

# Curriculum Vitae

(updated March 11, 2021)

Bradley Edward Layton, MS PhD PE

Sole Proprietor, [Human Powered Future](#) PLLC  
Missoula, Montana

Managing Member, Acting CEO, Integration Energy LLC  
Missoula, Montana

Founder, [Integrated Engineering Blockchain Consortium](#), [CoEngineers](#)

Founder and Member, Biocarbon Technologies LLC  
Missoula, Montana

Founder and Member, [Neodymia LLC](#)  
Missoula, Montana

Affiliated Faculty  
[Environmental Studies](#), [Physics](#), [Biochemistry & Biophysics](#), [Geosciences](#), [Climate Change](#)  
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## EDUCATION

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- Biomedical Engineering, PhD University of Michigan, Ann Arbor, MI 2003  
*Concentrations:* soft-tissue mechanics, molecular structure of collagen, diabetic neuropathy, biomedical instrumentation  
*Dissertation:* “Remodeling of Heterogeneous Extracellular Matrices of Diabetic Nerve: Models and Experiments”  
*Advisor:* [Ann Marie Sastry](#)
- Mechanical Engineering, MS University of Michigan, Ann Arbor, MI 1999  
*Concentrations:* finite element modeling, neuroanatomy
- Mechanical Engineering, BS Massachusetts Institute of Technology, Cambridge, MA, 1992  
*Concentrations:* fluid mechanics, engineering design  
*Minor:* writing  
*Advisor:* [David Gordon Wilson](#)

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## PROFESSIONAL EXPERIENCE

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<a href="#">Expert Witness</a> , ~10 cases MI, PA, MT, FL	2015 – pres
Sole Proprietor, Professional Engineer Montana lic# 30610	2010 – pres
<a href="#">Human Powered Future</a> , PLLC, Missoula, MT	
Licensed Professional Engineer – Idaho lic# 19127	2020 – pres
Licensed Professional Engineer – Utah lic# 11526658-2202	2019 – pres
Licensed Professional Engineer – Colorado lic# PE.0055658	2018 – pres
Licensed Professional Engineer – Pennsylvania lic# PE 091220P	2020 – pres
Managing Member, Acting Chief Executive Officer Integration Energy, LLC, Missoula, MT	2016 – pres
Founder & Partner, BioCarbon Technologies Missoula, MT	2018 – pres
Founding Member, <a href="#">Integrated Blockchain Engineering Consortium</a>	2015 – pres
Director Energy Technology Program, University of Montana, Missoula, MT	2010 – 2017
Associate Professor Applied Computing and Engineering Technology Dept, University of Montana, Missoula, MT	2015 – 2017
Assistant Professor Applied Computing and Electronics Department, University of Montana, Missoula, MT	2010 – 2015
Affiliated Faculty Department of Neurobiology and Anatomy, Drexel University, Philadelphia, PA	2010 – pres
Affiliated Faculty Biochemistry and Biophysics Program, the University of Montana, Missoula, MT	2011 – pres
Affiliated Faculty Environmental Studies, the University of Montana, Missoula, MT	2015 – pres
Associate Teaching Professor Mechanical Engineering and Mechanics, Drexel University, Philadelphia, PA	2010
Assistant Professor Mechanical Engineering and Mechanics, Drexel University, Philadelphia, PA	2003 – 2009
Postdoctoral Fellow Radiology, Advisor – <a href="#">Thomas Chenevert</a> , University of Michigan, Ann Arbor	2003
Postdoctoral Fellow Neurology, Advisor – <a href="#">Eva Feldman</a> , University of Michigan, Ann Arbor	2003
Postdoctoral Fellow Biomedical Engineering, Advisor – Martin Philbert, University of Michigan, Ann Arbor	2003
Graduate Student Research Assistant Mechanical Engineering   Biomedical Engineering, University of Michigan, Ann Arbor	1997 – 2002
– Designed and conducted animal diabetic neuropathy studies • nerve conduction velocity measurement • <i>in vivo</i> endoneurial fluid pressure measurement • atomic force microscopy of ECM proteins • <i>in situ</i> immunohistochemistry of ECM proteins • finite-element and failure modeling of soft-tissue composites • closed-form analysis of non-linear viscoelastic materials • statistical analysis of clinical neurology data • image analysis of stochastic fibrous materials	

- Technical Assistant 1997  
Georgia Business Net, Augusta, GA  
- Maintained and installed network hardware and software
- Watercraft Construction and Design Assistant 1997  
Stillwater Design, Cambridge, MA  
- Designed and built rowing shells and wakeless powerboats with carbon fiber, fiberglass and Kevlar
- Junior Engineer 1996  
Associated Design and Manufacturing Company, Alexandria, VA  
- Subcontractor to Northrop Grumman and USEPA  
- Consulted in mechanical design, thermodynamics, fluid mechanics, and system dynamics
- Fire Protection Engineer 1994 – 1996  
Gasser Associates, Aiken, SC  
- Subcontractor to Westinghouse  
- Performed fire-safety walk-downs on US DOE Savannah River Site buildings  
- Wrote recommendations based on National Fire Protection Association codes  
- Clearance: DOE L
- Assistant System Administrator 1993 – 1994  
Photon Research Associates, Arlington, VA  
- Subcontractor to NASA and Ballistic Missile Defense Office (BMDO)  
- Programmed and performed system administration on SGI-PC network  
- Modeled space-based infrared sensors  
- Clearance: DOD L
- Junior Scientist 1992  
US DOE Office of Space, Washington, DC  
- Collected and evaluated documents on properties of lunar soil and its effects on long-term lunar energy systems  
- Discussed findings with NASA and Johnson Space Center scientists  
- Clearance: DOE L
- Machinist 1990  
Merlin Metalworks, Somerville, MA  
- Designed, machined, and welded titanium bicycles

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## ENGINEERING CONSULTING

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### [Paradigm 3 Architecture PLLC](#)

- Custom structural engineering review, design, & analysis

### [Domo](#)

- Authored successful air permit for Missoula Valley airshed

### VIBE Mobility

- Custom design of motorized personal scooter

### Lockwood EV, Seeley Lake, MT

- Smith Newton diagnosis and maintenance

Dobeck Enterprises, Bozeman, MT

- Analyzed control algorithm for motorcycle stability

SwimGogs, New York, NY

- Finite element analysis for heads-up swim goggle liquid crystal display

Medbaye, Natick, MA

- Biostatistics validation for Bayesian-based medical diagnosis software

Patrick Browne, International Biomass, Missoula, MT

- Developing technologies for landfill reduction, and woody biomass utilization with international partners.

Kevin DePuy, Missoula, MT

- Developed renewable energy strategies for Hive

Jed Dennison, Missoula, MT

- Designing off-grid webcam for kayak recreation area

Craig Thomas, Cky-Ber Enterprises. Hamilton, MT

- Engineering Consulting and grant writing support

Bo Bo Khant, Bo Bo Electric, Missoula, MT

- Structural Engineering Consulting for photovoltaic installations

BD Erickson, [SATC USA](#) Inc. Missoula, MT

- Engineering Consulting with NIST for CFL and power conditioner

[James Stephens](#), Missoula, MT

- Engineering Consulting for bioenergy extraction

Dale Smith, Stevensville, MT

- Engineering Consulting for energy harvesting

David Murphy, Polson, MT

- Engineering Consulting for power conditioning unit

Victor Korzen, USWAY, Chicago, IL

- Research to bring wind turbine manufacturing to Montana.

Arboretum Ventures, Ann Arbor, MI

- Assessed viability of bone tissue engineering mechanical bioreactor

Craig Zeyher, Haddonfield, NJ

- Technical support to Mr. Zeyher on a patent application for a novel energy storage device

Zahava Barkay, Tel-Aviv University, Israel

- Nanomanipulation advice, Wolfson Applied Materials Research Center

Dale Hackerman, and Josephine Penza, Promotional Design Group, PO Box 597, Cherry Hill, NJ

- Mechanical engineering design support to Ms. Hackerman for handbag anti-theft device

Brent Mitchell, Osteotech Inc., 51 James Way, Eatontown, NJ 07724

- Consulting advice for characterization of a novel collagen-based tissue engineering construct

Travis Chaney, Engineered Arresting Systems Corporation, 2550 Market St, Aston, PA 19014

- Provided engineering equations and analysis support for improved aircraft arresting system

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## ACCOMPLISHMENTS

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- Blockchain awards through the IBEC, including Best in Infrastructure [2018 BlockAwards](#).
- Advised [Solar PV Trainer](#), [Solar Thermal Air Exchanger](#), [Solar Thermal Water Heat Exchanger](#), [Undershot Microhydroelectric](#) 2015 Energy Practicum.
- Led design of solar [PV array](#), [PV panel efficiency booster](#), and [compressed air storage](#) during 2014 Energy Practicum.
- Led design of an off-grid mobile wind turbine as part of 2013 [Energy Practicum](#)
- Led design and deploy a [lighter-than-air wind turbine](#) as part of 2012 Energy Practicum
- Led design, build and racing of three cars for [Shell EcoMarathon](#): 2010 Drexel solar-electric, 2012 UMontana solar-electric, 2014 UMontana electric.
- Led design, build, and racing of five human-powered vehicles for [ASME HPVC](#): 2008 Drexel @ Wisconsin; 2009 Drexel @ Philadelphia; 2011 UMontana @ Bozeman; 2011 UMontana @ Utah; 2016 @ San Jose
- Developed a theory to unify the second law of thermodynamics and information theory
- Discovered longest uninterrupted collagen gene in *Trichodesmium erythraeum*. Interpreted this as a possible horizontal gene transfer in the Devonian or Silurian period
- Developed numerical model and software to run tens of thousands of finite element simulations for determining failure probability in nonlinear stochastic composite biomaterials
- Developed atomic force microscopy protocol for measuring collagen morphology which resulted in resolving collagen's triple helix and established enlarged collagen fibril diameters in diabetic peripheral nerve
- Obtained *in vivo* endoneurial fluid pressure measurements on the order of 1 kPa and a resolution of 1Pa with an electromechanical microfluidic device
- Established a protocol for assessing relative amounts of extracellular matrix proteins in peripheral nerve with immunohistochemical confocal microscopy
- Developed soft-tissue-testing protocol which captures toe, linear, yield, failure and stress relaxation regions of peripheral nerve
- Developed numerical model to identify key molecular contributions of abnormal collagen to tissue-scale mechanical behavior of peripheral nerve
- Assessed results from two animal-model diabetic neuropathy studies with statistical methods which resulted in new findings in the role of extracellular matrix in diabetic neuropathy
- Developed GUI-based tool in MATLAB for analyzing apparent diffusion coefficient per MRI imaging, and volume brain tumor data for animals and humans
- Developed closed-form and numerical-form solutions for nanoscale collagen fibril diameter aggregation limit
- Developed a strategy for parameterizing the drift and hysteresis for a multi-axis, multi-positioner nanomanipulation device
- Developed a novel hypothesis for the mechanics of microtubule organization within growing axons
- Developed a method for nanoscale parallel force transduction in a microprinted array of neurons
- Developed a microfabricated device for measuring red blood cell mean volume
- Developed an educational atomic force microscope for use in high school classrooms
- Developed and patented a surgical stapler and bioresorbable staple for anastomoses

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## CORPORATE BOARDS

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- [GigRonin](#)
- [SMJ Drones](#)
- [Dependalite](#)
- [Smart International Inc.](#)
- [Bioroot Energy](#)
- [Blackstone Launchpad](#)
- [Helix](#)
- [Integrated Engineering Blockchain Consortium](#)
- [National Society of Professional Engineers Financial Technologies Taskforce](#)
- [NorthWestern Energy Electrical Transmission Advisory Committee](#)

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## FORENSIC ENGINEERING EXPERIENCE

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- Pneumatic press workplace injury (federal)
- DUI/diabetes investigation
- Custom-written MATLAB code for gel blot image analysis.
- Surgical robotics
- Head injury
- Wooden stair tread failure during construction results in injury
- Faulty artificial knee design results in patient rejection of knee
- System analysis and design of inverted pendulum design for motorcycle dynamometer
- Image analysis of allegedly identical scientific images

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## COLLABORATIONS

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Rich Hammen, NASA Chemist

- Developing Rare Earth Metal Extraction strategy

Steve Running, Regents Professor, Nobel Laureate, University of Montana

- Developing large-scale models for carbon accounting

Yehuda Benayahu, Professor of Marine Biology, Tel Aviv, Israel

- Provided atomic force microscopy and Raman spectroscopy support for characterizing a novel sponge collagen

Ronald Balsamo, Professor of Biology, Villanova University

- Provided atomic force microscopy support for characterizing drought-resistant plants

Peter Baas, Professor of Neurobiology and Anatomy, Drexel University.

