-Present Co-Founder of Advanced Regeneration Technologies, Inc., West Lafayette, IN,
Vice President and Director of New Technologies
8/15-1/18 National Association of Multicultural Engineering Program Administrators
(NAMEPA) Board of Directors, Committee Chair, Special Task Force: K-12
College Readiness (Honors Bound).
9/16-12/24 Co-Founder of IFBattery, West Lafayette, IN

Purdue University

7/04-8/07 Assistant Professor, School of Mechanical Engineering
7/04-8/07 Assistant Professor, Weldon School of Biomedical Engineering and Department
of Basic Medical Sciences
8/07-8/13 Associate Professor, School of Mechanical Engineering
8/07-8/13 Associate Professor, Weldon School of Biomedical Engineering and Department
of Basic Medical Sciences
1/13-12/21 Director, College of Engineering Honors Program
8/13-12/21 Professor, School of Mechanical Engineering
8/13-12/21 Professor, Weldon School of Biomedical Engineering and Department of Basic
Medical Sciences
1/18-12/21 Director, Office of Professional Practice (Internships, Domestic and International
Co-operative Education)
1/22-Present Adjunct Professor of Mechanical Engineering

Tulane University

7/00-6/04 Assistant Professor, Biomedical Engineering Department
6/01-6/04 Adjunct Assistant Professor, Department of Orthopaedic Surgery

University of California, Berkeley

6/95-8/95 Development Engineer, Lanxide Corporation, Newark, DE
8/95-6/00 Research Assistant, University of California, Berkeley, CA
1/98-6/00 Research Assistant, Endocrine Unit, Veterans Affairs Medical Center, San
Francisco, CA
9/98-6/00 Consultant, NASA Ames Research Center, Moffett Field, CA

Administrative Philosophy

As an administrator, I have served in three primary positions: At Purdue University, I was the Director of the Engineering Honors Program for eight years and also the Director of the Office of Professional Practice for three of those years. Here at the University of Cincinnati, I am the Associate Head and Director of the Undergraduate Program for the Department of Biomedical Engineering. In each case, my contributions have been a mix of curriculum development, fund raising, developing new facilities, and working together with the myriad administrative offices on campus. These efforts have been successful largely due to my commitment to continuous quality improvement.

The Engineering Honors program was my first administrative role, and it was a positive experience, allowing me to build a philosophy for working with staff – simultaneously providing two-way feedback that promoted individual development and programmatic improvement. We developed a protocol for assessing the type and quality of work that our office was doing. In addition to building and expanding the curriculum, we also developed the Milestones Program, an innovative set of teaching tools designed to promote hands-on experiences in mechanical and electronics prototyping. Each Milestone required 5 – 7 sessions (except for the finite element module which was 12) and were able to be integrated into the curriculum or delivered in an extracurricular manner. The most novel aspect of the program was that we generated all of our operational funds (post-staff salary) by running an outstanding summer camp for rising high school seniors (\$150,000 – 200,000 per year). I am exceedingly proud of our effort. We taught the students CAD, Arduinos, teamwork, robotics, and kept them busier than they ever had been. More importantly, consistent feedback between each camp and at the end of the summer ensured that the camp improved every year.

Through the Office of Professional Practice, I was in charge of Purdue's cooperative education program which included the United States' premier global co-op program (GEARE). We expanded the number of colleges involved in co-op and grew the international component substantially. My primary goal was to connect GEARE to the United Nations, which should have taken 3 – 5 years, but my staff broke the problem down into small parts, engaging alumni and contacts within the State Department, and accomplished it in six months. In addition, I had the opportunity to help design a new space for the office and work with both individual and corporate donors whose funds were primarily used to establish scholarships.

In UC's Department of Biomedical Engineering, my primary responsibility has been to upgrade and improve the curriculum. In addition to revitalizing the course sequence, I organized Course Roundups at the end of each semester where the faculty discuss (1) what went well this semester, (2) what did not go well, and (3) what needs to be changed for the next course offering. This process has delivered a wide range of improvements and an overall increase in faculty engagement. I have also been able to assist the Head with the development of Research Impact Teams and the continued development of our teaching and research facilities. This commitment to continuous quality improvement of our courses has not only strengthened our curriculum, but also our department.

Honors and Awards

- 1992 Barry M. Goldwater Scholarship–University of Delaware
- 1994 W. F. Lindell Mechanical Engineering Achievement Award – University of Delaware
- 1995 Taylor Award (Outstanding Male Graduating Student) – University of Delaware
- 1995 Senior with Highest Cumulative Scholastic Index
- 1995 National Defense Science and Engineering Graduate Fellowship
- 1995 Berkeley Fellowship – University of California, Berkeley
- 1996 Outstanding Graduate Student Instructor Award–University of California, Berkeley
- 2002 AHMB Biomedical Engineering “Teacher of the Year” Award – Tulane University

- 2003 Faculty Marshall for 2003 Graduation – Tulane University
- 2004 AHMB Biomedical Engineering “Teacher of the Year” Award – Tulane University
- 2010 Purdue College of Engineering Early Career Research Award of Excellence
- 2010 Purdue University Faculty Scholar
- 2010 B.F.S. Schaefer Outstanding Young Faculty Scholar, School of Mechanical Engineering, Purdue University
- 2013 College of Engineering Team Award (Purdue Neurotrauma Group) with Thomas Talavage and Larry Leverenz.
- 2013 Willis A. Tacker Prize for Outstanding Teaching in Biomedical Engineering
- 2014 A. A. Potter Best Teacher Award for Purdue’s College of Engineering
- 2014 Jeffrey F. Rhoads, **Eric Nauman**, Beth M. Holloway, Charles Morton Krousgrill. *The Purdue Mechanics Freeform Classroom: A New Approach to Engineering Mechanics Education*. 2014 ASEE Annual Conference. **Best Paper Presentation Award and Overall Best Paper Presentation.**
- 2014 Inducted into the Purdue Research Foundation’s *Innovators Hall of Fame*
- 2015 Harry Solberg Award for the Best Teacher in Purdue’s School of Mechanical Engineering
- 2016 Charles B. Murphy Outstanding Undergraduate Teacher Award and induction into Purdue’s Teaching Academy
- 2016 Bernie Flowers Award for Outstanding Contributions to Amateur Football – Awarded to the Purdue Neurotrauma Group (Larry Leverenz, **Eric Nauman**, and Tom Talavage)*
- 2016 University of Delaware Distinguished Career Award
- 2018 Inducted into Purdue’s Book of Great Teachers
- 2021 Purdue Teaching Academy – Award for Exceptional Teaching and Instructional Support During the COVID-19 Pandemic (In-Person Learning Environment)
- 2023 University of Cincinnati College of Engineering: Professor of the Year – Chosen by the CEAS Tribunal
- 2023 American Institute of Medical and Biological Engineering – College of Fellows Member
- 2025 Faculty-to-Faculty Research Mentoring Award for CEAS

Research Interests

Professor Nauman is the director of the Human Injury Research and Regenerative Technologies (H.I.R.R.T.) Laboratory at the University of Cincinnati. Its mission is to explore the mechanisms that govern a variety of pathologies including traumatic brain injury (TBI), spinal cord injury (SCI), musculoskeletal damage, atherosclerosis, and cancer metastasis. In addition, we strive to develop novel protective and reconstructive treatment methods. We view this work as a collaborative enterprise and our focus is on improving the understanding of injury processes, and simultaneously developing treatments and delivery methods targeted directly to those damage mechanisms.

Some of our specific interests include:

- Human injury, especially sports injuries, traumatic brain injuries, spinal cord injuries, gunshot wounds and bruising
- Biofluids and fluid flow in porous media
- Computational methods applied to continuum mixture theory
- Mechanics of hierarchical materials
- Spine Mechanics and orthopaedic implant development
- Adult stem cell-based therapies for bone defects, osteoporosis, ligament and cartilage damage, adipose tissue augmentation, spinal cord injuries, glaucomatous degeneration, and head injuries.
- Tumor identification and treatment, especially via nanoparticles
- Tissue-engineered models of osteoporosis and glaucoma
- Medical informatics
- Biophysics and cell metabolism

Major Research Accomplishments

- Our first engineered tissue product has been used in humans to repair tendon damage in the shoulder: https://www.youtube.com/watch?v=VLAm_YUbsv8
- Co-authored landmark contributions to the field of traumatic brain injury.
- Seventeen United States patents to date.
- Purdue Research Foundation's *Innovators Hall of Fame*

Publications

Google Scholar

Citations: 10,685 (3,738 since 2020)

h-index: 54 (30 since 2020)

i10-Index: 128 (91 since 2020)

NCBI Library

<https://www.ncbi.nlm.nih.gov/myncbi/1FgadjsifFGkEp/bibliography/public/>

Peer-Reviewed Journals

1. Roy, R.V. and **Nauman, E.A.** *Noise-Induced Effects on a Nonlinear Oscillator*. Journal of Sound and Vibration. Vol. 183, No. 2: 269-95, 1995.