- Molecular dynamics, micromechanics neuronal cytoskeleton, neuronal molecular motors

Jeffrey Fong, Physicist, Project Manager Mathematical and Computational Sciences Division

- Developed course material for numerical methods course

Brian Jamieson, NASA/ Goddard Space Flight Center, Detector Systems Branch

- Provided test bed for microfabricated hematology analyzer

Cheryl MadMan Blackfeet Community College

- Developed sustainable energy technology curriculum under NSF ATE grant

Karen Moxon, Professor of Biomedical Engineering, Drexel University.

- Collaborated on neural probe insertion strategy

Nicky Phear, Climate Change Studies

- Working towards technology-based solutions for climate change under NSF ATE award

Dario Pisignano, National Nanotechnology Laboratory, Lecce, Italy

- Provided atomic force microscopy, microfabrication training, molecular modeling training

Michel Wallemacq, Belgian Embassy, Washington, DC

- Writing paper on the relationship between fracking and renewable energy investment

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## **CURRENT AND RECENT RESEARCH INTERESTS**

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- Soft tissue mechanics
- Cybersecurity
- Distributed networks
- Blockchain design for engineering and academics
- Solar car design
- Localization of energy resources
- Sustainable energy through human-powered transportation infrastructures and renewable energy
- Development of a molecular atomic-force-microscope-compatible mechanical testing device
- Mechanics-based models of extracellular matrix proteins and carbohydrates
- Self-assembly characteristics of structural proteins
- MEMS-based field hematology analyzer
- Nanomechanics and nanomanipulation
- Evolution of mechanical proteins such as tubulin and collagen
- MechanoEvolution
- Information Theory
- Complexity & Big History
- Zero waste economics
- Net-Zero Carbon / Net-Positive Energy, water, soil residential design



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## PUBLICATIONS

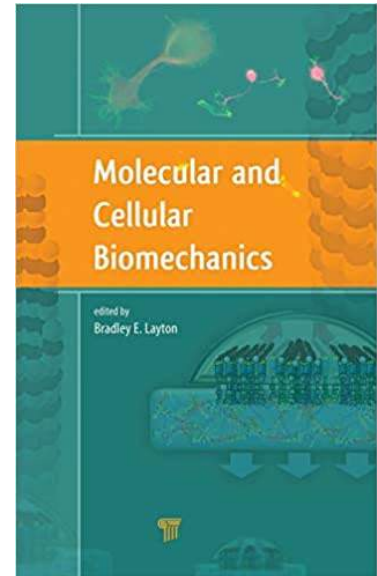
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### Books

Layton, B.E. et al. “Molecular and Cellular Biomechanics” B.E. Layton, Editor. Pan Stanford Publishing: 978-981-4316-83-5 ([Hardcover](#)); 978-981-4613-44-6 (eBook). DOI 10.1201/b18093-5

*“This book bridges the gap between life sciences and physical sciences by providing several perspectives on cellular and molecular mechanics on a fundamental level. It begins with a general introduction to the scales and terms that are used in the field of cellular and molecular biomechanics and then moves from the molecular scale to the tissue scale. It discusses various tissues or cellular systems through the chapters written by prominent engineers and physicists working in various fields of biomechanics.”*

*"Big picture" items, such as the number of atoms in cells and the number of cells in an organism, are discussed, followed by several of the physical laws that play a central role in nanoscale biomechanics, including the mechanics of the nucleus and its associated molecules. While the quantitative and straightforward language of the book will help the engineering community grasp the concepts better and utilize them effectively, the questions given in each chapter will encourage upper-level undergraduate students, graduate students, or those generally interested in understanding cellular and molecular mechanics to dig deeper into the material.*



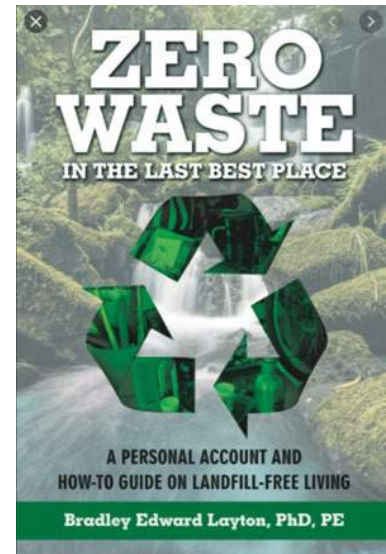
Layton, B.E. “Zero Waste in the Last Best Place” A personal account and how-to guide on Landfill-Free Living” (ISBNs: 9781532022685(sc) 9781532022692(hc) 9781532022678 (e)) (Editor’s Choice, Rising Star)

*What will the world look like in fifty years? In one hundred years? Four hundred years? Will we still pollute our skies with carbon? Will we still build monuments by the curb to nameless waste gods only to have our diapers, wrappers, cartons, and packaging squished into a foul-smelling hell-on-wheels to be hauled to the methane-emitting monument of NIMBY our global civilization is creating?*

*No! Let's drive cars, build gardens, and live in buildings that leave the earth cleaner than we found it!*

*In this little book Professor Bradley Layton takes us on a journey through the bowels of MIT, the dumpsters of our cities, and shares his own personal account of moving away from the landfill in Missoula, Montana, home of A River Runs Through It, downtown river surfing, and epic fly fishing.*

*Once you've made your way through this book, you'll never look at "garbage" or "trash" the same way again*





Layton, B.E. “Mechanoevolution” Bentham Science Publishers (invited, in preparation)

### Book chapters

1. Layton, B.E. 2012. “The Role of MechanoEvolution in Predicting Future Technologies” in [Systems Engineering for Micro and Nano Scale Technologies](#). Jonathan W. Plant, Janet L. Barth, M. Ann Garrison Darrin, Eds. Taylor & Francis / CRC Press Johns Hopkins Applied Physics Laboratory, Editor (invited)
2. Layton, B.E. and M. Brent Boyd. 2011. "[Atomic Force Microscopy of Isolated Mitochondria](#)" In: Atomic Force Microscopy: Methods and Protocols in Biomedical Applications, 736 pp. 133-151. P.C. Braga and D. Ricci, Eds. (invited) PMID: 21660726.

### Archival/refereed papers

3. Layton, B.E. S.L Noell & G.A. Oram JR. 2016. "[Entropy Acceleration, Shannon Information and Socioeconomics: Quantitative Examples](#)" *International Journal of Design & Nature and Ecodynamics* 11 (1) 48-63. DOI: 10.2495/DNE-V11-N1-48-63
4. Ronald Balsamo, Merewyn Boak, Kayla Nagle, Bela Peethambaran, Bradley Layton, 2015. "[Leaf biomechanical properties in Arabidopsis thaliana polysaccharide mutants affect drought survival](#)" *Journal of Biomechanics* 48 (15) 4124-4129.
5. Peters, T., Lynch, B., Layton, B.E., Jamieson, B.G., 2012. “A Space-Based Electrical Impedance Hematology Analyzer,” [Journal of Micromechanics and Microengineering](#) 22 (2) 1-7.
6. Allen, K.B. and Layton, B.E. 2010. "[Determination of the Mechanical Properties of DOPC:DOPS Liposomes using an Image Procession Algorithm and Micropipette-Aspiration Techniques](#)" *Chemistry and Physics of Lipids* 163 (8) 787-93. PMID: 20863821
7. Layton, B.E., M. Tripepi, B. Bitonti, N. Dollahon, RA Balsamo. 2010. "[Dehydration-induced expression of a 31-kDa dehydrin in Polypodium polypodioides \(Polypodiaceae\) may enable large, reversible deformation of cell walls](#)" *American Journal of Botany* 97 (4) 535-544. PMID: 21622416
8. J. Andrew Goshorn, Edward M. Deegan, and Layton, B.E. 2010. "[Spare Part Storage Optimization Onboard Deployable Military Support Assets](#)" *Naval Engineers Journal* 122, (1) 137-47.
9. Allen K., and Layton B.E. 2009. "[Determination of the Forces Imposed by Micro and Nanopipettes during DOPC:DOPS Liposome Manipulation](#)" *Chemistry and Physics of Lipids* 162 34-52. PMID: 19665459.
10. Allen K., F.M. Sasoglu, and Layton, B.E., 2009. "[Cytoskeleton-Membrane Interactions in Neuronal Growth Cones: A Finite Analysis Study](#)" *Journal of Biomechanical Engineering-Transactions of the ASME*, 131(2) 1-10. PMID: 19102565.
11. F. Mert Sasoglu, Andrew Bohl, Kate Allen, Layton, B.E. 2009. "[Parallel force measurement with a polymeric microbeam array using an optical microscope and micromanipulator](#)" *Computer Methods & Programs in Biomedicine*, 93 1-8. PMID: 18774621.
12. Layton, B.E. 2008. “A Comparison of Energy Densities of Prevalent Energy Sources in Units of Joules Per Cubic Meter,” *International Journal of Green Energy* 5 (6) 438-455. <https://www.tandfonline.com/doi/abs/10.1080/15435070802498036>
13. Zeiger, A. Layton, B.E. 2008. "[Molecular Modeling of the Axial and Circumferential Elastic Moduli of Tubulin](#),” *Biophysical Journal*, 95 3606-3618. PMID: 18621829.

14. Layton, B.E. Adam D'Souza, Adam Zeiger, Alia Sabur, William Dampier 2008. "[Collagen's triglycine repeat length may help to explain an interdomain transfer event from a eukaryote into Trichodesmium erythraeum](#)" Journal of Molecular Evolution, 66 (6) 539-554. Cover Image. PMID: 18521530.
15. Layton, B.E. 2008. "[Recent Patents in Bionanotechnologies: Nanolithography, Bionanocomposites, Cell-Based Computing and Entropy Production](#)" Recent Patents in Nanotechnology, 2 (2) 72-83.
16. Mulero, R. Layton, B.E. 2007. "[Two-dimensional Minkowski sum optimization of ganged stamping blank layouts for use on pre-cut sheet metal for convex and concave parts](#)" Journal of Manufacturing Systems 26 (1) 1-12.
17. Sasoglu, F.M. Bohl, A.J., Layton, B.E. 2007. "[Design and microfabrication a high-aspect-ratio tapered PDMS microbeam array for parallel nanoscale force measurement and protein printing.](#)" Journal of Micromechanics and Microengineering 17 623-632.
18. Layton, B.E., Sastry, A.M., 2006. "[An Equal and Local-Load-Sharing Failure-Mechanics Model for Peripheral Nerve Extracellular Matrix in Diabetic and Non-Diabetic Rats.](#)" Acta Biomaterialia 2 (6) 595-607. PMID: 16905373.
19. Gadia, V., Roy, S., Venkatesh, N., Lunagaria, S., Patel, R., Layton, B.E. 2005. "Towards Nanotechnology for All." News from the Bottom, Volume 1, Issue 2
20. Gadia, V., Roy, S., Venkatesh, N., Lunagaria, S., Patel, R., Layton, B.E. 2005. "Construction of an Educational Model of an Atomic Force Microscope." The Nanotechnology Group Volume 4, Number 7.
21. Layton, B.E., Sullivan, S.M., Palermo, J.J., Buzby, G.J., Gupta, R., Stallcup III, R.E., 2005. "[Nanomanipulation and Aggregation Limits of Self-Assembling Structural Proteins,](#)" MicroElectronics Journal 36 (7) 644-649. <https://doi.org/10.1016/j.mejo.2005.04.051>
22. Layton, B.E., Sastry, A.M., 2004. "[A Mechanical Model for Collagen Fibril Load Sharing in the Peripheral Nerve of Diabetic and Non-Diabetic Rats.](#)" ASME Journal of Biomechanical Engineering 126, 803-814. PMID: 15796339.
23. Layton, B. E., Sastry, A. M., Lastoskie, C. M., Philbert, M. A., Miller, T. J., Sullivan, K.A., Feldman, E.L., Wang C.-W., 2004. "[In Situ Imaging of Mitochondrial Outer Membrane Pores Using Atomic Force Microscopy.](#)" Biotechniques 37, 564-573. PMID: 15517968.
24. Layton, B.E., Sastry, A.M., Sullivan, K.A., Feldman, E.L., Wang, H., Philbert, M.A., Komorowski, T.E., 2004. "[Differences between Collagen Morphologies, Properties and Distribution in Diabetic and Normal BioBreeding and Sprague-Dawley Rat Sciatic Nerves.](#)" Journal of Biomechanics 37 (6) 879-888. PMID: 15111075.
25. Wang, H., Layton, B.E., Sastry, A.M., 2003. "[Nerve Collagens from Diabetic and Non-diabetic Sprague-Dawley and BioBreeding Rats: An Atomic Force Microscopy Study.](#)" Diabetes Metabolism Research and Reviews 19 (4) 288-298. PMID: 12879406
26. Cheng, X., Sastry, A.M., Layton, B.E., 2001. "[Transport in Stochastic Fibrous Networks.](#)" Journal of Engineering Materials and Technology 123 (1) 12-19.