2. **Nauman, E.A.**, Chang, W.C.W., Satcher, R.L., and Keaveny, T.M. *Microscale Engineering Applications in Bone Adaptation*. Microscale Thermophysical Engineering. Vol. 2, No. 3: 139-172, 1998.
3. **Nauman, E.A.**, Risic, K.J., Keaveny, T.M., and Satcher, R.L. *Quantitative Assessment of Steady and Pulsatile Flow Fields in a Parallel Plate Flow Chamber*. Annals of Biomedical Engineering. Vol. 27: 194-199, 1999. PMID: 10199696
4. Haddock, S.M., Debes, J.C., **Nauman, E.A.**, Fong, K.E., Arramon, Y.P., and Keaveny, T.M. *Structure-Function Relationships for Coralline Hydroxyapatite Bone Substitute*. Journal of Biomedical Materials Research. Vol. 47: 71-78, 1999. PMID: 10400883
5. **Nauman, E.A.**, Fong, K.E., and Keaveny, T.M. *Dependence of Inter-Trabecular Permeability on Flow Direction and Anatomic Site*. Annals of Biomedical Engineering. Vol. 27: 517-524, 1999. PMID: 10468236
6. **Nauman, E.A.**, Satcher, R.L., Keaveny, T.M., Halloran, B.P., and Bikle, D.D. *Osteoblasts in Culture Respond to Pulsatile Fluid Flow with Short-Term Increases in PGE₂ Production but No Change in Proliferation or Mineralization*. Journal of Applied Physiology. Vol. 90: 1849-1854, 2001. PMID: 11299276
7. Bikle, D.D., Majumdar, S., Laib, A., Powell-Braxton, L., Rosen, C., Beamer, W., **Nauman, E.**, Leary, C., Halloran, B. *The Skeletal Structure of Insulin-Like Growth Factor-I Deficient Mice*. Journal of Bone and Mineral Research, Vol. 16, No. 12: 2320-2329, 2001. PMID: 11760848
8. **Nauman, E.A.**, Ebenstein, D.M., Hughes, K.F., Pruitt, L., Halloran, B.P., Bikle, D.D., and Keaveny, T.M. *Mechanical and Chemical Characteristics of Mineral Produced by bFGF-Treated Bone Marrow Stromal Cells In Vitro*. Tissue Engineering. Vol. 8, No. 6, 931-939, 2002. PMID: 12542939
9. Dee, K.C., **Nauman, E.A.**, Livesay, G.A., and Rice, J. *Research Report: Learning Styles of Biomedical Engineering Students*. Annals of Biomedical Engineering, Vol. 30: 1100-1106, 2002. PMID: 12449770
10. **Nauman, E.A.**, Sakata, T., Keaveny, T.M., Halloran, B.P., and Bikle, D.D. *bFGF Administration Lowers the Phosphate Threshold for Mineralization in Bone Marrow Stromal Cells*. Calcified Tissue International. Vol. 73: 147-152, 2003. PMID: 14565596
11. Gentleman, E.D., Lay, A.N., Dickerson, D.A., **Nauman, E.A.**, Livesay, G.A., and Dee, K.C. *Mechanical Characterization of Collagen Fibers and Scaffolds for Tissue Engineering*. Biomaterials, Vol. 24: 3805-3813, 2003. PMID: 12818553
12. Sander, E.A., Shimko, D.A., Dee, K.C., and **Nauman, E.A.** *Examination of Continuum and Micro-Structural Properties of Human Vertebral Cancellous Bone Using Combined Cellular Solid Models*. Biomechanics and Modeling in Mechanobiology. Vol. 2, No. 2: 97-107, 2003. PMID: 14586811
13. Sander, E.A., and **Nauman, E.A.** *Permeability of Musculoskeletal Tissues and Scaffolding Materials: Experimental Results and Theoretical Predictions*. Critical Reviews in Biomedical Engineering. Vol. 31, Issues 1-2, p. 1-26, 2003. PMID: 14964350
14. Shimko, D. A., White, K.K., **Nauman, E.A.**, and Dee, K.C. *A Device for Long-Term, In Vitro Loading of Three-Dimensional Natural and Engineered Tissues*. Annals of Biomedical Engineering. Vol. 31: 1347-1356, 2003. PMID: 14758925
15. Gentleman, E., **Nauman, E.A.**, Dee, K.C., Livesay, G.A. *Short Collagen Fibers Provide Control of Contraction and Permeability in Cell-Seeded Collagen Gels*. Tissue Engineering. Vol. 10, No. 3/4: 421-427, 2004. PMID: 15165459

16. Shimko, D.A., Burks, C.A., Dee, K.C., and **Nauman, E.A.** *Comparison of In Vitro Mineralization by Embryonic and Adult Stem Cells Cultured in an Osteogenic Medium.* Tissue Engineering. Vol. 10, No. 9/10, 1386-1398, 2004. PMID: 15588399
17. Sander, E.A., Alb, A.M, **Nauman, E.A.**, Reed, W.F., and Dee, K.C. *Solvent Effects on the Microstructure and Properties of 75/25 Poly(D,L-lactide-co-glycolide) Tissue Scaffolds.* Journal of Biomedical Materials Research. Vol. 70A, 506-513, 2004. PMID: 15293325
18. Rumancik, S., Routh, R.H., Pathak, R.D., Burshell, A.L., and **Nauman, E.A.** *Assessment of Bone Quantity and Distribution in Adult Lumbar Scoliosis: New DXA Methodology and Analysis.* Spine. Vol. 30, No. 4, p. 434-439, 2005. PMID: 15706341
19. Routh, R.H., Rumancik, S., Pathak, R.D., Burshell, A.L., and **Nauman, E.A.** *The Relationship Between Bone Mineral Density and Biomechanics in Patients with Osteoporosis and Scoliosis.* Osteoporosis International. Vol. 16, p. 1857-1863, 2005. PMID: 15999291
20. Shimko, D.A., Shimko, V.F., Sander, E.A., Dickson, K.F., and **Nauman, E.A.** *Effect of Porosity on the Fluid Flow Characteristics and Mechanical Properties of Tantalum Scaffolds.* Journal of Biomedical Materials Research B – Applied Biomaterials. Vol. 73B, p. 315-324, 2005. PMID: 15736288
21. Youn, I., Suh, J.-K. F., **Nauman, E.A.** and Jones, D.G. *Differential Phenotypic Characteristics of Heterogeneous Cell Populations in the Rabbit Periosteum.* Acta Orthopaedica Scandinavia. Vol. 75, No. 3, 442-450, 2005. PMID: 16156476
22. Lewus, K.E. and **Nauman, E.A.** *In vitro characterization of a bone marrow stem cell-seeded collagen gel composite for soft tissue grafts: effects of fiber number and serum concentration.* Tissue Engineering. Vol. 11, No. 7/8, 1015-1022, 2005. PMID: 16144437
23. Gentleman, E. Livesay, G.A., Dee, K.C and **Nauman, E.A.** *Development of Ligament-Like Structural Organization and Properties in Cell-Seeded Collagen Scaffolds In Vitro.* Annals of Biomedical Engineering. Vol. 34, No. 5, 726-736, 2006. PMID: 16463084
24. Sander, E.A., Downs, J.C., Hart, R.T., Burgoyne, C.F., and **Nauman, E.A.** *A Cellular Solid Model of the Lamina Cribrosa: Mechanical Dependence on Morphology.* Journal of Biomechanical Engineering. Vol. 128, No. 6, 879-889, 2006. PMID: 17154690
25. Gentleman, E., **Nauman, E.A.**, Livesay, G.A., and Dee, K.C. *Collagen Composite Biomaterials Resist Contraction While Allowing Development of Adipocytic Soft Tissue In Vitro.* Tissue Engineering. Vol. 12, No. 6, 1639-1649, 2006. PMID: 16846359
26. Kazakia, G.J., **Nauman, E.A.**, Ebenstein, D.M., Halloran, B.P., and Keaveny, T.M. *Effects of In Vitro Bone Formation on the Mechanical Properties of a Trabeculated Hydroxyapatite Bone Substitute.* Journal of Biomedical Materials Research. Vol. 77, No. 4, p. 688-699, 2006. PMID: 16514602
27. Livesay, G.A., Reda, D.R., and **Nauman, E.A.** *Peak Torque and Rotational Stiffness Developed at the Shoe-Surface Interface: The Effect of Shoe Type and Playing Surface.* American Journal of Sports Medicine. Vol. 34, No. 3, p. 415-422, 2006. PMID: 16399930
28. Shimko, D.A. and **Nauman, E.A.** *Development and Characterization of a Porous Poly-Methylmethacrylate (PMMA) Scaffold with Controllable Modulus and Permeability.* Journal of Biomedical Materials Research B – Applied Biomaterials. Vol. 80, No. 2, 360-369, 2007. PMID: 16838352
29. Gentleman, E., Dee, K.C, Livesay, G.A., and **Nauman, E.A.** *Operating Curves to Characterize the Contraction of Fibroblast-Seeded Collagen Gel/Collagen Fiber Composite*

- Biomaterials*. Plastic and Reconstructive Surgery. Vol. 119, No. 2, 508-516, 2007. PMID: 17230083
30. **Nauman, E.A.**, Ott, C.M., Sander, E., Tucker, D.L., Pierson, D., Wilson, J.W. and Nickerson, C.A. *A Novel Quantitative Biosystem to Model Physiological Fluid Shear Stress on Cells*. Appl Environ Microbiol, Vol. 73, No. 3, 699-705, 2007. PMID: 17142365
 31. Smith, L.J., Niziolek, P.J., Haberstroh, K.M., **Nauman, E.A.** and Webster, T.J. *Decreased Fibroblast and Increased Osteoblast Adhesion on Nanostructured NaOH-etched PLGA Scaffolds*. International Journal of Nanomedicine. Vol. 2, No. 3, 383-388, 2007. PMID: 18019837
 32. Smith, L.J., Swaim, J.S., Yao, C., Haberstroh, K.M., **Nauman, E.A.**, and Webster, T.J. *Increased Osteoblast Cell Density on Nanostructured PLGA-coated Nanostructured Titanium for Orthopedic Applications*. International Journal of Nanomedicine. Vol. 2, No. 3, 493-499, 2007. PMID: 18019847
 33. Galle, B. , Ouyang, H., Shi, R., and **Nauman, E.** *Correlations Between Tissue Level Stress and Cellular Damage within the Guinea Pig Spinal Cord White Matter*. J Biomech. Vol. 40, No. 13, 3039-3043, 2007.
 34. Feng, B., Li, B.Y., **Nauman, E.A.**, and Schild, J.H. *Theoretical and Electrophysiological Evidence for Axial Loading about Aortic Baroreceptor Nerve Terminals in Rats*. Am J Physiol Heart Circ Physiol. Vol. 293, No. 6, H3659-H3672, 2007. PMID: 17951369
 35. Dickerson, D.A., Sander, E.A., and **Nauman, E.A.** *Modeling the Mechanical Consequences of Vibratory Loading in the Vertebral Body: Microscale Effects*. Biomechanics and Modeling in Mechanobiology. Vol. 7, No. 3, 191-202, 2007. PMID: 17520305
 36. Ouyang, H., Galle, B., Li, J., **Nauman, E.**, and Shi, R. *Biomechanics of Spinal Cord Injury: A Multimodal Investigation Using Ex Vivo Guinea Pig Spinal Cord White Matter*. Journal of Neurotrauma. Vol. 25, No. 1, 19-29, 2008.
 37. Cook, D.D., **Nauman, E.**, and Mongeau, L. *Reducing the Number of Vocal Fold Mechanical Properties: Evaluating the Incompressibility and Planar Displacement Assumptions*. Journal of the Acoustical Society of America. Vol. 124, No. 6, 3888-3896, 2008.
 38. Ouyang, H., Galle, B., **Nauman, E.A.**, Shi, R. *Critical Roles of Decompression in Functional Recovery of Ex Vivo Spinal Cord White Matter*. Journal of Neurosurgery: Spine. Vol. 10, No. 2, 161-170, 2009.
 39. Routh, R.H., Nobes, K.M., Burshell, A.L., and **Nauman, E.A.** *The Effects of Anti-Resorptive Therapies and Estrogen Withdrawal in Adult Scoliosis Measured by Sub-Segmental Vertebral BMD Analysis*. Bone. Vol. 45, No. 2, 193-199, 2009. PMID: 19303956
 40. Cook, D.D., **Nauman, E.**, and Mongeau, L. *Ranking vocal fold model parameters by their influence on modal frequencies*. Journal of the Acoustical Society of America, Vol. 126, No. 4, 2002-2010, 2009.
 41. Susilo, M.E., Roeder, B., Voytik-Harbin, S., Kokini, K., and **Nauman, E.A.** *Development of a Three Dimensional Unit Cell to Model the Micromechanical Response of a Collagen-Based Extracellular Matrix*. Acta Biomaterialia. Vol. 6, No. 4, 1471-1486, 2010. PMID: 19913642
 42. Sander, E.A. and **Nauman, E.A.** *Effects of Reduced Oxygen and Glucose Levels on Ocular Cells, In vitro: Implications for Tissue Models*. Cells Tissues Organs. Vol. 191, No. 2, 141-151, 2010. PMID: 19641288
 43. Galle, B., Ouyang, H., Shi, R., and **Nauman, E.** *A Transversely Isotropic Constitutive Model of Excised Guinea Pig Spinal Cord White Matter*. Journal of Biomechanics. Vol. 43, No. 14, p. 2839-2843, 2010.

44. Ouyang, H., Sun, W., Fu, Y., Li, J., Cheng, J.X., **Nauman, E.A.**, and Shi, R. *Compression induces acute demyelination and potassium channel exposure in spinal cord*. Journal of Neurotrauma. Vol. 27, No. 6, p. 1109-1120, 2010. PMID: 20373847.
45. Alkabes, K.C., Hawkins, J.E., Miller, M.A., **Nauman, E.**, Widmer, W., Dunco, D., Kras, J., Couetil, L., Lescun, T., Gautam, R. *Evaluation of the effects of transendoscopic diode laser palatoplasty on clinical, histologic, magnetic resonance imaging, and biomechanical findings in horses*. American Journal of Veterinary Research. Vol. 71, No. 5, p. 575-582, 2010.
46. Strickland, C.G., Aguiar, D.E., **Nauman, E.A.**, and Talavage, T.M. *Development of subject-specific geometric spine model through use of automated active contour segmentation and kinematics constraint-limited registration*. Journal of Digital Imaging. Vol. 24, No. 5, p. 926-942, 2011. PMID: 20882395
47. Beier, B., Musick, K., Matsumoto, A., Panitch, A., **Nauman, E.A.**, and Irazoqui, P. *Toward a Continuous Intravascular Glucose Monitoring System*. Sensors, Vol. 11, No. 1, p. 409-424, 2011. PMID: 21096685
48. Raman, A., Trigueros, S., Cartagena, A., Stevenson, A.P., Susilo, M., **Nauman, E.A.**, and Contera, S.A. *Mapping Nanomechanical Properties of Live Cells Using Multi-Harmonic Atomic Force Microscopy*. Nature Nanotechnology. Vol. 6, No. 12, p. 809-814, 2011.
49. Deorosan, B. and Nauman, E.A. *The Role of Glucose, Serum, and Three-Dimensional Cell Culture on the Metabolism of Bone Marrow-Derived Mesenchymal Stem Cells*. Stem Cells International. 2011. PMID: 21603146
50. Butz, K.D., Chan, D.D., **Nauman, E.A.**, and Neu, CP. *Stress distributions and material properties determined in articular cartilage from MRI-based finite strains*. Journal of Biomechanics. Vol. 44, No. 15, p. 2667-2672, 2011. PMID: 21920526
51. Alipour, F., Brucker, C., Cook, D.D., Gommel, A., Kaltenbacher, M., Mattheus, W., Mongeau, L., **Nauman, E.**, Schwarze, R., Tokuda, I., Zorner, S. *Mathematical Models and Numerical Schemes for the Simulation of Human Phonation*. Current Bioinformatics. Vol. 6, No. 3, p. 323-343, 2011.
52. Breedlove, E.L., Robinson, M., Talavage, T.M., Morigaki, K.E., Yoruk, U., O'Keefe, K., King, J., Leverenz, L.J., Gilger, J.W., **Nauman, E.A.** *Biomechanical Correlates of Symptomatic and Asymptomatic Neurophysiological Impairment in High School Football*. Journal of Biomechanics. Vol. 45, No. 7, p. 1265-1272, 2012. PMID: 22381736
53. Schaffer, J.E., **Nauman, E.A.**, and Stanciu, L.A. *Cold-Drawn Bioabsorbable Ferrous and Ferrous Composite Wires: An Evaluation of Mechanical Strength and Fatigue Durability*. Metallurgical and Materials Transactions B. Vol. 43, No. 4, p. 984-994, 2012.
54. Bell, B.J., **Nauman, E.A.**, Voytik-Harbin, S.L. *Multiscale Strain Analysis of Tissue Equivalents Using a Custom-Designed Biaxial Testing Device*. Biophysical Journal, Vol. 102, No. 6, p. 1303-1312, 2012.
55. Van Dyke, W.S., Sun, X., Richard, A.B., **Nauman, E.A.**, and Akkus, O. *Novel Mechanical Bioreactor for Concomitant Fluid Shear Stress and Substrate Strain*. Journal of Biomechanics, Vol. 45, No. 7, p. 1323-1327, 2012. PMID: 22356846
56. Butz, K.D. Merrell, G., and **Nauman, E.A.** *A Biomechanical Analysis of Finger Joint Forces and Stresses Incurred During Common Daily Activities*. Computer Methods in Biomechanics and Biomedical Engineering. Vol. 15, No. 2, p. 131-140, 2012. PMID: 21711164

57. Butz, K.D., Merrell, G. **Nauman, E.A.** *A three-dimensional finite element analysis of finger joint stresses in the MCP joint while performing common tasks.* Hand. Vol. 7, p. 341-345, 2012. PMID: 23997746
58. Schuff, M.M., Gore, J.P., and **Nauman, E.A.** *A Mixture Theory Model of Fluid and Solute Transport in the Microvasculature of Normal and Malignant Tissues, I, Theory.* Journal of Mathematical Biology, Vol. 66, No. 6, p. 1179-1207, 2013. PMID: 22526836
59. Bailes, J.E., Petraglia, A.L., Omalu, B.I., **Nauman, E.**, Talavage, T. *Role of Subconcussion in Repetitive Mild Traumatic Brain Injury.* Journal of Neurosurgery. Vol. 119, No. 5, p. 1235-1245, 2013.
60. Ouyang, H., **Nauman, E.**, and Shi, R. *Contribution of Cytoskeletal Elements to the Axonal Mechanical Properties.* J. Biol. Eng. Available Online 2013. PMID: 24007256.
61. Whittington, C.F., Brandner, E., Teo, K.Y., Han, B., **Nauman, E.**, and Voytik-Harbin, S.L. *Oligomers Modulate Interfibril Branching and Mass Transport Properties of Collagen Matrices.* Microscopy and Microanalysis. Vol. 19, No. 5, p. 1323-1333, 2013.
62. Schuff, M.M., Gore, J.P., and **Nauman, E.A.** *A Mixture Theory Model of Fluid and Solute Transport in the Microvasculature of Normal and Malignant Tissues, II, Factor Sensitivity Analysis, Calibration, and Validation.* Journal of Mathematical Biology. Vol. 67, No. 6-7, p. 1307-1337, 2013. PMID: 23108729
63. Schaffer, J.E., **Nauman, E.A.**, and Stanciu, L.A. *Cold drawn bioabsorbable ferrous and ferrous composite wires: An evaluation of in vitro vascular cytocompatibility.* Acta Biomaterialia. Vol. 9, No. 10, p. 8574-8584, 2013. PMID: 22885027
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144. Issa, S.F., Issa, M.S., **Nauman, E.**, Wassgren, C., Schwab, C., Ahsan, Z. S., Nour, M., and Field, W. *Tensile Force Limits of the Sheep Spine: Comparison to Forces Required to Extricate Grain Entrapped Victims*. J Agromedicine. Vol. 30, No. 1, pp. 49-56, 2025.
145. Horasan, M., Verner, K.A., Yang, H., Main, R.P., and **Nauman, E.A.** Computationally Derived Endosteal Strain and Strain Gradients Correlate with Increased Bone Formation in an Axially Loaded Murine Tibia Model. J Mech Behav Biomed Mater. 2024.
146. Xu, X., Golz, B.T., Flannery, B.T., Gallant, M.A., Bullock, W.A., Bellido, T.M., **Nauman, E.A.**, Voytik-Harbin, S.L., Little, D., and Main, R.P. *The Development of a Collagen-Nanoscale Hydroxyapatite Three Dimensional (3D) In Vitro Culture System for Reproducing Osteocyte Differentiation and Tissue Mineralization*. Biomaterials, 2025.
147. Horasan, M., Verner, K.A., Main, R.P., and **Nauman, E.A.** *Characterization of Strains Induced by In Vivo Locomotion and Axial Tibiotarsal Loading in a Chukar Partridge Model*. Bone. Vol. 196, 2025.
148. Diorio, T. C., Abderezzai, J., **Nauman, E.**, Kurt, M., Tong, Y., Rayz, V.L. *MRI-Based Quantification of Cardiac-Driven Brain Biomechanics for Early Detection of Neurological Disorders*. Manuscript in Review.
149. Boles, C.R., Gunatilaka, C.C., Xiao, Q. Woods, J.C., Kingma, P.S., Higano, N.S., **Nauman, E.A.**, and Bates, A.J. *Tracheal Work of Breathing in Neonates with Tracheoesophageal Fistula Before and After Surgical Repair via Computational Fluid Dynamics Assessment*. J Pediatr Surg. Vol. 60, No. 12, 2025.
150. Taleghani, E.R., Bucherl, S., Davenport, R., Hale, I., **Nauman, E.**, and Ozer, K. *Effect of Edema on Flexor Tendon Tensile Forces Following Zone II Repair: A Biomechanical Analysis in a Cadaveric Model*. J Hand Surg Am. 2026.
151. Bucherl, S., McIver, K.G., Hu, S., Boles, C. Talavage, T. and **Nauman, E.A.** *Impact Mitigation in Modern Football Helmets: Advances and Limitations of Position-Specific Designs*. J Vis Exp. 2026.
152. Izhiman, Y., Anamala, C., **Nauman, E.A.** and Liaudanskaya, V. *Recreating the Human Brain: Are Assembloids Merely Descriptive Models?* Frontiers in Cellular Neuroscience. 2026.
153. Davis, Z. R., Gossett, P.C., Wilson, R.L., Kim, W., Mei, Y., Butz, K.D., Emery, N.C., **Nauman, E.A.**, Avril, S., Neu, C.P., and Chan, D.D. *Intervertebral Disc Elastography to Relate Shear Modulus and Relaxometry in Compression and Bending*. Bioengineering. Vol. 13, 2026.

Lecture Books and Text Books

1. **Nauman, E. A.**, Butz, K., Krousgrill, C. M., Atkinson, D., Susilo, M., and Murphy, M. **Forces, Moments and Stress in the Mechanical World**. 639 pages, 1st – 3rd Editions, 2014.
2. **Nauman, E.A.**, Butz, K., Auger, J., and Susilo, M. **Statics, Dynamics, and Basic Concepts of Stress in Analysis and Design**. 1st Edition, 2022.

Book Chapters

1. Arramon, Y.P. and **Nauman, E.A.** *The Intrinsic Permeability of Cancellous Bone*. Bone Mechanics, 2nd Edition. Edited by Stephen Cowin. CRC Publishing. 2001.
2. Gentleman, E., Livesay, G.A., Dee, K.C., and **Nauman, E.A.** *Tissue Engineering, Ligament*. Encyclopedia of Biomaterials and Biomedical Engineering. 2004.