### Technical reports

27. Layton, B.E. Westfall, D.W. Hammen, R.H. 2020. "Conceptual Design of a Rare-Earth Element Refinery in Colstrip, MT"
28. Layton, B.E. 2020. "Solar Analysis of Merle Norman 6kW Array"

29. Layton, B.E. 2018. “Power Savings at Pacific Steel after SATIC PowerPerfect Upgrade”
30. Layton, B.E. 2008. Final report for Pennsylvania Department of Community and Economic Development award, “A Green Alternative to Municipal Maintenance”
31. Layton, B.E. 2007. Internal report for “A Bioresorbable Staple with Growth Factor,” submitted to Coulter Foundation.
32. Layton, B.E. 2006. Final report for Pennsylvania Health Department award, “Nanoscience meets Nanotechnology”
33. Layton, B.E. 2005. Final report for NSF-DMII MRI award, “Acquisition of a Nanomanipulation Device for Biological, Electronic and Optoelectronic Samples and Devices”

#### **Application notes**

34. Layton, B.E. 2002. [World Precision Instruments 900A](#) User’s Manual.
35. Rishi Gupta, Aaron Geisberger, Gareth Hughes (Zyvex Corporation), Dr. Bradley Layton (Drexel University), Zyvex Application Note 9710: “Manipulation of Collagen for Mechanical Characterization” [http://www.zyvex.com/Products/CFMC\\_001a.html](http://www.zyvex.com/Products/CFMC_001a.html)  
<http://www.zyvex.com/Documents/9710.PDF>

#### **Conference papers and abstracts published**

36. Robles, Dan, and Layton. 2020. “[The Innovation Bank: Blockchain Technology and the Decentralization of the Engineering Professions](#)” ASME International Mechanical Engineering Congress and Exposition. Portland, OR, November 16-19.
37. Holecek, Costa, Costa, Browne, and Layton. 2019 “A First-Principles Carbon Management Model: Two Case Studies” [International Biochar Initiative](#), Seoul, South Korea, November 10-14.
38. Layton, B.E. “[Anthropogenic entropy acceleration and its relationship to Shannon information in the context of socioeconomics](#)” 5<sup>th</sup> International Conference on Energy and Sustainability, December 16-18, 2014, Wessex Institute, Putrajaya, Malaysia. DOI: 10.2495/ESUS140271
39. Layton, B.E. “Mechanoevolution: An Examination of the Coevolution of Humans and Technology” Inaugural meeting of the [International Big History Association](#), August 5, 2012, Grand Rapids, MI
40. Marks, F.M., Layton, B.E., Lowman, A.M. 2012 “AFM Force Mapping Method for Quantifying Adhesion Energy of Poly Methacrylic Acid pH-sensitive Hydrogels In Vitro” 34<sup>th</sup> Annual IEEE-EMBS Annual Conference, San Diego, CA Aug 28 - Sep 1.
41. Layton, Bradley “Energy Technology Program at The University of Montana College of Technology” UM + MCPS: Transforming Public Education Through Collaboration and Innovation May 9, 2012
42. Bradley Layton, 2011, “[The Application of Game Theory to Thermoeconomics IMECE2011-62681](#)” ASME International Congress and Exposition, November 11 – 17, Denver, Colorado. DOI: 10.1115/IMECE2011-62681
43. Layton, Bradley Edward 2010, “[Mechanoevolution](#)” Paper No: IMECE2010-39329. pp. 627-634. ASME International Mechanical Engineering Congress and Exposition, November 12 – 18, Vancouver, British Columbia, Canada. <https://doi.org/10.1115/IMECE2010-39329>.

44. Bradley Layton and Brandon Tolle, 2010, "Predicting Material Anisotropy at the Molecular Scale across all Sequenced Tubulins," ASME International Mechanical Engineering Congress and Exposition, November 12 – 18, Vancouver, British Columbia, Canada.
45. Dana Denick, Jay Bhatt and Bradley Layton, 2010. "Citation Analysis of Engineering Design Reports for Information Literacy Assessment" American Society for Engineering Education Annual Conference and Exposition, June 20 – 23, Louisville, KY
46. Simara Price, Bradley Layton, Maliha Ahmed, Shivanthi Anandan, 2010. "Towards Development of a Genetic System in *Trichodesmium erythraeum*," 110th General Meeting for the American Society of Microbiology. May 23 – 27 San Diego, CA
47. Michael Marks, Bradley Layton, and Tony Lowman, 2010. "Atomic Force Microscopy as a Tool for Determining Mucosin Adhesion *In Vitro*," Society for Biomaterials, April 21 – 24, Seattle, WA.
48. Justin Warren, Yury Gogotsi and Bradley Layton 2010. "Mechanical Properties of Assembled Nanopipettes" ASME Global Congress on NanoEngineering for Medicine and Biology (NEMB 2010), Feb 7 – 10, Houston, TX
49. M. Brent Boyd and Bradley Layton, 2009 "Nanomechanics of *Arabidopsis thaliana*" ASME International Mechanical Engineering Congress and Exposition November 13 – 19, 2009, Orlando, Florida (abstract and podium only)
50. Bradley Layton, 2009 "Fighting Fire with Fire: Information Theory Battles Global Warming," ASME International Mechanical Engineering Congress and Exposition November 13 – 19, 2008, Orlando, Florida (abstract and podium only)
51. Bradley Layton and Ronald Balsamo 2008. "Nanomechanics of Drought Tolerance" CREES/USDA Grantees Conference, September Sept 27 – 28, Santa Fe New Mexico.
52. Andrew Bohl and Bradley Layton "Energy Analysis of Sustainable Transportation" ASME International Mechanical Engineering Congress and Exposition November 2 – 6, 2008, Boston, Massachusetts (abstract and podium only)
53. Andrew Bohl and Bradley Layton "Mechanical Property Measurement of PLGA for Surgical Device Manufacturing" ASME International Mechanical Engineering Congress and Exposition November 2 – 6, 2008, Boston, Massachusetts (abstract and podium only)
54. Benjamin Legum and Bradley Layton "Nanofabrication Strategy for Carbon-Nanotube Pipettes" ASME International Mechanical Engineering Congress and Exposition November 2 – 6, 2008, Boston, Massachusetts (abstract and podium only)
55. Kate Allen and Bradley Layton, "A Mechanical Model for Cytoskeleton and Membrane Interactions in Neuronal Growth Cones," ASME International Mechanical Engineering Congress and Exposition November 11 – 15, 2007, Seattle, Washington
56. Layton, Bradley E., Lauren Jablonowski, Ryan Kirby, and Nick Lampe, "Bicycle Infrastructure Development Strategy for Suburban Commuting," [ASME International Mechanical Engineering Congress and Exposition](#). November 11 – 15, 2007, Seattle, Washington
57. Stephanie Sullivan, Brian Jamieson, Bernard Lynch, and Bradley Layton "Cell Sorting Evaluation of a Multi-Bed Microfabricated Hematology Analyzer," ASME International Mechanical Engineering Congress and Exposition November 11 – 15, 2007, Seattle, Washington

58. Adam Zeiger and Bradley Layton, "Tubulin Mechanics: A Molecular Mechanics Study of all Known Tubulin Structures," ASME International Mechanical Engineering Congress and Exposition November 11 – 15, 2007, Seattle, Washington. (abstract only)
59. Bradley Layton and Ronald Balsamo, "An Orthotropic Material Mechanics Model of Cellulose Wall Structure Derived From in situ AFM of the Drought-Resistant Fern *Polypodium polypodioides*," ASME International Mechanical Engineering Congress and Exposition November 11-15, 2007, Seattle, Washington. (abstract only)
60. F Mert Sasoglu, Devrim Kilinc, Kathleen Allen and Bradley Layton, "Towards a Method for Printing a Network of Chick Forebrain Neurons for Biosensor Applications," IEEE-EMBC Annual Meeting, Lyon, France, August 23-26, 2007.
61. Legum, B., Cooper, R., Gogotsi, Y., Layton, B.E. "The Effect of Deformation on Room Temperature Coulomb Blockade using Conductive Carbon Nanotubes," IEEE-EMBC Annual Meeting, Lyon, France, August 23-26, 2007. PMID: 18002930.
62. Adam Zeiger and Bradley Layton, "A Molecular Mechanics Model for Axial Elastic Modulus Prediction of Tubulin" ASME Applied Mechanics and Materials Conference, Austin, Texas, June 3-7, 2007. (invited, abstract only)
63. Bradley Layton and Adam D'Souza, "The Bonds That Make Us Big: The Collagen Goldilocks Hypothesis," ASME Applied Mechanics and Materials Conference, Austin, Texas, June 3-7, 2007. (invited, abstract only)
64. Ronald A. Balsamo, Manuela Tripepi, Natalie Algar, Jill M. Farrant, and Bradley E. Layton, "Whole leaves to cellulose microfibrils: Mechanical, molecular, and architectural approaches to study wall in-folding in vegetative tissues of desiccation tolerant plants." 5th International Workshop on Desiccation Sensitivity and – Tolerance in Seed and Vegetative Plant Tissues, 14 - 21 January, 2007, Drakensberg, South Africa
65. Layton, B.E., Tamayne, D. Dolin, M. Gallagher, M. "An Integrated Atomic Force Microscopy Nanomanipulation Stage for Biological Samples," Seeing at the Nanoscale IV, July 17-20, 2006, Philadelphia, PA.
66. Sasoglu FM, Bohl AJ, Layton BE 2006. Microfabrication Procedure of PDMS Microbeam Array using Photolithography for Laminin Printing and Piconewton Force Transduction on Axons. Conf Proc IEEE Eng Med Biol Soc. 1:2844-7. PMID: 17946983
67. Patel, R., Legum, B., Gogotsi, Y., Layton, B.E., "Parameterization of a Piezoelectric Nanomanipulation Device," Proceedings of ESDA2006 8th Biennial ASME Conference on Engineering Systems Design and Analysis, July 4-7, 2006, Torino, Italy.
68. Sullivan, S.M., Jamieson, B.J., Layton, B.E., "A Micro-Fabricated Electrical Impedance Based Hematology Analyzer," ASME International Mechanical Engineering Congress and Exposition. November 5-11, 2005, Orlando, FL
69. Allen, K.B., Sasoglu, F.M., Layton, B.E., "Mechanical Neural Growth Models," ASME International Mechanical Engineering Congress and Exposition. November 5-11, 2005, Orlando, FL
70. Layton, B.E., Jamieson, B.J., Sullivan, S.M. 2005. "A Micro-Fabricated Electrical-Impedance-Based In-Flight Hematology Analyzer," 3rd Annual Conference on Microchannels and Minichannels. June 13-15, Toronto, Canada.

71. Layton, B.E., Allen, K.B., Stokes, M.D., Myers, K.A., Baas, P.W., 2005. "Towards a Method for Peripheral Nervous System Axonal Stiffness Measurements with MEMS-based Microgrippers," 2nd Annual IEEE-EMBS Conference on Neural Engineering, March 16-19, Arlington, VA.
72. Layton, B.E., Fontecchio, A., Ko, F., Nabet, B., Spanier, J. 2005. "Acquisition of a Zyvex L100 nanomanipulation device for biological, electronic, and optoelectronic samples and devices." Design, Service and Manufacturing Research and Grantees Conference, Jan 3-6. Tempe, AZ
73. Layton, B.E. 2004. "Nanomanipulation and Aggregation Limits of Self-Assembling Structural Proteins" European Micro and Nano Systems, October 20-21, Paris France
74. Layton, B.E. 2004. "Self-Assembly Limits in Structural Proteins" Proceedings of ASME Integrated Nanosystems, September 22-24, Pasadena, CA
75. Layton, B.E., Gupta, R., Jackson, N.L., Shah, A.J., Stallcup, R.E., III, Sullivan, S.M., 2004. "Nanomanipulation and Characterization of Structural Proteins" 26th Annual International Conference IEEE-EMBS Sep 1-5, San Francisco, CA. PMID: 17270802.
76. Layton, B.E. 2004 "A Mechanics-Based Model for the Collagen Fibril Aggregation Limit" October 13-16, 2004, Biomedical Engineering Society Annual Fall Meeting, Philadelphia, PA
77. Layton, B.E. Sastry, A.M., 2003. Mitochondrial Pore Imaging via AFM. BMES Annual Fall Meeting. Oct 1-4, Nashville, TN.
78. Layton, B.E. 2003. Implications of hexagonal close-packing in a finite domain on self-assembly of nanofibrous materials. NATO-Advance Study Institute (ASI) Nanoengineered Nanofibrous Materials. Sep 1-12, Antalya Turkey.
79. Chenevert, T.L., Layton, B.E., Johnson, T.D., Schepkin, V.D., Ross, B.D. 2003. A Model of Temporal Dependence in Therapy-Induced ADC Change, ISMRM 11th Scientific Meeting and Exhibition, Toronto, Canada, July 10-16.
80. Layton, B.E., Sastry, A.M., 2002. Damage in the heterogeneous ECM of peripheral nerves due to diabetes. ASME International Mechanical Engineering Congress, November 17-22, New Orleans, LA.
81. Layton, B.E., Sastry, A.M., Wang, H., Sullivan, K.A., 2002. A model for pressure enhancement in the diabetic nerve: simulations of diabetic rat peripheral nerve and nerve collagens. 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society] EMBS/BMES Conference, 2002. Proceedings of the Second Joint, Volume: 1, 450 -451.
82. Sastry, A.M.; Layton, B.E.; Wang, H.; Sullivan, K.A.; Philbert, M.A.; Komorowski, Mechanical and structural changes in diabetic rat peripheral nerve collagens Annual International Conference of the IEEE Engineering in Medicine and Biology - Proceedings, v 1, 2002, p 432-433
83. Layton, B.E., Sastry, A.M., Sullivan, K.A., Feldman, E.L., 2000. Remodeling of Peripheral Nerve Tissue in Diabetic Rats. International ASME Congress, November 5-10, Orlando, FL

### **Patents and Provisional Patents**

1. Layton, B.E. "Robotic Chainsaw for Remote Liming and Bucking of Standing Trees." [62/963,597](#) Provisional Submitted Dec 2019.
2. Bradley Layton and Gregory Buzby "An Integrated Atomic Force Microscopy Nanomanipulation Platform" Issued January 19, 2010. Patent number 7,647,848.



3. Smith, Layton and Brown “Electromechanical Roadway Energy Scavenging Device” Submitted February 16, 2013.
4. Bradley Layton and Nicholas Haas, “Vertical Axis Wind Turbine,” (submitted)
5. Ari Brooks, Margaret Wheatley, Bradley Layton “A Surgical Stapler,” (submitted) <http://www.google.sr/patents/US20110264117>
6. Ari Brooks, Margaret Wheatley, Bradley Layton “A Surgical Staple, with Elution Drug,” (submitted) <http://www.google.sr/patents/US20110264117> (Layton and Sastry 2004; Layton and Sastry 2006)
7. Bradley Layton “A Pontoon Rowing Boat” (provisional patent, submitted November 29, 2005)

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## PENDING AND RECENT PROPOSALS

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1. [“Zero-Waste Blockchain Economy: Entropy and Information meet Financial Accounting”](#) MIT Climate CoLab. Circular Economy. Semi-Finalist \$10,000
2. POWER Grant to the Montana Department of Labor and Industry \$125,000 for Renewable Energy Technology Training for displaced coal workers
3. MBRCT Annual Submission \$60,000
4. NorthWestern Energy \$5,000 for NABCEP solar PV course

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## FUNDED PROPOSALS, GRANTS, and MINI-GRANTS

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5. [“Nanotechnology-Enabled Extraction and Refinery of Rare Earth Elements, Scandium and Germanium from Powder River Basin Coal Residues in Montana”](#) DOE. \$2,150,000
6. USDA REAP \$22,800 - \$5,700 match – Lyon Ranch Solar
7. USDA REAP \$40,025 - \$10,006 match – Superior Meats Solar
8. NorthWestern Energy \$40,000 USB for Missoula Food Bank Solar.
9. Yung, L., et al. 2016. UM BRIDGES: Bridging Divides across the Food, Energy, and Water Nexus. National Science Foundation Research Traineeship (NRT) Program. (NSF DGE 1633831) (9/1/16 – 8/31/21). Role: Senior Investigator. Funding: \$2,999,932. (NSF 1)
10. KRELf Lommasson 2015 “10 kW PV Array for the Lomasson Center” Mark Hansen \$12k
11. KRELf WCSI 2015 “42.0 kW PV Array for West Campus” Ryan Carson. \$12k (\$8k match).
12. “2014 NorthWestern Energy Green Sense Educational Proposal Mobile Solar Training Lab” March 3, 2015 – December 31, 2015. Northwestern Energy \$40,000. Role: Co-PI. With Onsite Energy.
13. [“Project: Sustainable Energy Technology Program Enhancement at Missoula College: Partnering for Success.”](#) 8/1/2014 – 7/31/2017. National Science Foundation DUE-1400670. Role: PI. Co-PIs: Nicky Phear, Cheryl Madman. Funding: \$727,912. (NSF 2)
14. “Montana TAACCCT Consortium Grant” 2013-2017. US Dept of Labor. \$25M. UMontana budget ~\$1.3M. Lead Institution: Great Falls Community College.
15. “Special Topics Course: Shell Eco-Marathon” 2012 – 2013. Perkins Foundation. \$5,500.



16. “Solar Car for 2012 Shell EcoMarathon” Fall 2011. Funding for critical components for solar vehicle. Funding: \$1730.20 (KRELF internal)
17. “Faculty Development Travel Grant” The University of Montana. Fall 2011. Funds were used to travel to IEEE-EMBC and ASME conferences. Funding: \$1500 (internal)
18. “Human Powered Future” The University of Montana Research and Creativity Committee. 5/1/2011 – 8/31/2012. Total project funding: \$5,000 (internal)
19. “Energy Auditing Technologies” The Perkins Foundation. 4/1/2011 – 6/17/2011. Total project funding: \$2,500 (internal)
20. [“Multiscale Structure-Function Relationships of Collagen in the Marine Cyanobacterium \*Trichodesmium erythraeum\*”](#) NSF CMII 07030000 PI, with Shivanthi Anandan (Drexel Bioscience) and Fred Silver (UMDNJ). 6/1/2009 – 5/31/2012. Total project funding: \$403,000 (NSF 3)
21. “LiT: RUI: Mitigation of Dehydration-Induced Nanomechanical Failure in *Arabidopsis thaliana*,” Co-PI in collaboration with Ronald Balsamo of Villanova University. NSF IOS 0950374 3/1/2010 – 2/28/2014. Total Project Funding: \$422,000 (NSF 4)
22. "Design, Testing and Deployment of a Hybrid Savonius-Darrieus Wind Turbine for Urban Use" PI. Energy Commercialization Institute \$5,000
23. “Does nanoscale cellulose fibril rearrangement in mesophyll and vascular tissues affect survival rates during dehydration in *Eragrostis*?” USDA 2008-35100-04413 Co-PI, 7/15/2008 – 7/14/2010 with Ronald Balsamo (Co-PI) of Villanova University. Total project funding: \$100,000.
24. “The Keck Institute for Attofluidic Nanotube-Based Probes”, Co-I Yury Gogotsi, Gary Freidman, Jane Clifford, Elisabeth Papazoglou, Keck Foundation 7/1/07 – 6/30/10. Total Budget: \$3,000,000.
25. “A Savonius-Darrieus Hybrid Turbine for Urban or Residential Use” PI, NetScientific Inc. 6/30/2009. – 12/31/2010. Total project funding: \$45,000.
26. “MRI: Acquisition of a Nanomanipulation Device for Biological, Electronic and Optoelectronic Samples and Devices,” NSF DMII MRI 0421033 PI, with Co-PIs: Frank Ko, Jonathan Spanier, Adam Fontecchio, and Bahram Nabet, sponsored by the National Science Foundation, 7/15/2004 – 7/14/2005; Total project funding: \$143,000 (NSF 5)
27. “Nanotechnology Meets Neuroscience: Microgrippers to Study the Molecular Motor Mechanics of Axons,” Co-PI, with Peter Baas, sponsored by Pennsylvania Department of Health, 1/1/2005 – 6/30/2006; Total project funding: \$364,544
28. “A Micro-fabricated Hematology Analyzer,” Co-PI with Brian Jamieson, sponsored by DDF05-553 NASA, 1/1/2005 – 6/30/2006; Total project funding: \$60,000
29. “Drexel University GAANN Fellowships in Biomedical Applications in Engineering.” Co-I with Mun Choi, PI. Sponsored by Department of Education. P200A060138 8/1/2006 – 7/31/2009. Total project funding: \$400,000
30. “Research Experiences for Teachers in Areas of Innovative and Novel Technologies in Philadelphia” Co-I (PI: Mun Choi, Co-PIs: Yury Gogotsi, Bradley E. Layton, Athina P. Petropulu, Fredricka K. Reisman) Sponsored by National Science Foundation 0601845 10/1/06 – 02/28/09; Total project funding: \$459,904. (NSF 6)

31. “A Surgical Stapler with Biodegradable Staples” Co-PI (PIs: Ari Brooks and Margaret Wheatley) Sponsored by the Coulter Translational Research 11/30/2006 – 11/30/2007; Total project funding: \$95,000.
32. “A Green Alternative to Municipal Maintenance” PI Sponsored by the DCED and James Roebuck, C000021433 7/1/2005 to 6/30/2008. Total project funding: \$15,000
33. “MechanoEvolution: How early molecular winners affect our lives on a daily basis,” Drexel Special topics course, sponsored by Drexel University, Total project funding: \$5,000
34. “Cell and Protein Mechanics Workshop” Sponsored in part by IEEE-EMBS and Greater Philadelphia Bioinformatics Alliance, September 2006, Total project funding: \$6,000

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## **PROGRAM INITIATION AND DEVELOPMENT**

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1. Assisted my colleagues in the renaming of our department to “Applied Computing and Engineering Technology” to more accurately reflect our role at Missoula College, the University of Montana, and the Montana University System.
2. Initiated a Certificate of Applied Science in Energy Technology at Missoula College – The University of Montana.
3. Helped develop three Certificates of Technical Skills in Energy Technology fields as part of DOL TAACCCT SWAMMEI consortium.
4. Development of the Energy Technology Program at Missoula College - University of Montana. Helped facilitate the coordination of face-to-face and online learning.
5. Helped to establish the program in Physical Cell Biology with Peter Baas, Gianluca Gallo and Michele Marcolongo at Drexel University, 2006. This program is an inter-college program to give life scientists access to faculty and facilities on the Main Campus, while providing engineering students access to the faculty and facilities on the Queen Lane Campus. The primary focus of the program is to model and measure physical changes to cells and cytoskeletal elements in models relevant to disease and development.