3. Burshell, A.L. and **Nauman, E.A.** *Adult Scoliosis, Degenerative Disease, and BMD: A Subsegmental Analytic Approach. Osteoporosis*, 3rd Edition. Edited by Marcus, R., Feldman, D., Nelson, D.A., and Rosen, C.J. Academic Press, 2007.
4. Butz, K.D., Chan, D.D., Neu, C.P., and **Nauman, E.A.** Noninvasive Determination of Material Properties for Biological Materials. CRC Handbook of Imaging in Biological Mechanics. 2014.
5. **Nauman, E.A.** and Talavage, T.M. *Subconcussive Trauma. Handbook of Clinical Neurology*. 2018. PMID: 30482352

Invited Lectures and Policy Statements

1. **Nauman, E.A.** *Damage Repair in Compact and Trabecular Bone: Functional Characterization*. Sponsored by the LSU Civil Engineering Department - Center for Micromechanics and Damage of Advanced Composite Materials Planning Symposium. 2001.
2. **Nauman, E.A.** *Short-Term and Long-Term Effects of Fluid Flow on Osteoblast Differentiation*. Fluid Flow in Bone Workshop, Phoenix, AZ, 2001.
3. Livesay, G.A., Suh, J-K.F., Dee, K.C., **Nauman, E.A.** *Current Challenges in the Design and Characterization of Materials for Orthopaedic Tissue Engineering: Tendons/Ligaments*. At the 6th Annual Orthopaedic Tissue Engineering Conference pre-conference symposium, May, 2002.
4. Suh, J-K.F., Livesay, G.A., **Nauman, E.A.**, Dee, K.C. *Current Challenges in the Design and Characterization of Materials for Orthopaedic Tissue Engineering: Cartilage*. at the 6th Annual Orthopaedic Tissue Engineering Conference pre-conference symposium, May, 2002.
5. Suh, J-K.F., Livesay, G.A., **Nauman, E.A.**, Dee, K.C. *Current Challenges in the Design and Characterization of Materials for Orthopaedic Tissue Engineering: Tendon-Bone Interface*. At the 6th Annual Orthopaedic Tissue Engineering Conference pre-conference symposium, May, 2002.
6. **Nauman, E.A.**, Dee, K.C., Suh, J-K.F., Livesay, G.A. *Current Challenges in the Design and Characterization of Materials for Orthopaedic Tissue Engineering: Bone*. At the 6th Annual Orthopaedic Tissue Engineering Conference pre-conference symposium, May, 2002.
7. Dee, K.C., **Nauman, E.A.**, Livesay, G.A., Suh, J-K.F. *Current Challenges in the Design and Characterization of Materials for Orthopaedic Tissue Engineering: Cell-Biomaterial Interactions*. At the 6th Annual Orthopaedic Tissue Engineering Conference pre-conference symposium, May, 2002.
8. **Nauman, E.A.**, Dee, K.C., and Livesay, G.A. *Benefits and Challenges of Active Learning: Experiences at Tulane University*. American Society of Mechanical Engineers/International Mechanical Engineering Congress and Exposition, Nov. 17-22, New Orleans, LA 2002.
9. **Nauman, E.A.**, Talavage, T., Breedlove, E., Robinson, M., Yoruk, U., Morigaki, K., and Leverenz, L. *Detecting TBI – sideline assessment and clinical evaluation*. 1st Annual Midwestern Conference on Traumatic Brain Injury, 2010.
10. Schuff, M.M., Gore, J.P., and **Nauman, E.A.** *A volume fraction-based mixture theory model to predict capillary level transport of nanoparticles in tumors*. InterPore Conference, Texas A&M, 2010.
11. Morigaki, K.E., Breedlove, E.L., **Nauman, E.A.**, Talavage, T.M., Leverenz, L.J., Zakrajsek, A.E., Robinson, M.E., Yoruk, U., and Butz, K. *Predictive Modeling of Cognitive*

- Impairments from Head Trauma*. Keynote Lecture at the 2011 EATA Convention, Philadelphia, PA, January 8-10, 2011
12. **Nauman, E.A.**, Breedlove, E.L., Morigaki, K.E., Talavage, T.M., Leverenz, L.J., Zakrajsek, A.E., Robinson, M.E., Yoruk, U., and Butz, K. *Traumatic Brain Injury: Comparing Military to Civilian Trauma*. Presentation to the National Academy of Sciences, 2011.
 13. TM Talavage, EL Breedlove, KE Morigaki, ME Robinson, RD Ranaweera, **E.A. Nauman**, LJ Leverenz, *fMRI Assessment of Effects of Technique on Neurological Impairment in High School Football Players*. 19th Annual Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine, Montreal, Quebec, Canada, May 2011, CD-ROM #3642
 14. Leverenz, L.J., **Nauman, E.A.**, Talavage, T.M. *Use of Computer-Based Neurocognitive Testing to Identify Impairments in Patients Without Symptoms*. 2011 Big Sky Athletic Trainer and Sports Medicine Conference, Big Sky, MT, February 1, 2011.
 15. Leverenz, L.J., **Nauman, E.A.**, Talavage, T.M. *Can We Play Football Safely? Lessons learned from studying High School football players,* Science on Tap Lafayette, Lafayette, IN, April 21, 2011.
 16. Leverenz, L.J., **Nauman, E.A.**, and Talavage, T.M. *CRASH: High School Football Head Injuries*, Purdue University President's Council "Back to Class," September 30, 2011.
 17. **Nauman, E.A.** *The Role of the University in Social Entrepreneurship and Technology Development: The Experience at Purdue University*. Keynote Address at Congreso XI La Investigacion en Pontificia Universidad Javeriana, Bogota, Colombia. September 20-23, 2011.
 18. **Nauman, E.A.**, Leverenz, L, and Talavage, T. *Neurology and Neurotrauma Research at Purdue*. Big Ten/CIC Head Injury Summit. Chicago, IL April 30, 2011.
 19. Talavage, T.M. and **Nauman, E.A.** *Biomechanical Linkage of History of Head Collisions to Neurophysiological Impairments in High School Athletes*. 2011 Big Sky Athletic Trainer and Sports Medicine Conference, Big Sky, MT, February 2, 2012.
 20. Leverenz, L., and **Nauman, E.A.**, and Talavage, T. *Sub-concussive Impacts in High School Athletes*. Science with a Twist – Indianapolis, IN February 20, 2014.
 21. **Nauman, E.A.**, Leverenz, L.J., and Talavage, T. M. *Redefining Traumatic Brain Injury – Prevention, Protection, Repair and the Link Between Biomechanics and Neuroimaging*. Society for Brain Mapping and Therapeutics Annual Congress, March 6-8, Los Angeles, CA, 2015
 22. **Nauman, E. A.** Implementation of Novel Teaching Methodologies - Successes and Challenges in First and Second Year Engineering at Purdue. Mid Years Engineering Experience Conference: From Slump to Jump! Texas A&M, March 22-24, 2015.
 23. Talavage, T. and **Nauman, E.A.** *Application of Structural Health Monitoring for Characterization, Treatment, and Prevention of Repetitive Strain Injuries in the Brain*. Concussion Neuroimaging Symposium, Lincoln, NE, October 20, 2015.
 24. Leverenz, L., **Nauman, E.A.**, and Talavage, T. *Heads Up: Concussion in Contact Sports*. 2016 Indiana Academy of Science Annual Meeting. Indianapolis, IN March 26, 2016.
 25. Leverenz, L. **Nauman, E.A.** and Talavage, T. *Engineering Healthier Brains and Beyond*. Purdue University President's Council Pregame. West Lafayette, IN November 19, 2016.
 26. Talavage, T.M., **Nauman, E.A.**, and Hannemann, R.E. *What Do We Do About Contact Sports?* Developmental and Behavioral News. Section on Developmental and Behavioral Pediatrics. American Academy of Pediatrics. Vol. 26, No. 1, p 3-5, 2016.

Granted Patents

1. **8,702,809** (2014) *Demineralized Cancellous Bone Scaffolds* - The present invention provides a cancellous bone scaffold to use in the replacement or repair of connective tissue such as ligaments and tendons. The cancellous bone scaffold has a fully demineralized segment with at least one adjacent mineralized end segment.
2. **8,764,688** (2014) *Therapeutic Method and Apparatus Using Mechanically Induced Vibration* - A sleeve that provides mechanical stimulation to the arm to prevent bone density loss. A primary goal of this product is to prevent bone density loss that occurs during extended space travel. For one embodiment, only the predefined frequency specifications had to be met (between 40 Hz and 60 Hz). By meeting these frequencies for a duration of 30 minutes the product will theoretically prevent the loss of bone density. Additionally, clinical trials will need to be conducted before this product can be marketed. The product includes of several mechanical vibrators attached to a sleeve. The vibrators are small unbalanced-mass motors which are similar to those found in cell phones. The motors are encased in dome shaped housings designed to reduce lateral vibrations along the arm. The product is controlled using an Arduino board attached to the sleeve that actuates the motors. The motors, in turn, provide the specified frequency to the arm for 30 minutes. The spacing of the motor housings was determined from PEA simulations. This resulted in the motors being spaced 2 in apart along the arm at 90.degree. increments around the axis of the arm. The controller has a display that allows for user interaction and includes a session timer. In addition, this product is contemplated for use in reducing muscle atrophy, eliminating bed sores, and treating other ailments that can result from sedentary behavior.
3. **9,056,983** (2015) *Dynamic Load-Absorbing Materials and Articles* - A compound for protection of an object from a blast or shock wave. The compound includes a matrix material and at least a first and second sets of inclusions in the matrix material that differ in size, quantity, shape and/or composition in a direction through the impact-absorbing material, the combination of which contributes to the ability of the material to exhibit at least one property that changes as the inclusions are deformed in response to a blast or shock wave.
4. **9,155,607** (2015) *Compositions and Methods for Repair or Regeneration of Soft Tissue* - Disclosed are bioscaffolds and methods for use in soft tissue repair. This patent focused on general soft tissues, as opposed to orthopaedic interfaces, and includes the use of a bioactive agent.
5. **9,364,584** (2016) *Demineralized Cancellous Bone Scaffolds* - The present invention provides a cancellous bone scaffold to use in the replacement or repair of connective tissue such as ligaments and tendons. The cancellous bone scaffold has a fully demineralized segment with at least one adjacent mineralized end segment.

6. **9,394,959** (2016) *Dynamic Load-Absorbing Material and Articles* - Dynamic load-absorbing materials suitable for use as cushion-type and armor-type materials, for example, of types that can be incorporated into protective gear, equipment, armor, vehicles, and various other structures, or used for the isolation and dissipation of vibratory loads, such as vibration isolators used to support avionic equipment. The impact-absorbing materials include a matrix material (22) and at least first and second sets of inclusions (which can be either included material or voids) (24) in the matrix material (22) that define a hierarchy of inclusions (24) in the matrix material (22). The inclusions (24) differ in size, quantity, shape and/or composition in a direction through the impact-absorbing material, the combination of which contributes to the ability of the material to exhibit at least one property that changes as the inclusions (24) are deformed under load.
7. **9,839,250** (2017) *Dynamic Load-Absorbing Material and Articles* - A double-shell helmet designed to absorb considerably more energy than traditional helmets. The double-shell helmet includes an outer shell, an impact absorbing material layer affixed to the outer shell on a first side of the impact absorbing material layer, an inner shell affixed to the impact absorbing material layer on a second side of the impact absorbing material layer opposite the first side of the impact absorbing material layer, and a foam layer affixed to the inner shell.
8. **10,183,423** (2019) *Method of Making a Blast or Shock Wave Mitigating Material* - A compound for protection of an object from a blast or shock wave. The compound includes a matrix material and at least a first and second sets of inclusions in the matrix material that differ in size, quantity, shape and/or composition in a direction through the impact-absorbing material, the combination of which contributes to the ability of the material to exhibit at least one property that changes as the inclusions are deformed in response to a blast or shock wave.
9. **10,665,868** (2020) *Electrochemical Cells and Batteries* - We developed a type of battery that does not require a membrane to separate the electrolytes. Because the fluids are immiscible, the battery is easy to set up and can be run in a static configuration or as a flow battery.
10. **10,675,512** (2020) *Technologies for a Sport Ball and for Evaluation of Handling a Sport Ball* - This invention consists of an array of sensors integrated into a basketball (but could easily be replicated in another kind of sport ball) that tracks the motion of the ball and the pressure exerted on it. Moreover, the sensors can tell where and when the pressure is applied, making it possible to quantify proper ball handling in different aspects of the game.
11. **10,857,006** (2020) *Lower Leg Prosthetic System and Devices* - This goal of this effort was to develop a low-cost prosthetic that allowed safe rotations at the ankle, making movement on uneven surfaces simpler and safer.