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## **SEMINARS, LECTURES, WORKSHOPS, INVITED TALKS AND PRESENTATIONS**

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### **Talks and Roundtables**

1. “The Innovation Bank: Blockchain Technology and the Decentralization of Engineering Professions” Nov 16-19, 2020. ASME 2020 IMECE <https://youtu.be/XztRiX9PEr4>
2. “The Big Picture on Sustainability” to the Montana Board of Licensed Professional Engineers and Surveyors, Missoula, MT Sep 17, 2020 (invited)
3. “Diabetes Embrittles Peripheral Nerve: Direct Mechanical Evidence in the Sprague-Dawley Model” University of Michigan Neurology. December 18, 2019 (invited by [Dr. Eva Feldman](#)).
4. Zero Waste in the Last Best Place” A Conversation with the Franklin Elementary School 5<sup>th</sup> Grade Class on their efforts to eliminate waste. February 25, 2018.
5. Future of Renewable Energy Technology in Montana” The 2<sup>nd</sup> Asia Montana Energy Summit. Montana State University, Bozeman, Montana, Mansfield Center Delegation to Korean Institute for Energy Research. May 10, 2016.

6. “The Confluence of Renewable Energy and Human Health: Putting Ourselves to Work for a Human-Powered Future” Mansfield Center Brown Bag Lunch Series. University of Montana, 2016
7. Energy Roundtable with Abraham Kim, James Geiringer and William Whitsitt, Grape City Studios. Sendai Japan. March 2<sup>nd</sup> 2016.
8. “Bridging the Gaps: The Future of Energy.” Tohoku University. Sendai Japan. March 1<sup>st</sup> 2016.
9. “Motors and Motor Control: Nanomanipulators to Solar Cars” Grand Valley State University. January 15<sup>th</sup>, 2016.
10. “2015 Energy Technology Practicum” Austin Heavyrunner. Washington DC, Oct 23<sup>rd</sup>, 2015
11. “Birds of a Feather” with Cheryl Madman, Racquell Littleplume, John Pickens and Austin Heavyrunner, NSF ATE, Washington DC, Oct 22<sup>nd</sup>, 2015
12. [“The Big Picture on Energy Sustainability: The Evolution of Energy Flows through Societies” Harvesting Clean Energy](#) NCAT, Billings, MT Sept 29, 2015.
13. “Carbon Sequestration” Asia-Montana Energy Summit, Missoula, MT April 28 – 30, 2015.
14. “Energy Storage” Asia-Montana Energy Summit, Missoula, MT April 28 – 30, 2015.
15. [“Human Power”](#) April 2015. With Allison DePuy and the Inspired Classroom.
16. [“Solar Power”](#) April 2015 with Allison DePuy and the Inspired Classroom.
17. [“Uncle Helios”](#) April 2015 with Allison DePuy and the Inspired Classroom
18. [“Energy Talk”](#) April 2015 with Bob Seidenschwarz
19. “Anthropogenic Entropy Acceleration and its Relationship to Shannon Information in the Context of Socioeconomics” 5<sup>th</sup> International Conference on Energy and Sustainability, December 16-18, 2014, Wessex Institute, Putrajaya, Malaysia.
20. “Solutions: Towards a Landfill-free UMontana” Business School lecture, Oct 6, 2014. Invited by Jenny Mish to give a personal perspective on living a zero- or negative landfill lifestyle. Shared podium with Martin No Runner of i.e. Recycling.
21. “Measuring the Immeasurable: Putting some numbers on Humanity’s Technological Energy Budget” Global Leaders Initiative Freshman Seminar, Aug 28, 2014. Invited by Jenny McNulty and Dave Patterson
22. Madman, Cheryl, John Pickens, Cheri Kicking Woman, Lola Woppert, and Bradley Layton “Launching the Missoula College Browning Community College NSF Program” August Browning Community College, Aug 20, 2014, Browning, MT
23. Layton, B.E. “Opportunities for the Missoula College Energy Technology Program and the Missoula Economic Partnership” invited by Royce Engstrom. The University of Montana Undergraduate Center, February 28, 2013.
24. Layton, B.E. “Sustainable Transportation in Missoula” invited to speak to the Sustainable Business Council at The Loft with Steve Lippman, Microsoft’s Director of Environmental Engagement, by Sue Anderson, February 23, 2013.
25. Layton, B.E. Tim Chester, Grant Myhre, Andrew Machain. 2013 “Renewable Hands-on Energy Technology Projects at Missoula College.” Charter Day (invited by Provost Brown). February 13, 2013.

26. Oram, G. "Using the Carbon Cycle to Inhibit Global Warming: The Economic and Environmental Benefits to Burning Biomass" December 5<sup>th</sup>, 2012, Portland Oregon.
27. Balsamo and Layton "Potential roles of the signaling protein 14-3-3 in desiccation tolerance of grasses"
28. "Energy Technology Education in Efficiency To Engender Energy Independence: Science & Math Lay the Foundation for the Next Generation of Energy Technology Leaders." STEM Summit 2012 Keynote Speaker, Bellevue College. Bellevue, Washington, Feb 7, 2012 (*invited*)
29. "Your Photosynthetic Skyprint and Strategies for Reducing it" (panel member) The University of Montana Day of Dialog, October 27, 2011.
30. "Molecules, Bearers of Information, Carriers of Entropy: How Nanotech and Greentech Need to Start Talking" Joint Meeting of the Northwestern Division of the American Chemical Society and the Montana Academy of Sciences. April 16, 2011. (*invited keynote*)
31. "Sustainable Energy Technology" Given to Vicky Watson's students, November, 2010.
32. "Nanoscale Education" 50th Annual PNWIS conference in Missoula, University of Montana, November 3-5, 2010.
33. "Nanomechanics of Collagen Evolution in *Trichodesmium erythraeum*" University of Montana Department of Chemistry and Biochemistry hosted by Chris Palmer, September 27, 2010
34. "A Quantitative Look at Global Energetics" Drexel University Blood and Oil series hosted by Scott Knowles, August 11, 2010
35. "Diabetes and Collagen Mechanics" Drexel University Body Synthetic course hosted by Todd Doehring, August 11, 2010
36. "Practical Implications of the Energy Density of Prevalent Energy Sources," University of Montana, College of Technology, June 15, 2010.
37. "The Role of Cell and Protein Mechanics in Biomedical Engineering: A Perspective on Research and Teaching in the Post-Genomic Era" Ohio State University, Department of Biomedical Engineering. March 2010.
38. "Protein Evolution: Collagen and Tubulin Are Optimized Self-Assembling Nanobiomaterials" Eastern Analytical Symposium and Exposition. November 2009.
39. "Genetic Drift toward Mechanical Anisotropy: Collagen and Tubulin" MIT Materials Science Department, October 2009
40. "Nanoscale Protein Mechanics" University of British Columbia. March 2009.
41. "Collagen and Tubulin Mechanics," IUPUI. Invited by Alan Jones, March, 2008.
42. "Protein Evolution," Johns Hopkins University Applied Physics Laboratory. Invited by Ann Darrin, November, 2007.
43. "MechanoEvolution," Johns Hopkins University, Applied Physics Laboratory Colloquium. Invited by Ann Darrin, November, 2007.
44. "An Energetic Argument Justifies the War for Oil: What Engineers can do to Prevent the Loss of Life in the Quest for Energy-Dense Resources," Delaware Valley Chapter of the American Society of Mechanical Engineering. Invited by Mark A. Nicosia, President of Delaware Valley ASME, Widener University.

45. "Mechanics of Protein Evolution," October, 2007. Carnegie Mellon University. Invited by Phil LeDuc.
46. "The Mechanics of Protein Evolution," September, 2007. University of Colorado, Boulder. Invited by Jerry Qi.
47. "Tubulin Mechanics" May, 2007. Talk given with Adam Zeiger to Neurobiology and Anatomy Department, Drexel University.
48. "MechanoEvolution" April, 2007. Invited to speak to the Drexel University Mechanical Engineering and Mechanics department by the Engineering Graduate Student Association.
49. "The Relationship of Biomechanics to Drought and Desiccation Tolerance in Plants," Talk given as Keynote by collaborator, Ronald Balsamo of Villanova University to Omaha Nebraska group.
50. "Collagen Mechanics," February, 2007. Invited by Todd Doehring to speak at the Biomedical Engineering Departmental Seminar Series.
51. "Integration of an Atomic Force Microscope with a Nanomanipulator," February, 2007. Invited by Yury Gogotsi and the Drexel Nanotechnology Institute.
52. "Writing for Mechanical Engineers," February, 2007. Invited speaker to the faculty forum on behalf of Harriet Millan.
53. "Mechanical Genes," November, 2006. Invited speaker at Villanova University's biology departmental seminar series. Delivered via webcast.
54. "Cell and Protein Mechanics," November, 2006. Invited speaker at the Drexel College of Engineering Discovery Workshop on Bioscience Research hosted by Mun Choi and Kenneth Blank.
55. "An Educational Atomic Force Microscope," August, 2006. invited speaker at the MSP (Math and Science Program) outreach symposium hosted by Mun Choi
56. "Mechanical Axonal Growth Models: Towards Directed Neural Growth and Highly Parallel Piconewton Force Transduction," July, 2006. invited speaker at Bioengineering Department Politecnico di Milano, Milan, Italy.
57. "Mechanical Axonal Growth Models: Towards Directed Neural Growth and Highly Parallel Piconewton Force Transduction," July, 2006. invited speaker at National Nanotechnology Laboratories, Lecce, Italy.
58. "An Athletic Engineer's Perspective on the Value of an MIT Education," March, 2006. invited speaker at the MIT Young Alumni Club of Philadelphia
59. "Bionanotechnology in Mechanical Engineering," November 2005. invited speaker at the Drexel University Chapter of the Society of Women Engineers.
60. "Nanometrology and Micrometrology of Cells, Organelles and Proteins under Mechanical and Environmental Challenge," December, 2005. invited speaker at the Army Research Laboratory
61. "Nanometrology and Micrometrology in Biological Systems" November, 2005. invited speaker at the National Institute of Standards and Technology, Mathematical and Computational Sciences Division
62. "An update of the micromanipulation and nanomanipulation capabilities at Drexel University." July, 2005. invited speaker at the Drexel University GPBA Bio-Nanotechnology Symposium

63. “Micromanipulation, Nanomanipulation and Self-Assembly Limits of Structural Proteins” February, 2005. invited speaker at the Drexel University Department of Material Science and Engineering
64. “Nanotechnology meets Neuroscience” February, 2005. invited Neurology Grand Rounds speaker at the Drexel University School of Medicine
65. “Micromanipulation, Nanomanipulation and Self-Assembly Limits of Structural Proteins” November, 2004. invited speaker at the Drexel University Department of Biomedical Engineering, Science and Health Systems
66. “Nanomanipulation and Characterization of Structural Proteins” November, 2004. invited speaker at the Computational Systems Biology Group sponsored by Aydin Tozeren
67. “Nanosopic Imaging and Nanomanipulation of Neurons, Organelles, and Proteins” July, 2004. invited speaker at Drexel Queen Lane Campus laboratories of Dr. Peter Baas on neuronal manipulation
68. “Cellular Nanomanipulation: Cell Sensing Series” June, 2004. invited seminar speaker at Drexel Biochemistry Department IBAPS Institute of Basic and Applied Protein Science,
69. “Mechanical Models of Soft Tissue: Molecular to Tissue Scales” October, 2003. Invited seminar speaker at Drexel University Material Science Department.

#### **Conference Poster Presentations**

1. “Solar Thermal and Microhydro Missoula College Energy Technology Showcase” with Kristin Onstad and Greg Gonstad, NSF ATE, Washington DC, Oct, 2016
2. Missoula College Energy Technology Showcase” with Cheryl Madman, Racquell Littleplume, John Pickens and Austin Heavyrunner, NSF ATE, Washington DC, Oct 23<sup>rd</sup>, 2015
3. Oram, Gary, Six, Diana, Layton, Bradley. 2013. “Why Renewable Energy Matters: There Isn’t Any More Out There.” 13<sup>th</sup> Annual Conference on Science, Policy and the Environment, Washington DC. January 15<sup>th</sup> – 17<sup>th</sup>, 2013.
4. Nagle, K., Little, T., Balsamo, R., Layton, B. 2012. “Towards a model for nanoscale cell wall prediction of drought survivability in *Arabidopsis thaliana*” The 11<sup>th</sup> Annual Graduate Student & Faculty Research Conference, Missoula, MT, April 14
5. Sasoglu, F.M., Allen, K.B., Layton, B.E. 2007. “Fibronectin printing and Neuronal Arrays,” Mid-Atlantic MEMS Alliance, Johns Hopkins University, MD, October 2, 2007.
6. Sasoglu, F.M., Bohl, A.J. Layton, B.E. 2006. “Design and Characterization of a Parallel Nanoscale Force Transduction Array,” 28th IEEE EMBS Annual International Conference, New York, NY, August 30- September 3, 2006.
7. Sullivan, S.M., Layton, B.E., Jamieson, B.G. 2006. “A Micro-Fabricated Electrical-Impedance-Based In-Flight Hematology Analyzer,” Mid-Atlantic MEMS and Nanotech Special Topics Symposium, Laurel, MD, April 4, 2006.
8. Sasoglu, F.M., Layton, B.E. “Design and Microfabrication of an Actuated PDMS High-Aspect-Ratio Microbeam Array for Piconewton Force Transduction,” TASSA Conference, Drexel University, March 25-26, 2006.

9. Sasoglu, F.M., Layton, B.E. "Design and Microfabrication of an Actuated PDMS High-Aspect-Ratio Microbeam Array for Piconewton Force Transduction," Mid-Atlantic MEMS and Nanotech Special Topics Symposium, Laurel, MD, April 4, 2006.
10. Sullivan, S.M., Layton, B.E., Jamieson, B.G. Velasquez, J. 2005. "A Micro-Fabricated Electrical-Impedance-Based In-Flight Hematology Analyzer," BMES Fall Meeting, Baltimore, MD, September 29, 2005.
11. Sasoglu, F.M. Layton, B.E., 2005. "Parameterization and Microfabrication Procedure of A Microcone Array to Measure Cell Stiffness," BMES Fall Meeting, Baltimore, MD, September 29, 2005.
12. Allen, K.B., Layton, B.E., 2005 "Mechanical Neural Growth Models" BMES Fall Meeting, Baltimore MD September 29 2005.
13. Allen, K.B., Layton, B.E., 2005. "Microtubule Polymerization, and Single Cell Micromanipulation," A.J. Drexel Institute of Basic and Applied Protein Science 3rd Annual Protein Institute Retreat, June 16th 2005
14. Sasoglu, F.M., Layton, B.E., 2005. "A Silicone Elastomer Microbeam Array for Measuring Neurite Stiffness," Drexel University Research Day, April 26, 2005, Philadelphia, PA.
15. Sullivan, S.M., Layton, B.E., Jamieson, B.J., 2005 "A Micro-Fabricated, Electrical-Impedance-Based Space-Based Hematology Analyzer," Drexel University Research Day, April 26, 2005, Philadelphia, PA.
16. Layton, B.E., Fontecchio, A., Ko, F.K., Nabet, B., Spanier, J.E., Luzzi, D., MacDiarmid, A., Allen, K.B., Ermold, M., Gallo, E., Laim, L., Sullivan, S.M. Titchenal, N., 2005. "Acquisition of a nanomanipulation device for biological, electronic, and optoelectronic samples and devices" National Science Foundation Design, Service, and Manufacturing Research and Grantees Conference, January 3-6, 2005, Scottsdale, AZ,
17. Sullivan, S.M. Layton, B.E. 2004 "Genomic Sequence Analysis of Structural Proteins as a Predictor for Tissue Properties" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA.
18. Jackson, N.L., Sullivan, S.M., Layton, B.E. 2004. "'Knanoknot' Nanomechanical Manipulation of Collagen fibrils" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA.
19. Rose, S., Tan, S., Azad, F., Layton, B.E. 2004. "A self-assembly model for genetically engineered collagen" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA
20. Stokes, M., Layton, B.E., 2004 "Nanotechnology - Thermally Activated microgrippers" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA
21. Palermo, J.P., Buzby, G., Allen, K., Hudson, J., Hubert-Theriot, J., Layton, B.E. 2004. "Bench Top Atomic Force Microscope" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia,
22. PA Shah, A.J., Layton, B.E., 2004. "Assessment and Design of MEMS Microgripper Technologies," Drexel University Research Day, May 4, 2004, Philadelphia, PA.
23. Sullivan, S.M., Layton, B.E., 2004. "Directed Evolution of Earth's Most Abundant Protein," Drexel University Research Day, May 4, 2004, Philadelphia, PA.



24. Jackson, N.L., Layton, B.E., 2004. “KnanoKnot” – Nanomechanical Manipulation of Collagen Fibrils,” Drexel University Research Day, May 4, 2004, Philadelphia, PA.
25. Ramacrishna, P., Layton, B.E., 2004. “Towards Building a Molecular Rope Using Molecular Dynamics,” Drexel University Research Day, May 4, 2004, Philadelphia, PA.
26. Layton, B.E. “A Mathematical Model of Apparent Diffusion Coefficients in Brain Tumor Magnetic Resonance Imaging” July, 2003. presentation of postdoctoral research on brain tumor response modeling to Radiology Department, University of Michigan
27. Layton, B.E. “Nanosopic Mitochondrial Imaging” June, 2003. presentation of postdoctoral research on mitochondrial imaging results to Neurology Department, University of Michigan

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## TECHNICAL REVIEWERSHIP AND CONFERENCE ORGANIZATION

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### Proposal Reviews

1. “UMontana Internal \$5k Awards” with Kari Harris, The University of Montana 2015
2. “Hot Water” NIH and USDA proposal reviews with Steve Sprang, Fairmont Hot Springs 2015
3. Numerous NSF Review panels 2011 – pres
4. Online survey for National Science Foundation’s review policy 2013
5. Internal Drexel University reviewer for State of Pennsylvania tobacco settlement 2009
6. National Science Foundation Reviewer for the University of South Carolina Nanocenter 2010

### Book Reviews

7. Reviewer for “Engineering Your Future” Wiley
8. Reviewer for “Engineering Skills for Career Success” Alexander/Watson
9. Reviewer of “Thinking Like an Engineer” Stephan et al. Pearson
10. Reviewer for “Energy Systems and Sustainability” Boyle, Everett, and Ramage. Oxford University Press
11. Reviewer for “Sustainability: Theory and Practice” Pearson
12. Evaluator for “Systems Biomechanics of the Cell” Springer

### Technical Reviews

13. IREC Standard 14732, 2011

### K-12 Academic Reviews

14. National Science Bowl Middle School Math, 2017
15. National Science Bowl High School Chemistry, 2017
16. National Science Bowl Middle School Energy, 2017

### Journal paper and conference paper reviews

The Aeronautical Journal • Advances in Engineering Education • ASME Conference on Engineering Systems Design and Analysis • ASME Microchannels and Minichannels • Cell Biochemistry and Biophysics • Cellular and Molecular Bioengineering • Computer-Aided Design • Electrophoresis • IEEE-EMBC Proceedings • IREC Standard 14732: 2012 General

Requirements for Renewable Energy and Energy Efficiency Certification Programs • Journal of Composite Materials • Journal of Engineering Materials Technology • Journal of Mechanical Engineering Science • Journal of Micromechanics and Microengineering • Journal of Orthopedic Research • Journal of Physics D: Applied Physics • Journal of Polymer Science: Polymer Physics • Journal of Wind Engineering & Industrial Aerodynamics • Lab on a Chip • Langmuir • MicroElectronics Journal • Nanotechnology • NATO ASI 2003 Nanotechnology Textbook • Neuroscience • Proceedings of the Institution of Mechanical Engineers, Part C, Journal of Mechanical Engineering Science • Recent Patents in Nanotechnology • The Royal Society Interface • Proceedings of the Royal Society A: Mathematical • Physical and Engineering Sciences • Sensors • Trends in Biotechnology

### **Conference Organization/Chair**

1. Organized panel on Energy Storage for Asia-Montana Energy Summit 2015.
2. Editor of Cell and Molecular Mechanics Theme for IEEE-EMBS, 2007 – 2015.
3. Invited to be session chair for ASME IMECE, Vancouver, British Columbia, Canada, November 15, 2010.
4. Session chair for “Nanoscale, Biological, Cellular and Nonlinear Materials – III,” ASME International Mechanical Engineering Congress and Exposition, November 11-15, 2007 Seattle, Washington
5. Chair for Cellular and Protein Mechanics Workshop sponsored by IEEE-EMBS, ASME, GPBA (Greater Philadelphia Bioinformatics Alliance). September 14-16, 2006. Philadelphia, PA
6. Co-Chair for Microscale Flows in Biological Systems Track of the ASME 3rd Annual Conference on Microchannels and Minichannels. June 13-15, 2005. Toronto, Canada.

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### **OTHER CONFERENCES/WORKSHOPS ATTENDED FOR PROFESSIONAL DEVELOPMENT**

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1. “Montana Water Laws and Regulations” HalfMoon Education Inc. Missoula, MT Nov 10, 2020
2. SEAK “How to Write an Expert Witness Report” – San Diego, CA March 7-8, 2020
3. SEAK “How to Give an Expert Witness Deposition” – San Diego, CA March 5-6, 2020
4. SEI PV 202 NorthWestern Energy 2020
5. NorthWestern Energy Solar Certification Training – SATIC USA December 2018.
6. Energy Blockchain Consortium – Orlando Florida Nov 1-3 2018.
7. Bozeman – NorthWestern Energy post-congressional session meeting, Bozeman, MT June 3, 2015
8. NCCER Instructor training. Awarded NCCER teaching certificate, September 23-23, 2014
9. NASA Glenn Research Center to discuss hydrogen production strategies, August 11-13, 2014
10. ANSI-IREC accreditation informational session, October 10-11, 2013
11. Green Thread Workshop hosted by Lisa Swallow and Steve June 2012
12. AFL CIO conference: “Into the Future: Montana’s Job Growth & Workforce Development Conference” May 22-23, 2012
13. “Clean Energy Workforce Education Conference” Saratoga, NY, March 8-10, 2011

14. “Living with the Lab: Boosting Hands-On Learning in Engineering Education” 2009. Louisiana Tech, July 12-15, 2009
15. IEEE Permanent magnet motor building course, November, 2007
16. Essential Skills of Dynamic Public Speaking. March 2007
17. Tree-tending. Ardmore, PA. April 2007. Certificate awarded
18. “How to Publish in Nature, or Wherever You Want: Tips for Manuscript Preparation to Avoid Being de-Natured” A special symposium by Chris Gunter, Senior Editor of Nature and only local Philadelphia editor, University of Pennsylvania, December, 2006
19. Richard Dawkins Lecture, Philadelphia Free Library, November, 2006
20. Drexel University Biomedical Applications Symposium, November 15, 2006
21. ASME Teaching Seminar, Drexel University September 21 – September 23, 2006
22. ASME Nano Bootcamp, Northwestern University, July 2004

## **INDUSTRY-UNIVERSITY RESEARCH INITIATIVES**

1. Serving as the Director of the Energy Technology Program at the University of Montana College of Technology. Several of the students who are enrolled in Energy Technology are displaced workers whose jobs have fallen victim to NAFTA. A large emphasis is placed on placing graduates into Energy Technology related jobs. To this end, I have established relationships with local manufacturers and companies to sponsor student projects. These are listed elsewhere.
2. Served as the director of the Cell and Protein Mechanics Laboratory at Drexel University. This laboratory has provided support for numerous Drexel faculty and has established a collaborative relationship with Zyvex Corporation, one of the Nation’s leading nanotechnology companies. Since acquisition of the Zyvex L100, Drexel University has been made a partner with under the Zyvex Academic Partnership program: <http://www.zyvex.com/Alliances/academic.html>

## **SUMMARY OF COURSES TAUGHT, AND COURSES DEVELOPED**

### **Energy Technology and Sustainability**

PV 202 Trigonometry of Solar Shading	2020
- Ad hoc invited lecture at the request of SEI instructor Tom Honey	
Zero Waste in the Last Best Place	2018
- Selected to teach at the Osher Lifelong Learning Institute	
ETEC 120 NCCER Core and Electrical I	2015
- Taught wiring and construction skills with support from DOL TAACCCT III	
EET 113 Circuits, Summer	2012
- Developed course with Wally Higgins in preparation for Practicum	
NRGY 101 Introduction to Energy Systems I	2010 – 2017
- Online and face-to-face delivery of 40+ students per semester	
NRGY 102 Introduction to Energy Systems II	2010 – 2017
- Online and face-to-face delivery of 10 - 20 students per semester	
NRGY 191/195 Energy Practicum	2011 – 2017
- Led ~20 students through hands-on project-based energy technology projects	