12. **10,898,331** (2021) *Bioresorbable Porous Metals for Orthopaedic Applications* – This material is a porous combination of iron and manganese that solves a number of problems for orthopaedic repairs. Unlike magnesium-based materials, this one breaks down slowly over time and, depending on the ratio of iron to manganese, the size of the breakdown products can be controlled. Its porous structure is also useful for most pinning or securing procedures because the bone has a chance to grow into the implant and take on the mechanical loading while the metal degrades.
13. **10,948,489** (2021) *Method of Detecting a Substance* – This multi-sensor array includes a novel method for attaching antibodies and detecting very small quantities of a protein in a fluid environment. This technique makes it possible to quickly and accurately measure proteins such as those that might cross the blood-brain barrier during a head injury.
14. **10,966,816** (2021) *Connective Tissue to Bone Interface Scaffolds* – This patent is a refinement of previous patents that describe the attachment of soft tissues to bone. In this case, it focuses on the repair of shoulder tendons.
15. **11,654,012** (2023) *Connective Tissue to Bone Interface Scaffolds*. A specialized application of our previous work on repairing the hard tissue to soft tissue transition for orthopaedic applications. Herein we targeted the enthesis of shoulder tendons.
16. **12,041,984** (2024) *Padding Materials for Protective Products and Methods of Producing the Same*. This patent develops the methods necessary to integrate padding materials into fabrics, making it possible to create custom, conforming padding materials for athletes, soldiers, or the elderly.
17. **12,171,903** (2024) *Bioresorbable Porous Metals for Orthopaedic Applications*. Extending our work on resorbable metals, we focused on a particular method that uses salt particles to create the voids. Similar to methods used for polymers, the challenge is that you have to carefully control the temperature, so you sinter the metal without eliminating the salt. Once everything has cooled, the salt can be removed with a simple series of water rinses.

Funding History

Awarded and Pending

1. (PI) PHS-NIH NATIONAL EYE INSTITUTE An In-Vitro Model of Intraocular Pressure-Mediated Damage to the Optic Nerve Head (Awarded) 7/8/2004 \$422,722.00
2. (PI) PURDUE RESEARCH FOUNDATION: XRGRANT Mechanical insults to the Spinal Cord-Experimental and Computational Evaluation (Awarded) 2005 \$15,292.00.
3. (CO-PI) BIOMET INC. In-Vivo Evaluation of Orthopedic Device Coatings (PI) Breur, Gert J. (Awarded as 201523) 10/27/2005 \$84,492.00.
4. CO-PI) NATIONAL SCIENCE FOUNDATION Dual Beam Scanning Electron Microscope for Hydrated and Soft Material Applications (PI) McCann, Maureen C. (Awarded as 101151) 8/11/2006 \$53,840.00.
5. (PI) EMBEDDED CONCEPTS LLC Embedded Concepts - Project 1A (Awarded as 201025) 10/12/2006 \$16,775.00.

6. (PI) BRET A FERREE Stem Cell Response to Nucleus-Derived Bioscaffolds (Awarded as 202166) 1/8/2007 \$28,261.00.
7. (PI) ANOVA Biomechanical Testing of Motion Segments (Awarded as 202161) 1/17/2007 \$27,577.00.
8. (CO-PI) UNIVERSITY OF PITTSBURGH MEDICAL CENTER Hybrid Model of Vocal Fold Inflammation and Tissue Mobilization (PI) Siegmund, Thomas H. (Awarded as 102859) 11/20/2007 \$41,343.00.
9. (PI) NANOVIS INCORPORATED In Vitro Optimization of Nanohydroxyapatite Particle Concentration (Awarded as 202811) 12/5/2007 \$9,000.00.
10. (PI) HILL ROM INDUSTRIES Hill-Rom Foam Validation Study (Awarded as 202842) 12/21/2007 \$11,994.00.
11. (PI) HILL ROM INDUSTRIES Hill-Rom Foam Validation Study (Awarded as 202842) 12/21/2007 \$17,991.00.
12. (PI) TRASK TRUST FUND Tissue-Engineered Interfaces for the Musculoskeletal System-Noninvasive Ligament and Tendon Repairs (Awarded as 202599) 8/29/2007 \$40,000.00.
13. (PI) PURDUE RESEARCH FOUNDATION – TRASK FOUNDATION Development of a Novel Ligament Replacement. 8/1/2007 – 7/13/2009, \$40,000.
14. (PI) LILLY ENDOWMENT Development of a Novel Finger Joint Replacement. 1/1/2007-12/31/2008, \$50,000.
15. (PI) GEORGE WASHINGTON CARVER FELLOWSHIP Smith, Lester, J. (Awarded) 6/23/2005 - 1/11/2008 \$20,000.00.
16. (PI) MERRELL MD, DR. GREG Design and Manufacture of a Novel Fracture Fixation Device for Upper Extremities (Awarded as 203191) 6/12/2008 \$3,713.00.
17. (Co-I) NSF-S-STEM. Purdue Scholarship Program in Quantitative Physiology (PI) Ed Bartlett. 1/1/2008 – 12/31/2011, \$600,000.
18. (CO-PI) NATIONAL SCIENCE FEDERATION Engineering issues in Understanding Human Speech (PI) Plesniak, Michael W. (Awarded as 103256) 8/14/2008 \$67,143.90.
19. (PI) AMIPURDUE Tissue Scaffold for Tissue Engineered Orthopedic Interfaces (Awarded as 203352) 8/22/2008 \$62,494.50.
20. (CO-PI) UNIVERSITY OF PITTSBURGH MEDICAL CENTER Hybrid Model of Vocal Fold Inflammation and Tissue Mobilization (PI) Siegmund, Thomas H. (Awarded as 102859) 8/25/2008 \$39,511.20.
21. (PI) NANOVIS INCORPORATED Commercialization of NVS COC-31: Nano-Implants Strengthening Bones at Risk of Imminent Fracture (Awarded as 203664) 7/28/2009 \$495,279.00.
22. (CO-PI) IN STATE DEPARTMENT OF HEALTH Predictive Modeling of Cognitive Impairment from Head Trauma In Collegiate Football Players (PI) Talavage, Thomas M. (Awarded as 203753) 3/17/2009 \$30,000.00.
23. (PI) AMIPurdue Tissue Scaffold: Cartilage Application (Awarded as 203352) 8/14/2009 \$102,340.00.
24. CO-PI UNIVERSITY OF PITTSBURGH Hybrid Model of Vocal Fold Inflammation & Tissue Mobilization (PI) Siegmund, Thomas H. (Awarded as 102859) 9/8/2009 \$40,209.50.
25. (PI) AMIPURDUE AMI-Fractal Foam Helmet Padding Technology (Awarded as 204662) 7/23/2010 \$39,052.00.

26. (CO-PI) UNIVERSITY OF PITTSBURGH Hybrid Model Of Vocal Fold Inflammation And Tissue Mobilization (PI) Siegmund, Thomas H. (Awarded as 102859) 5/6/2010 \$43,519.00.
27. (CO-PI) STEVENS INSTITUTE OF TECHNOLOGY NSF – *Engage Proposal* (PI) Kokini, Klod (Awarded as 105725) 11/29/2011 \$2,400.00.
28. (PI) SIMBEX *Characterization of an Assessment System for Head Trauma in High School Football Players* (Awarded as 204924) 12/13/2010 \$20,903.20.
29. (PI) TRASK TRUST FUND *Evaluation of a Multi-scale Polymer-Based Armor for the Dissipation of Blast Waves* (Awarded as 205358) 7/6/2011 \$50,000.00.
30. (CO-PI) NATIONAL SCIENCE FOUNDATION *Stress Distributions Determined in Short T2 Biomaterials by MRI-Based Finite Strain and Mathematical Modeling* (PI) Neu, Corey P. (Awarded as 105239) 4/1/2011 \$144,000.00.
31. (CO-PI) INDIANA CLINICAL AND TRANSLATIONAL SCIENCES INSTITUTE Spinal Cord and Brain Injury Research Fund, *Predictive Modeling of Cognitive Impairment from Head Trauma in High School Athletes*, (CO-PI) Talavage, Thomas M. and Leverenz, Larry J. (Awarded as 105300) 8/1/2011 \$120,000.
32. (CO-PI) PURDUE UNIVERSITY SPECIAL INITIATIVE PROGRAM *Bilsland Strategic Initiatives Fellowships/Assistantships – Graduate School* (Awarded as 401351) 5/1/2012 \$20,894.00.
33. (CO-PI) MASSACHUSETTS INST. OF TECH. LINCOLN LAB *Multi-Model Early Detection Interactive Classifier (Medic) System for Mid Traumatic Brain Injury (TBI) Assessment* (PI) Talavage, Thomas M. (Awarded as 106136) 8/28/2012 \$8,750.00.
34. (PI) INDIANA CLINICAL AND TRANSLATIONAL SCIENCES INSTITUTE *Developing an Animal Model of Acute Rotator Cuff Disease* 2012 \$9,935.00.
35. (CO-PI) PURDUE UNIVERSITY *Big Ten Athletic Conference/CIC/Ivy League Conference Intercollegiate and Inter-Conference Traumatic Brain Injury Research Collaboration* (PI) Talavage, Thomas (Awarded as 206549) 1/1/2013 \$100,000.00.
36. (CO-PI) PURDUE UNIVERSITY PRF *XR Research Grant* (PI) Buckius, Richard O. (Awarded as 206733) 6/1/2013 \$24,533.00.
37. (PI) MATHWORKS *Mathworks Proposals for Innovative Curricula: Integrating Computation Into Mechanical Engineering Core* (CO-PI) Magana DeLeon, Alejandra (Awarded as 206946) 8/6/2013 \$40,000.00.
38. (CO-PI) PHS-NIH NAT INST ARTHRIT, MUSCUL, SKIN DIS *Biomechanics of Human Articular Cartilage Measured in Vivo* (PI) Neu, Cory P. (Awarded as 106982) 4/11/2014 \$40,525.40.