NRGY 213 Power Systems	2012, 2015
- Online and face-to-face delivery of problems from Kaiser's <a href="#">Electrical Power</a>	
NRGY 214 Energy Storage and Distribution	2015 – 2017
- Co-Taught with Alan Fraser	
NRGY 235 Building Energy Efficiency	2011, 2012, 2014
- Online and face-to-face delivery of ~15 students per semester	
NRGY 242 Solar Thermal and Wind Systems	2010 – 2017
- Online and face-to-face delivery of ~15 students per semester	
NRGY 245 Fuel Cells	2013
- Online and face-to-face delivery with laboratory component.	
NRGY 250 Energy Finance	2012, 2014
- Online and face-to-face delivery	
NRGY 295 Energy Practicum II	2015 – 2017
- Advised Dustin Armstad on Solar Thermal Collection design	
NRGY 296 Independent Study ASME Human-Powered Vehicle Design	2011
- Advised a team of six. Team won “Best Recycled Ride” in Bozeman	
NRGY 296 Independent Study Solar Car Design	2011 – 2014
- Advised a team of ten to compete in Shell EcoMarathon, Houston	
NRG 297 Undergraduate Research, Fall 2011, Spring 2012, Fall 2012, Fall 2014	
- Advised Trevor Little, pre-engineering student on cell nanomechanics (NSF grant)	
- Advised Will Smith on growing algae in magnetic fields	
- Advised Charles Moore on growing algae for energy production	
- Advised Eric Wall on Arabidopsis Nanomechanics	
- Advised Doug Cummins on lighting efficiency	
- Advised George Corddry on aquaculture project	
NRG 298 Energy Internship	2010 – 2017
- Advising ~5-10 students per semester on internal and external internships	
NRG 299 Energy Capstone	2010 – 2017
- Teaching ~5-10 students per semester sustainable transportation solutions	
Biochem 695 Master's research	2011- 2012
- Advised Kayla Nagle towards here doctoral degree in Biochemistry and Biophysics	

### **Mathematics**

MEM 591 Applied Engineering Mathematics	2004 - 2010
- matrix, tensor, vector notation, linear algebra, Markov processes, eigenvalue problems, analytical differential calculus, vector field calculus, heat transfer equations, fluid dynamics equations, elasticity equations	
MEM 592 Applied Engineering Mathematics II	2005 - 2010

- ordinary differential equations, partial differential equation, Laplace transforms, Navier equations, variation of parameters, waves in elastic solids, series solutions, non-linear differential equations

MEM 593 Applied Engineering Mathematics III 2005 - 2010  
 - Fourier transforms, partial differential equations, numerical methods, optimization, stochastic processes, probability theory, and statistics

### **Senior Engineering Design**

MEM 491 Senior Design “Vibrational Analysis of an Industrial Compressor”	2004
MEM 491 Senior Design “A Portable Pump Design”	2005
MEM 491 Senior Design “FSAE Braking System Design”	2006
MEM 491 Senior Design “Space-Based Hematology”	2006
MEM 491 Senior Design “NanoBase Design for a Simultaneous Atomic Force Microscopy and Nanomanipulation”	2006
MEM 491, 492, 493 Senior Design “A Miniaturized Hematology Analyzer”	2007
MEM 491, 492, 493 Senior Design “An Integrated Atomic Force Microscopy Nanomanipulation Platform for Biological Samples”	2007
MEM 491, 492, 493 Senior Design “A Human Electric Hybrid Vehicle Chassis”	2008
MEM 491, 492, 493 Senior Design “A Human Electric Hybrid Vehicle Motor and Controls”	2008
MEM 491, 492, 493 Senior Design “A Human Electric Hybrid Vehicle Suspension and Drivetrain Team.”	2008
MEM 491, 492, 493 Senior Design “A Small Wind Turbine for Sustainable Urban Energy.”	2008
MEM 491, 492, 493 Senior Design “A Surgical Stapler”	2008
MEM 491, 492, 493 Senior Design “Mechanical Testing of a Surgical Staple”	2009
MEM 491, 492, 493 Senior Design “A Small Wind Turbine for Sustainable Urban Energy: Mechanical Team.”	2009
MEM 491, 492, 493 Senior Design “A Small Wind Turbine for Sustainable Urban Energy: Electrical Team.”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Shell Design”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Frame Design”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Suspension Design”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Transmission Design”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Seat, Steering and Brakes Design”	2009
MEM 491, 492, 493 Senior Design “Automotive X-Prize Motor, Battery and Lighting Design”	2009
MEM 491, 492, 493 Senior Design “ASME Human-Powered Vehicle Transmission, Brakes and Steering design”	2009
MEM 491, 492, 493 Senior Design 2008-2009, team 013, “ASME Human-Powered Vehicle Seat, Frame and Shell Design”	

MEM 491, 492, 493 Senior Design 2009-2010, team 001, “ASME Human-Powered Vehicle Seat, Frame and Shell Design”

MEM 491, 492, 493 Senior Design 2009-2010, team 002, “ASME Human-Powered Vehicle Transmission, Brakes and Steering design”

MEM 491, 492, 493 Senior Design 2009-2010, team 003, “Automotive X-Prize Regenerative Brake Design”

MEM 491, 492, 493 Senior Design 2009-2010, team 004, “Urban-Turbine Design”

MEM 491, 492, 493 Senior Design 2009-2010, team 005, “Surgical Stapler-Staple Integration”

MEM 491, 492, 493 Senior Design 2009-2010, team 006, “Portable Solar”

### **Dynamics**

MEM 238 Dynamics 2004, 2009, 2010

- wrote and delivered lectures on Newtonian mechanics to Drexel’s pre-juniors
- worked with forty-five students on design projects to prepare them for their senior design class and to improve their technical communication skills.

### **Materials**

TDEC 211 Materials 2003

- led two recitations with approximately 30 students each
- facilitated online availability of course material

### **Freshman Engineering Design**

Primary Instructor for course of 850+ students 2008 - 2010

- Primary duties included delivering lectures, organizing guest speakers, maintaining syllabi, developing new moduli, organizing weekly meetings with core faculty, distributing weekly notes to the nearly 30 laboratory faculty, organizing weekly meetings with the ten graduate student teaching fellows, and leading at least two laboratories per week as well as maintaining grading consistency for all students.

TDEC 132 Freshman Design “A Two-Sided Television” 2004

TDEC 132 Freshman Design “Educational AFM team” 2004

- Faculty advisor educational atomic force microscope design team. Students used LabView, SolidWorks and performed database research into the fundamentals of atomic force microscopy. Students submitted the completed version which includes an instruction manual for integration with the NSF-RET program. Students received the highest grade of their class and have two online publications.

TDEC 132 Freshman Design KnanoKnot team 2004

- covered basic principles of scanning electron microscopy and nanomanipulation with the ultimate goal of pushing the dexterity limits of the Zyvex L100.

TDEC 132 Freshman Design “PVC Boat for Children” 2004

- covered basic principles boat design

TDEC 132 Freshman Design “NanoForensics” 2004

- evaluated the ability of nanoparticles to identify artifacts

TDEC 132 Freshman Design “PVC Boat for Adults” 2004

- covered basic principles boat design

TDEC 132 Freshman Design “Recycle Team”	2004
- explored alternatives to solid waste collection	
ENGR 101, 102, 103 “ <a href="#">Bicycle Highway</a> ,” Featured on Drexel University Innovations page	2004
ENGR 101, 102, 103 “A Human-Powered Composter”	2008
ENGR 101, 102, 103 “Automotive X-Prize Transmission Design”	2009
ENGR 101, 102, 103 “Human-Powered Vehicle Design”	2009
ENGR 101, 102, 103 “Space Elevator Design”	2009

### Special Courses

MEM 399 Integrated AFM Nanomanipulator Matt Dolin	2006
MEM 399 Knanoknot Derek Mitchell	2006
MEM 699-002 MEMS-Based Hematology Analyzer	2005
- Stephanie Sullivan’s project with NASA Goddard	
MEM-399-003 MechanoMolecular Properties of Growing Axons	2005
- Mentored Ms. Aisha Granville on the mechanical and electrostatic props of structural proteins	
MEM 380-005 MechanoEvolution	2005, 2006
- Explored the similarities and symbioses between natural evolution and machine evolution	
MEM 699-004 Marine Collagen Characterization	2006
- mentored student in atomic force microscopy of novel sponge collagen	
MEM 399-006 Marine Collagen Detection	2007
- Mentored student in immunohistochemical detection of Trichodesmium erythraeum collagen	
MEM 399-007 Collagen Evolution	2007
- Mentored student in bioinformatics of collagen evolution	
MEM 699-004 Cell and Protein Printing	2007
- Mentored student in cell and protein printing strategies for cell sensor arrays	
MEM 399-003 Nanobiomechanics	2007
- Mentored student in nanoscale biomechanics of cells and proteins	
MEM 399-001 Attofluidics	2007
- Mentored student Matt Lynch on nanofluid mechanics	
MEM 399-001 Drought resistant plants	2008 - 2013
- Mentored student Andrew McDonald on soft tissue mechanics	
MEM 399-001 Surgical Stapler	2008-2010
- Mentored student Scott Holden on finite element analysis and mechanical drawing	
MEM 695-001 Solar Tower Design	2010
- Abemelek Abay, Ethiopian master’s student with interest and experience in solar power design	



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## OTHER STUDENTS AND TEACHERS MENTORED

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### National Science Foundation Research Experience for Teachers

#### Summer 2004

Janet Hudson of Shaw Middle School and six of her students to prepare them for an international robotics competition.

Joyce Hubert-Theroit of Henderson Senior High School, and Mr. Joseph Podrazik to build an instructional atomic force microscope to be used at their schools

#### Summer 2005

Joe Podrazik, Souderton High School, Souderton, PA. Together we built an educational atomic force microscope for use in his high school engineering classroom.

Janet Hudson of Shaw Middle School. Together we explored the educational atomic force microscope

#### Summer 2006

Joe Podrazik, Souderton High School, Souderton, PA. Together we build a second-generation motorized educational atomic force microscope. This version was demoed during a webcast from Drexel to Souderton in the Fall of 2006.

Emily Wideman, Milton-Hershey High School, Hershey, PA

Fahmida Shah, North Carolina School of Science and Mathematics, North Carolina. Emily was involved in assisting my graduate student Kathleen Allen in computer modeling and culturing of neurons.

#### Summer 2009

Art Gutzler, NSF RET Fellow, Father Judge High School, Philadelphia, PA. Art performed atomic force microscopy on *Trichodesmium erythraeum* a performed image analysis, as well as prepared lesson plans based upon his findings.

#### Summer 2012

Kate Dirksen, Sentinel High School, Missoula, Montana. Kate is working with two students Kaylee Peters (9<sup>th</sup> grader at Sentinel) and Emily Sterbis (12<sup>th</sup> grade Big Sky) on their year-long science projects. My role is to explore with her the relationship between genetics and micromechanics in building a foundation of knowledge for understanding the drought resistance through the model organism *Arabidopsis thaliana*.

#### Autumn 2014

Wyatt Kingston, Sentinel High School, Missoula, Montana. Wyatt is working on a novel regenerative braking system for automobiles that is more or less an “air braking” system that deploys when car brakes are applied.

### SEED (Summer Engineering Experience at Drexel) Summer Mentorship Program

#### Summer 2004

Sally Tan, Illinois Math and Science Academy, Aurora, Illinois

Fahmida Shah, North Carolina School of Science and Mathematics, North Carolina

#### Summer 2005

Luke Irvin, Pine Grove High School, Pine Grove, Pennsylvania

Mike Iannuzzi, Springfield High School, Springfield, Pennsylvania

Dan Mattson, Glen Ellyn High School, Glen Ellyn, Illinois

Summer 2006

George Thomas, Poquoson High School, Poquoson, Virginia  
Nick Gunther, Springfield High School, Springfield, Pennsylvania  
Poonam Sharma, Plymouth Whitemarsh High School, Plymouth Meeting Pennsylvania,  
Sanjay Ramdon, Saint Mary High School, Highgate PO, Saint Mary, Jamaica.