39. (CO-PI) NATIONAL INSTITUTES OF HEALTH A 3D *Co-Culture System for Examining Osteocyte-Osteoblast Interactions and Response to Physical Stimuli* (PI) Main, Russell P. (Awarded as 107017) 4/30/2014 \$43,736.30.
40. (CO-PI) GENERAL ELECTRIC GE HEALTHCARE *Enhanced Imaging of Neurotrauma Associated with Head Trauma in High School Collision Sports* (PI) Talavage, Thomas M. (Awarded as 207228) 6/4/2014 \$30,000.00
41. (CO-PI) PHS-NIH INST NEURO DISORDERS, STROKES – *Biomechanics of Blast Injury* (PI) Shi, Riyi (Awarded as 107302) 9/3/2014 \$80,229.20.
42. (PI) ALLOSOURCE AlloSource – *Early Phase Validation* (CO-PI) Dickerson, Darryl (Awarded as 207476) 7/2/2014 \$20,000.00.
43. (PI) PURDUE RESEARCH FOUNDATION *PRF Portion AlloSource – Early Phase Validation* (CO-PI) Dickerson, Darryl (Awarded as 207478) 3/31/2014 \$20,000.00.
44. (CO-PI) BRAINSCOPE – *Acute Concussion Triage Using Portable EEG Assessment Trained with Imaging Biomarkers of Injury* (PI) Talavage, Thomas M. (Awarded as 207580) 6/2/2014 \$300,000.00.
45. (CO-PI) ALLIED MILK PRODUCERS – *Nutritional Intervention for Repetitive Subconcussive Events*. August 1, 2016 – May 31, 2017, \$100,000.
46. (CO-I) NSF – *Mechanobiological Regulation in Cortical Bone in Vertebrates*. June 1, 2015 – May 31, 2020. \$373,388.
47. (CO-I) INDIANA STATE DEPARTMENT OF HEALTH – *MRI Validation for ISDH HBOT Project*. June 5, 2019 – June 30, 2020. \$511,946.
48. (CO-I) NATIONAL ENDOWMENT FOR THE HUMANITIES – *Integrating the Humanities and Global Engineering*. 2020. \$35,000.
49. (PI) US ARMY RESEARCH LABORATORY. *Improving Numerical Models of Blast Effects on Soldiers Through Efficient Model Development and Finite Element Mesh Generation* August 15, 2021-August 14, 2022, \$450,000.
50. (PI) CORVID and AFWERX. *Positioning and Scaling of the CAVEMAN Human Body Model for Pilot Injury Risk Analysis*. 9/8/2020-12/31/2021. \$75,000.
51. (PI) CORVID and AFWERX. *SBIR Phase II: Bio-mathematical Models of Aggregated Tissues & Organ Properties – Extension to Brain Tissue*. 6/1/2021 - 5/31/2023, \$134,000

Professional Memberships

(Past and Present)

American Institute for Medical and Biological Engineering, Fellow; American Society of Mechanical Engineers, Associate Member; Biomedical Engineering Society, American Society of Bone and Mineral Research, American Society for Engineering Education, Tau Beta Pi National Engineering Honor Society, Pi Tau Sigma Mechanical Engineering Honor Society, National Society of Black Engineers, National Neurotrauma Society, Association for Research in Vision and Ophthalmology.

Teaching Philosophy

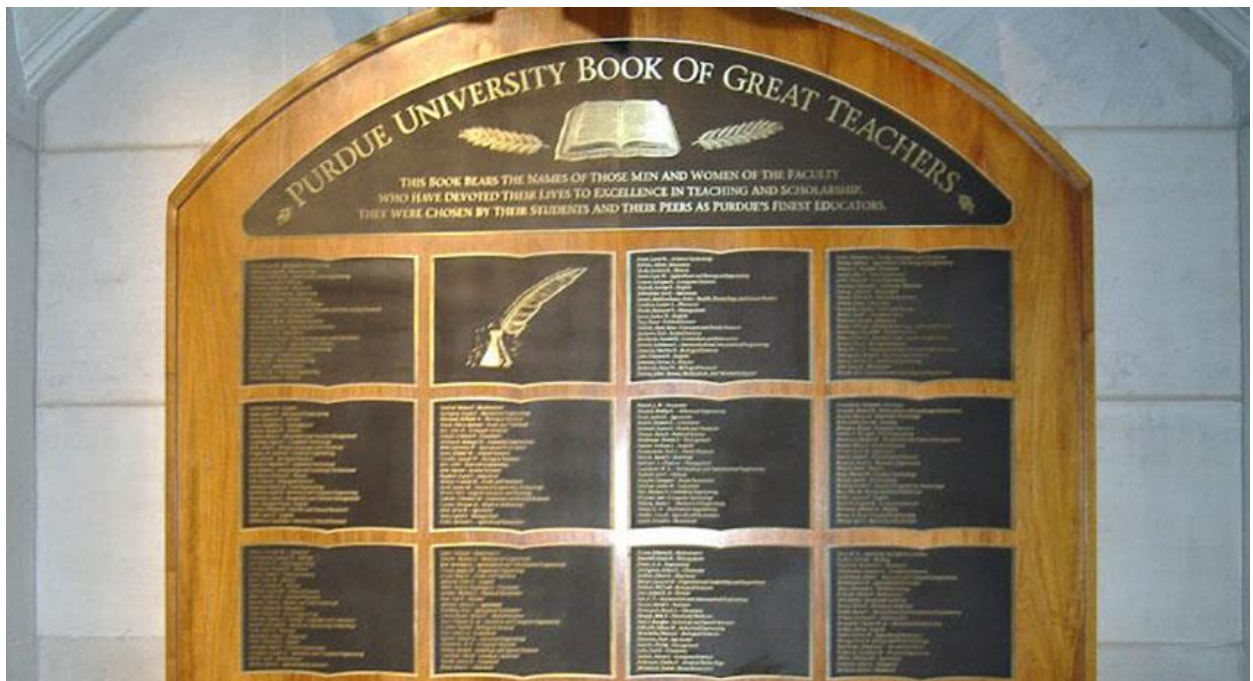
Teaching is fundamentally about expanding possibilities for students. It became evident to me early in my career that, in addition to strong foundations, students need to be able to put concepts in context, and integrate them across multiple educational experiences including classes, clubs, research projects, and competitions. The importance of this pathway was further highlighted for me when I served as the director of Purdue's Engineering Honors Program. Another key element to becoming an outstanding teacher is the application of feedback loops at many levels, particularly within lecture (active learning exercises, design challenges, reflections, and quizzes), across multiple lectures (homeworks with structured critiques), over the semester (exams and projects), between semesters (faculty assessments and reflections), and across the curriculum (structured assessments with other faculty).

As director of Purdue's Engineering Honors Program, I expanded the program significantly, implementing a new vision that emphasizes continuous quality improvement, inclusiveness, and active learning. Feedback occurs within individual classes, a variety of times throughout the week, with exams, and continues at the programmatic level at the end of each course. As the number of Honors courses grew from two to ten, the Honors Program served as a test bed for the College of Engineering's mainstream undergraduate curriculum. Courses developed for the Honors Program also provided opportunities for increased corporate engagement.

Real-world context is also vital to keeping students engaged. Students will place greater value on work when it has a framework associated with it. Several years ago, I took the lead on writing a 600-page lecture book for Basic Mechanics I, a class taken by almost 40% of the students in Purdue's College of Engineering. The lecture book implemented: (i) active learning; (ii) solutions delivered in video format; (iii) an introduction to global concepts as well as a range of biomechanical, automotive, and infrastructure-related case studies; (iv) visualization activities; and (v) increased faculty-student interactions. After printing costs, 100% of the sales of the book (\$70 each) were used to fund a graduate student. That graduate student updated the lecture book each year so students would not see the exact same sets of problems year after year. This initiative proved to be particularly effective. The rate at which students received grades of D, F or had to withdraw decreased dramatically, especially for female students – from 33% in 2008 to 12% in 2012. That model has been adapted to the University of Cincinnati's College of Engineering and Applied Science with the addition of a video series designed to help students review topics and enable junior faculty to augment their teaching skills.

Major Teaching Accomplishments

- Lecture book was used to substantially decrease DFW rates in a sophomore level mechanics course at Purdue University.
- Expanded the Engineering Honors Program at Purdue University, developing or substantially re-working ten different courses.
- Examined learning styles in BME students at Tulane University, providing motivation to develop courses with increased active learning breaks and visualization exercises.
- At Purdue University, I received every teaching award for which I was eligible and was inducted into the Book of Great Teachers (on permanent display in the West Foyer of the Purdue Memorial Union).



Courses Taught

University of Cincinnati

Course	Semester	Number of Students	Instructor Rating* (Mean, Median)
<i>BME 2020 – Statics and Dynamics</i>	Spring 2022	38	4.47, 4.56
<i>BME 5160/6060 – Biomechanics of the Skeleton</i>	Fall 2022	7	4.75, 4.83
<i>BME 5101/7001 – Survey of Biomedical Engineering</i>	Fall 2022	35	4.28, 4.28
<i>BME 2020 – Statics and Dynamics</i>	Spring 2023	32	4.91, 4.95
<i>BME 4061 Advanced Biostatistics</i>	Spring 2023	33	4.54, 4.69
<i>BME 6017 – Continuum Models in Biomedical Engineering</i>	Fall 2023	5	5.00, 5.00
<i>BME 5101/7001 - Survey of Biomedical Engineering</i>	Fall 2023	62	4.46, 4.50
<i>BME 2020 – Statics and Dynamics</i>	Spring 2024	34	4.78, 4.89
<i>BME 6017 – Continuum Models in Biomedical Engineering</i>	Fall 2024	5	5.00, 5.00
<i>BME 2020 – Statics and Dynamics</i>	Spring 2025	39	4.85, 4.69
<i>BME 2040 – Solid Mechanics</i>	Spring 2025	20	3.83, 3.36
<i>BME 2021 – Statics and Introduction to Strength of Materials</i>	Fall 2025	49	4.50, 4.64
<i>BME 6017 – Continuum Models in Biomedical Engineering</i>	Fall 2025	4	5.00, 5.00

* Average student response to: “Overall, I would rate this instructor as:” of the course evaluation (5 = highest, 1 = lowest).

Purdue University
(excluding sections of EPICS taught continuously from Fall 2005 – Spring 2018)

Course	Semester	Number of Students	Instructor Rating*
<i>ME 270 – Basic Mechanics I</i>	Fall 2004	102	4.4
<i>BME 601 – Principles of Biomedical Engineering I**</i>	Fall 2004	16	4.6
<i>ME 274 – Basic Mechanics II</i>	Spring 2005	70	4.5
<i>ME 597K – Human Motion Kinetics †</i>	Spring 2005	NA	NA
<i>ME 270 – Basic Mechanics I</i>	Summer 2005	82	4.6
<i>ME 270 – Basic Mechanics I</i>	Fall 2005	116	4.5
<i>ME 697S – Continuum Mechanics</i>	Fall 2005	7	4.8
<i>ME 577 – Human Motion Kinetics</i>	Spring 2006	13 [8]	4.8 [4.75]
<i>ME 270 – Basic Mechanics I</i>	Summer 2006	88	4.8
<i>ME 577 – Human Motion Kinetics</i>	Spring 2007		N/A
<i>ME 274 – Basic Mechanics II</i>	Summer 2007		N/A
<i>ME 270 – Basic Mechanics I</i>	Fall 2007	121	4.7
<i>ME 270 – Basic Mechanics I</i>	Fall 2007	128	4.8
<i>BME 541 – Biomedical Fluid Dynamics</i>	Fall 2007	20	4.9
<i>ME 297H – Engineering Disasters**</i>	Fall 2007	22	4.3

Course	Semester	Number of Students	Instructor Rating*
<i>ME 577 – Human Motion Kinetics</i>	Spring 2008	33	?
<i>ME 274 – Basic Mechanics II (co-taught)</i>	Summer 2008	43	?
<i>ME 270 – Basic Mechanics I (Section 1)</i>	Fall 2008	135	4.5
<i>ME 270 – Basic Mechanics I (Section 2)</i>	Fall 2008	135	4.9
<i>ME 297H – Multiphysics Modeling</i>	Fall 2008	6	4.9
<i>ME 577 – Human Motion Kinetics</i>	Spring 2009	20	4.3
<i>BME 595 – Stem Cells for Tissue Engineering</i>	Spring 2009	9	4.3
<i>ME 270 – Basic Mechanics I</i>	Fall 2009	74	4.8
<i>ME 697/BME 695 – Biomedical Fluid Dynamics</i>	Fall 2009	13	4.9
<i>ME 577 – Human Motion Kinetics</i>	Spring 2010	32	4.9
<i>ENGR 103 – Visualization in Engineering</i>	Fall 2010	25	4.5
<i>ME 270 – Basic Mechanics I (S)</i>	Fall 2010	120	4.7
<i>ME 297H – Engineering Disasters</i>	Fall 2010	15	4.9
<i>ME 597 – Computational Fluid Mechanics and Biology</i>	Spring 2011	5	4.7
<i>ME 577 – Human Motion Kinetics</i>	Spring 2011	48	4.9
<i>ME 297H – Biological Applications of Transport</i>	Spring 2011	4	5
<i>ME 270 – Basic Mechanics I</i>	Summer 2011	89	4.8
<i>ME 597 – Introduction to Continuum Physics and Applied Mathematics</i>	Fall 2011	14	4.8
<i>ME 270 – Basic Mechanics I (S)</i>	Fall 2011	120	4.6
<i>ME 297H – Engineering Disasters</i>	Fall 2011	6	4.5
<i>ME 697/BME 695 Biomedical Fluid Dynamics</i>	Spring 2012	17	5.0*
<i>ME 577/BME 595 Human Motion Kinetics</i>	Spring 2012	67	5.0*

Course	Semester	Number of Students	Instructor Rating*
<i>ME 270 – Basic Mechanics I (S)</i>	Fall 2012	119	4.7
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2012	7	5
<i>ME 577 – Human Motion Kinetics</i>	Spring 2013	16	5.0
<i>ME 270 – Basic Mechanics I (S)</i>	Spring 2013	120	4.2
<i>ME 270 – Basic Mechanics I (S)</i>	Fall 2013	109	4.7
<i>HONR 299 – History of Great Ideas</i>	Fall 2013	11	5.0
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2013	11	4.6
<i>ME 297H – Engineering Disasters</i>	Fall 2013	7	4.8
<i>ME 697/BME 695 – Biomedical Fluid Dynamics</i>	Spring 2014	9	4.8
<i>ME 577/BME 595 – Human Motion Kinetics</i>	Spring 2014	45	4.7
<i>ME 270 – Basic Mechanics I (S, with honors sections)</i>	Fall 2014	112	4.8
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2014	14	4.9
<i>HONR 399 – It's a Complex World</i>	Fall 2014	14	4.8
<i>HONR 299 – Toy Design</i>	Spring 2014	25	Team Taught
<i>ME 270 – Basic Mechanics I (S, with honors sections)</i>	Fall 2015	100	4.6
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2015	10	4.8
<i>ENGR 142 – Creativity and Innovation in Engineering Design II</i>	Spring 2016	57	4.8
<i>ME 577/BME 595 – Human Motion Kinetics</i>	Spring 2016	50	4.9
<i>HONR 299 – Toy Design</i>	Spring 2016	15	Team Taught
<i>ME 463 – Senior Design</i>	Spring 2016	26	5.0

Course	Semester	Number of Students	Instructor Rating*
<i>ENGR 161 – Introduction to Innovation and the Physical Science of Engineering Design I</i>	Fall 2017	72	4.7
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2017	12	5.0
<i>ENGR 162 – Introduction to Innovation and the Physical Science of Engineering Design II</i>	Spring 2017	67	4.6
<i>HONR 399 – It's a Complex World</i>	Spring 2017	20	Team Taught
<i>BME 695 – Advanced Cell and Tissue Mechanics</i>	Spring 2017	10	4.9
<i>ENGR 161 – Introduction to Innovation and the Physical Science of Engineering Design I</i>	Fall 2018	79	4.4
<i>BME 595 – Continuum Models in Biomedical Engineering</i>	Fall 2018	14	4.9
<i>ME 270H – Honors Seminar in Support of ME 270</i>	Fall 2018	NA	NA
<i>BME 695 Advanced Cell and Tissue Mechanics</i>	Spring 2019	10	5.0
<i>ENGR 162 – Introduction to Innovation and the Physical Sciences of Engineering Design II</i>	Spring 2019	76	4.4
<i>ENGR 161 – Introduction to Innovation and the Physical Sciences of Engineering Design I</i>	Fall 2019	63	4.9

* Average student response to: “Overall, I would rate this instructor as:” of the course evaluation (5 = highest, 1 = lowest).

** Teaching obligation was 1/2 of one semester. † Teaching obligation was 1/3 of one semester. Brackets indicate distance learning students. * Only responses from the BME offering were available through the online course survey system.

Courses Taught – Tulane University

Course	Semester	Number of Students	Instructor Rating*	SOE Median Instructor Rating
ENGR 241 – <i>Statics</i>	Fall, 2000	57	1.0	1.8
BMEN 665 – <i>Structure-Function Relationships in Biological Tissues</i>	Spring, 2001	13	1.3	1.7
ENGR 241 – <i>Statics</i>	Fall, 2001	65	1.1	1.9
BMEN 663 – <i>Mechanics of Collisions and Human Injury</i>	Spring, 2002	11	1.2	1.8
ENGR 241 – <i>Statics</i>	Fall, 2002	77	1.0	1.7
BMEN 663 – <i>Mechanics of Collisions and Human Injury</i>	Spring, 2003	22	1.45†	Not Available
ENGR 241 – <i>Statics</i>	Fall, 2003	63	1.0	Not Available
BMEN 631 – <i>Continuum Models in Biomedical Engineering</i>	Fall, 2003	16	Not Available	Not Available
BMEN 652 – <i>Biophysics and the Cell</i>	Spring, 2004	21	1.4	1.7

* Average student response to Question 16 of the School of Engineering (SOE) Course Evaluation (1 = highest and 5 = lowest). † indicates first semester of online evaluations.

Student Advising – Primary Advisor

Ph.D. Students (Green text indicates Tulane students, black text indicates Purdue students)

1. Dan A. Shimko (Conferred 2004) – Design and Optimization of a Tissue-Engineered Bone Graft Substitute.
2. Kathleen L. Rea Fureigh (Conferred 2004) – Development of an In Vitro Model of Parkinsonian Degeneration.
3. Edward A. Sander (Conferred 2006) – A Link Between Ischemia and Mechanical Failure in the Optic Nerve Head.
4. Eileen Gentleman (Conferred 2005) – Collagen-Based Biomaterials for Soft Tissue Engineering. (Co-advisors, KC Dee, Glen Livesay).
5. Dawn Sabados (Conferred 2005) – Autofluorescence Imaging of Cell Level Metabolic Activity and Dependence on the Microenvironment.
6. Beth Galle (Conferred 2008) – A Combined Experimental and Computational Approach to Investigate the Mechanism of Spinal Cord Slow Compression Primary Cellular Injury.
7. Darryl Dickerson (Conferred 2009) – Development of a Naturally Derived Biomaterial with Controlled Regional Extracellular Matrix Heterogeneity for Orthopaedic Interface Regeneration.

8. Lester Smith (Conferred 2009) – A Practical Analysis of Adipose Stromal Cell Functional Differentiation Response to Multiple Microenvironmental Stimuli.
9. Cathy Slater (Conferred 2009) – Patient-Specific Three-Dimensional Geometric Segmentation and Model Development for use with Image-Guided Robotics Systems for Minimally Invasive Spine Surgery.
10. Theresa Gordon (Conferred 2010)– Development of Mathematical Models for the Improvement of Healthcare Delivery to Patients with Osteoporosis.
11. Mary Schuff – (Conferred 2010) Multiphysics models of fluid and solute transport in the microvasculature of normal and malignant breast tissues with application to the detection and treatment of cancer (Co-advisor, Jay Gore)
12. Byron Deorosan – (Conferred 2011) In Vitro Metabolic Assessment of Bone Marrow-Derived Stem Cells and its Application to Central Nervous System Trauma.
13. Monica Susilo – (Conferred 2011) A Combined Unit Cell and Mixture Theory Model to Investigate Cell Microenvironment in Three-Dimensional Fibrillar Extracellular Matrix During Dynamic Loading. (Co-advisor, Klod Kokini)
14. Scott Van Dyke – Biophysical Factors Affecting Regeneration of the Enthesis (Co-advisor, Ozan Akkus)
15. Kent Butz – Computational Modeling of Stresses in the Knee and Spine
16. Evan Breedlove – Computational Modeling of Physical Insults to the Brain
17. Taylor Lee – Quantification of Head Impacts in Athletes
18. Brie Lawson – Computational and Experimental Biomechanics Models of the Lower Extremities.
19. Roy Lycke – Computational Models of Deep Brain Probes
20. Ninad Trifale – Microscale Models of Porous Materials

M.S. Students (Green text indicates Tulane students, black text indicates Purdue students)

1. Richard M. Morency (Conferred 2003) Application of the Serret-Frenet Basis for the Analysis of Variation of Accelerations on Roller Coaster Passengers. Co-advised with Dr. Glen A. Livesay.
2. Kirsten E. Lewus (Conferred 2004) The Development and Analysis of a Bone Marrow Stromal Cell-Seeded Collagen Based Composite Soft Tissue Graft.
3. Jayna Belt (Conferred 2004) A Theoretical Model of Osteophyte Formation on the Human Spine and its Relationship to Osteoporosis.
4. Dawn Reda (Conferred 2004) Experimental and Theoretical Analysis of Shoe-Surface Interactions and Their Relationship to Knee Injuries.
5. Jeremie Wade (Conferred 2005) – An Investigation of Ovine Lumbar Kinematics Using the Purdue Spine Simulator. (Co-advisor, Ben Hillberry)
6. Kim Campana (Conferred 2005) – Finite Element Analysis of the Lumbar Spine to Evaluate the Performance of a Total Facet Arthroplasty System. (Co-advisor, Ben Hillberry)
7. Michael Wilczek (Conferred 2008) – In Vitro Lumbar Spine Testing with Simulated Muscular Preloads
8. Jarren Stratton (Conferred 2006) – Limited Wavelength IR Sensing of Glucose and E. Coli. (Co-advisor, Jay Gore)
9. Jason Habeger (Conferred 2007) – Effects of Implant Offset on the Wear Characteristics of an Artificial Disc Replacement Analogue.

10. Kent Butz (Conferred 2008) – Analysis of Forces and Stresses Incurred in the Joints of the Hand and Development of a Magnetic Composite for Use in Finger Joint Replacements.
11. Kara Tellio (Conferred 2009) – Wear Analysis of an Intervertebral Disc Replacement Analogue: Effect of Implant Offset.
12. Becky Gunn (Conferred 2009) – Continuum Characterization of Flexible Foams for Medical Applications and Computational Evaluation of Pressure Profile.
13. Demetri Andrisani (Conferred 2009) – Determination of the Transport Properties of Brain Tumors Using Contrast-Enhanced Magnetic Resonance Imaging.
14. Justin Floro (Conferred 2010) – High Strain Cervical Spinal Cord Stresses During Motor Vehicle Accidents.
15. Jocelyn Dunn (Conferred 2011) – Tissue Engineering of a Naturally-Derived Scaffold with Adjustable Mechanical Properties, Modified Surface Chemistry, and Interconnected Pores.
16. Anne Dye (Conferred 2011) – Design of Micro- and Macro-Scale Impact Mitigating Material Toward the Development of Helmet Padding Design Criteria.
17. Julia Alspaugh – Next Generation Orthopaedic Implants.
18. Emily McCuen – Head Impacts and Female Soccer Players.
19. Mackenzie Tweardy – A Computational and Experimental Model of Tau Deposition in the Brain.
20. Josh Auger – Mediating the Effects of Head Impacts in Female Soccer Players.

Institutional and Professional Service

Symposia

Organizing Committee Member for the 11th Annual Symposium on Computational Methods in Orthopaedic Biomechanics, New Orleans, LA, February 1, 2003.

Session Chairs

Knee Joint Mechanics, 10th Annual Symposium on Computational Methods in Orthopaedic Biomechanics, Dallas, TX, February 9, 2002.

Modeling Motion for Clinical Applications, 11th Annual Symposium on Computational Methods in Orthopaedic Biomechanics, New Orleans, LA, February 1, 2003.

Spine Biomechanics, 11th Annual Symposium on Computational Methods in Orthopaedic Biomechanics, New Orleans, LA, February 1, 2003.

Scientific Journal Reviewing Activities

Ad Hoc Reviewer for: Journal of Biomechanical Engineering, Journal of Cellular Biochemistry, Physiological Genomics, IEEE Transactions on Biomedical Engineering, Tissue Engineering, Journal of Biomechanics.

Federal Agency Proposal Review Panel

NASA Fluid Physics Review Panel, 2004.

CDC Biomechanics Peer Review Panel, 2003.

NASA Bioscience and Engineering Institute Peer Review Panel, 2002.

Purdue University

UHSS Task Force Member (Fall 2010 – Spring 2011)

College of Engineering

Tissue and Cellular Engineering Cluster Committee
Tissue and Cellular Engineering Cluster Hiring Committee

School of Mechanical Engineering Committees

Strategic Hiring Committee (Spring 2005 – Spring 2006)
General Hiring Committee (Spring 2007 – Spring 2008)
Communications Committee (Fall 2004 – Spring 2006)
ME Honors Program Task Force (Fall 2005 – 2009)
Mechanical Engineering Leadership Team (MELT) (Fall 2004 – Spring 2007)
Mechanical Engineering Head Search Committee (Fall 2010 – Spring 2011)
Mechanical Engineering Graduate Committee (Spring 2012 – Present)
Mechanical Engineering: Midwest Mechanics Seminar Coordinator (Spring 2012 – Present)

Weldon School of Biomedical Engineering

Graduate Admissions Committee (Spring 2004 – 2006)
MD/PhD Admissions Committee (Spring 2005 – Spring 2010)
Advisor to Biomedical Engineering Society Student Club (Spring 2004 – Spring 2007)
Advisor to Biomedical Engineering Society-Graduate Student Association (Spring 2005 – Spring 2006)
Advisor to Engineering World Health (Spring 2006 – Spring 2012)
Advisor for EPICS – St. Vincent Advancement Team, Riley Advancement Team (Fall 2005 – Present)

Department of Basic Medical Sciences

Biomedical Sciences Doctoral Track (BSDT) Advisory Committee (Spring 2006 – Spring 2011)

Community Outreach

Judge for FIRST Lego League Competition (Held at University of New Orleans, Fall 2003)
Judge for FIRST Lego League Competition (Held at Purdue University, Fall 2004)
Judge for FIRST Lego League Competition (Held at Purdue University, Fall 2005)
Judge for FIRST Lego League Competition (Held at Purdue University, Fall 2010)

Selected Media Appearances (Engagement and Outreach)

Television Appearances

- Purdue and Jeff High School teaming up. J. Krizen, WLFI Channel 18 News. Aug. 7, 2009.
- Football hits affect without symptoms. WLFI Channel 18 News. Oct. 3, 2010.
- Purdue researchers track football concussions. D. MacAnally, Eyewitness News, WTHR. Oct. 9, 2010.
- Hard tackles just as bad as concussions for football players. CNN American Morning. Oct. 27, 2010.
- Deep Impact. Robert Bazell, NBC Nightly News. Oct. 27, 2010.
- Research Measures Power of Football Hits. Dan Spehler, WRTV Channel 6 News. Oct. 29, 2010.

- Changes found in football players thought to be concussion-free. H. Feldmeyer, BoilerBytes. Big Ten Network. Nov. 24, 2010.
- Your Brain on Football: HBO Real Sports with Bryant Gumbel. November, 2012: <https://www.youtube.com/watch?v=UKIYAtnLLOA>
- NOVA – Making Stuff Safer, 2013: <https://www.youtube.com/watch?v=up3kvuad7AY>
- Inside Indiana Business – Purdue Discovery Helps Tendon Damage Recover Quicker. June 3, 2021. <https://www.insideindianabusiness.com/articles/purdue-discovery-helps-tendon-damage-recover-quicker>
- FOX19 - UC professor explains safety design behind Joe Burrow's new helmet. by Digital Staff. Published: Aug. 8, 2023 at 5:53 PM EDT. <https://www.fox19.com/2023/08/08/uc-professor-explains-safety-design-behind-joe-burrows-new-helmet/>
- WCPO Channel 9 News - Live Interview at Noon with Kristen Swilley. July 26, 2023
- Local 12 - 'We need better helmets': UC lab works to prevent and treat head injuries. Liz Bonis. WKRC, Aug. 16, 2023. <https://local12.com/health/health-updates/we-need-better-helmets-uc-lab-works-prevent-treat-head-injuries-university-cincinnati-concussion-bioscience-research-regenerative-technologies>
- Local 12 - New bioscience center opens on campus of UC Medical Center Liz Bonis and Megan Burgasser, WKRC, Aug. 16, 2023. <https://local12.com/health/next-in-medicine/next-in-medicine-new-bioscience-center-opens-on-campus-of-uc-medical-center-cincinnati>

Magazine Appearances

- Head Injury Study Scores Early Touchdown. K. Mayer, Purdue ECE Impact. Spring 2010.
- The Damage Done. David Epstein, Sports Illustrated. Vol. 113, No. 16, Nov. 1, 2010. p. 42-47.
- Blows to the Brain: Insight from Tragedy. signaPULSE. Autumn, 2010. p. 64-67.
- Head Game, Josh Dean, Hemispheres Inflight Magazine. Jan. 1, 2011.
- Why We Need Hit Counts in Football. Sean Gregory. Time Magazine. October, 2018
- Taking a Stance? Brian Burnsed, Sports Illustrated. Vol. 132, No. 11, p. 34-42. October, 2021.

Newspaper Appearances

- E. Weddle, Journal & Courier. Aug. 21, 2009.
- Friday night lights' risk: 1,800 hits to the head. Rex W. Huppke, Chicago Tribune. Oct. 6, 2010, Sec. 1, Pg. 1.
- Purdue study sheds light on football-related trauma. Nathan Baird, Journal & Courier. Oct. 7, 2010, Sec. A, Pg. 1.
- Undiagnosed brain damage possible: Purdue study finds players can suffer injury without showing concussion symptoms. Nat Newell, Indianapolis Star. Oct. 7, 2010, Sec. C, Pg. 1.
- Gray Matter: Attitudes toward brain injuries changing with more knowledge: fMRI gauges concussions in high school football players. Scott Sandsberry, Yakima Herald, online ed. Oct. 29, 2010.
- Collective Force of Head Hits Increases Odds of CTE, Study Says; New York Times. by Ken Belson and Benjamin Mueller; June 20, 2023

Radio Appearances

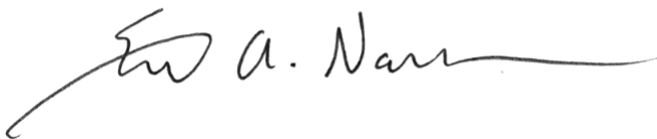
- Live interview: KRLD 1080, Dallas, TX. Oct. 4, 2010.
- Interview: S. Klemet, WBAA 920 News, West Lafayette, IN. Oct. 27, 2010.
- Interview: Joe Staysniak, Big Joe Show, 1070 The Fan, Indianapolis, IN. Oct. 27, 2010
- Head Games: R. Meyer, InfoTrak, TalkZone Talk Channel. Nov. 5, 2010.
- Live interview: talkSPORT radio (UK) with Paul and Max. February 18, 2021
- Football helmets don't protect the back of the head as well as they should, UC researcher finds. 91.7 WVXU by Ann Thompson. March 13, 2023
- Cincinnati Edition - A helmet designed to prevent concussions will make its way to Paycor stadium this season. <https://www.wvxu.org/show/cincinnati-edition/2023-08-01/helmet-designed-prevent-concussions-joe-burrow-bengals>

Online Appearances (Selected)

- Ten Things I Think I Think. Peter King, Monday Morning Quarter Back. Nov. 1, 2010.
- fMRI gauges concussions in high school football players. Wayne Forrest, AuntMinnie.com. Nov. 22, 2010.
- Brain Changes Found in Football Players Without Concussion. Lisa Collier, healthymagination. Nov. 29, 2010.
- The National Brain-Damage League. Shankar Vedantam, Slate. Jan. 18, 2011.
- Why We Need Hit Counts in Football. Sean Gregory. Time Magazine. October, 2018 <https://time.com/4069037/football-brain-injury-hit-counts-cte/>
- How to prevent concussions in football? Better helmets - UC engineer investigates ways to improve helmet designs to protect players. March 7, 2023. - <https://www.uc.edu/news/articles/2023/03/uc-engineer-wants-helmets-that-prevent-concussions.html>

Contact Information

585 Purdue Mall
West Lafayette, IN 47907-2088
Phone: (765) 494-8602
Fax: (765) 494-0539
Email: enauman@purdue.edu



Eric A. Nauman