Summer 2009

Casey Maher, Penn Charter, Philadelphia, PA  
Chris Jacinto, North Penn, Philadelphia, PA

Summer 2010

Shannon Sabino, Scale Model of Wind Turbine, Howell High  
Roman Frederick, Scale Model of High-Fuel Efficiency Car, Southwest Accelerated Learning Acad  
Timothy Hackett, Prediction of Tubulin's modulus from Tertiary Structure, Phoenixville High  
Chris Logue, Prediction of Tubulin's modulus from Tertiary Structure, Monsignor Bonnor High

### NSF 8-12 Outreach

**2015-2017** Led six faculty and 70+ Browning High School Students during the Energy Technology Summer Practicum under current \$730k NSF ATE award.

**2014-2015** Kasey Leavell, Wind Turbine Regenerative Braking System, Sentinel High School. Used 3D printing, home-made generator, and Newtonian mechanics model to develop deployable automobile braking system. Bronze medal at Sentinel HS Science Fair. Invited to compete at Arizona State University.

**2013** Developed and led an eight-week Lego Mindstorms™ curriculum for local 5<sup>th</sup> graders. Twenty students participated in five teams of four to accomplish tasks such as line following, color sensing, maze solving. Students learned applied geometry and logic in addition to the motor control and sensor capabilities.

**2012-2013** Emily Sterbis, Arabidopsis mechanics, Big Sky High School. Won first prize in "Intermountain Junior Science and Humanities Symposium and the title I used was "The Contribution of Cell Wall Architecture to Arabidopsis thaliana Survival in Drought." March, 2013

**2012** Kaylee Peters, Arabidopsis mechanics, Kaylee began her work with my research group as a rising 9<sup>th</sup> grader under the mentorship of Sentinel High School Botany teacher Kate Dirksen. She has a general interest in biology and environmental science. She is working on developing her own hypothesis as to how understanding the genotype-phenotype relationship of structural compounds in Arabidopsis thaliana may help us to understand how plants may have to adapt to a warming global climate.

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## SUMMARY OF SERVICE

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### Internal UMontana

- Grader, Math Counts 2020
- Director, Energy Technology 2010 – 2017
- Recycling Committee 2015 – 2017
- Executive Committee of Faculty Senate 2013 – 2015
- Global Leadership Initiative 2013 – 2014

- Faculty senate, 2011 – 2015
- University Revenue Enhancement Committee 2013
- Missoula College Strategic Planning Committee 2013
- Missoula College AS Planning Committee 2013
- Recruited and hired Elizabeth Baker to teach NRG 245 Fuel Cells
- Recruited and hired Greg Guscio to teach NRG 243 Photovoltaic Design and Installation
- Recruited and hired Jonathan Bowe to teach NRG 246 Introduction to Geothermal Systems
- Recruited and hired Zandy Sievers to teach NRGY 235 Building Energy Efficiency
- Recruited and hired Conor Darby and Tim Chester for NRGY 243 Photovoltaic Systems Installation
- Recruited and hired Lagan Todd to teach NRGY 235 Building Energy Efficiency
- Recruited and hired Marc Olson to teach NRGY 101 Introduction to Sustainable Energy Systems I
- Recruited and hired Marc Olson to teach CCS 102 Introduction to Sustainable Energy Systems II
- Faculty advisor for UM rowing team 2010-2011

#### **External UMontana**

- NorthWestern Energy Electrical Transmission Advisory Committee 2017 – present
- National Society of Professional Engineers Financial Technologies Taskforce 2015 – present
- Advised Montana Learning Center on renewable energy systems 2014
- Advised Hive on renewable energy systems 2014 – 2016
- Served as judge for Hellgate High School Senior Projects 2013
- Provided off-grid power to River City Roots Festival 2011, 2012
- Advised Hellgate High School Robotics Team, 2011
- Assisted with SpectrUM robotics camp, 2011
- Provided Biographical sketch to SpectrUM for their wind exhibit 2014

#### **Internal Drexel**

- Co-Chairman of the Graduate Student Recruitment Committee 2007-2010
- Mechanical Engineering and Mechanics Department representative to the Centralized Nanoscale Characterization and Microfabrication Facility 2007-present
- Chairman for the College of Engineering SuperNOVA project 2004-2005
- Committee member for the BS-Premed committee 2004-present
- Committee member for the mechanics committee 2003-present
- Drexel University College of Engineering Junior Advisory Council representative for the Mechanical Engineering and Mechanics Department (2006-2008)
- MEM External Affairs Committee (2006-present)
- MEM Outreach Committee (2006-present). Signed up to speak at MIT's ICAN (Institute Career Assistance Network) as a vehicle for recruiting graduate students.
- Drexel University Research Experiences for Teachers (RET) Program, Drexel University, Philadelphia, PA, 2003-2006: Worked closely with Ms. Janet Hudson of Shaw Middle School, Ms. Joyce Hubert-Theroit of Henderson Senior High School, and Mr. Joseph Podrazik to build an

instructional atomic force microscope to be used at their schools to bring the concepts of high-power microscopes to young students.

- Regular participation in the Higher Education Research Institute (HERI) Faculty Survey

### **Outreach Relations and Activities**

1. Served on the Mansfield Center Energy and Health Sciences Delegation to China, Japan, and Korea 2015 – 2017.
2. Helped author the [Missoula Zero Waste Resolution](#) as part of the Climate Smart Initiative.
3. Attended and lectured during Montana University System tour of Native American Colleges, February 2, 2015.
4. Attended Montana Renewable Energy Association's 2014 Clean Energy Fair. Successfully deployed wind turbine with Energy Technology students.
5. Attended Missoula Climate Change Summit meeting, October 2013. Suggested going to landfill-free model and development of Hydrogen Fueling Station.
6. Interview with UMontana journalism student Seab Larson for RTV350, Intermediate Video Photography project
7. Member of the Missoula Sustainable Business Council via Human Powered Future, PLLC
8. Invited to advise local middle school students on "The School of the Future" competition, CS Porter and Meadowhill Middle Schools, October, 2011
9. Taught course "Learn to Row from a Pro." UM Rec Center, Sept 2010. Invited by Sonja Tysk

### **Drexel University**

10. Special Workshop on Human Electric Hybrid Vehicle Design. January, 2008. Hosted John Tetz, independent HEHV builder, Rich Sadler, independent HEHV builder, and Stephen Mosca, founder of Go-One
11. Tour of Bossone Research Enterprise Building. June, 2007. Led a tour of five department heads and the provost of Wilkes University through the Bossone facilities along with their architect to discuss the design of the Bossone Building.
12. Tour of the Cell and Protein Mechanics Laboratory. March, 2007. Arranged through Joanne Ferroni as part of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology (NCSSSMST).
13. Tour of the Cell and Protein Mechanics Laboratory. February, 2007. Arranged through Mun Choi and Joanne Ferroni as part of Engineers week for local Philadelphia high school students. Tour led by Stephanie Sullivan.
14. Tour of the Cell and Protein Mechanics Laboratory. February, 2007. Arranged through Mun Choi for Dr. Hyun Chul Park's students of the Pohang University of Science and Technology.
15. "Mechanical Engineering at Drexel University: A perspective on the contributions engineers can make in the field of nanotechnology and global ecology" Special Webcast to Souderton High School, February, 2007. High School. Invited by Joseph Podrazik, Souderton High School Engineering Teacher.
16. Tour of the Cell and Protein Mechanics Laboratory. January, 2007. Arranged through Joanne Ferroni for the Lego League to understand the fundamentals of the Educational AFM.

17. North Philadelphia High School Laboratory tour of the Cell and Protein Mechanics Laboratory. December 2006. Twenty students discussed fundamentals of cell and protein mechanics in a hands-on demonstration. Organized through Joanne Ferroni.
18. A visit to the Energy Coordinating Agency of Philadelphia, Philadelphia, PA, November 2006. Organized a meeting with Harold Finigan and a group of freshman engineering students to learn how solar cells work.
19. Junior FIRST Robotics LEGO Japan Competition Philadelphia, PA, 2005. Worked closely with Janet Hudson of Shaw Middle School and six of her students to prepare them for an international robotics competition. Helped in securing funds from Governor Edward Rendell's office of special programs.
20. Drexel University Summer Engineering Experience at Drexel for Middle School Females, Philadelphia, PA, 2005. Presented work in my laboratory to a group of twenty-five eighth-grade girls to give them insight into university engineering research.
21. Illinois Math and Science Academy, Aurora, Illinois, 2005. Presented Drexel's engineering curriculum to over three hundred high school students, and continued to mentor Ms. Sally Tan on her work she did at Drexel during the summer of 2004 under the Summer Internship Program.
22. Souderton Public High School, Souderton, PA, 2005. Spoke to engineering class on aspects of engineering and engineering education. Topics included biomedical engineering and nanoscopic imaging and nanomanipulation.
23. Havertown Public High School, Havertown, PA, 2005. Served as a judge for senior projects ranging from engineering projects to ethics debates.
24. Souderton Public High School, Souderton, PA, 2004. Spoke to engineering class on aspects of engineering and engineering education. Topics included biomedical engineering and nanoscopic imaging and nanomanipulation.
25. Louis Stokes Alliance for Minority Participation, Drexel University, Philadelphia, PA, 2004. Worked closely with Ms. Nykia Jackson and Ms. Sidia Rose to develop bistable microgripper technology and genetically engineered collagen protocols.
26. Illinois Math and Science Academy, Aurora, Illinois, 2004. Presented Drexel's engineering curriculum to over three hundred high school students.
27. Young Inventors Competition Judge, Bonner HS, Drexel Hill, PA, 2004: At the invitation of local high school teachers I served as a judge at a local high school invention competition.
28. National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology Stuyvesant H.S., New York, NY, 2004: Presented current advanced research topics in nanotechnology to high school students and teachers.
29. Drexel University Summer Mentor Program, 2004: This summer program has enabled me to invite top high school students to participate in the investigations of my laboratory.
30. Drexel University Premed for Engineers Initiative, 2003-: Developed committee to bring a full premed degree to the College of Engineering at Drexel University.
31. Hands on Science, US Department of Energy, 1992: As a US Department of Energy employee in Washington DC, I traveled to a local K-12 school teaching science interactively to gifted minority students in southeast Washington DC.

## News Appearances

1. "Energy Talk" Aug 12, 2019. Bob Seidenschwarz. KVGGO 1290.
2. "Is Dirty Electricity Harmful to Human Health" July 28, 2019. Interview on the [Kim Komando Show](#)
3. "[An Engineer's Perspective on Environmental Challenges](#)." April 25, 2019. OmTimes Radio Interview with Jennifer McKenna of Conflict Rising.
4. "[Sustainable Missoula: Making the Case for Zero Waste by 2050](#)." Zero Waste Feature in the Missoula Current. July 27, 2018.
5. "Zero Waste" Interview by Brian Kahn of [Homeground Radio](#) to discuss Zero Waste in the Last Best Place. March, 2018.
6. Interview with Bob Seidenschwarz, Jon King, and Peter Christian on [Talkback](#) KVGGO on the future of energy technology in Montana." August 25, 2016.
7. "[Saved By The Alarm Bell: Missoula's Unsung Secret Greatness](#)" KBGA Interview with Dog Majik. May 7, 2016.
8. "Leading by Example" Featured in local magazine for living landfill-free in a small city in Montana with significant recycling challenges. [Missoula Valley Lifestyles](#), April 2016.
9. STEMfest 2015 feature in [Missoulia](#) with support from Inspired Classroom and StemConnector. Brought dozens of educators, researchers and industry leaders together to reach out to approximately 2000 Montana high school students.
10. "Harvesting Clean Energy TV interview with Lane Nordlund" CBS news. September 29, 2015.
11. "Harvesting Clean Energy radio interview with Russell Becker" September 29, 2015.
12. "Governor Bullock Recognizes Clean Energy Innovation" The Energy Independent. August 2015.
13. Cited on Mountain West News for developing a multi-tiered post-secondary education structure in energy technology as part of the Department of Labor Trade Adjustment Act Community College Training Strengthening Workforce Alignment in Montana's Manufacturing and Energy Industries.  
<http://mountainwestnews.org/Page3.aspx?a=Perspectives&ID=179> Nov 20, 2014.
14. Interview with Bob Seidenschwarz on KGVO's "Talk Back" Discussed global energy supply as well as opportunities to join the Energy Technology Program. Wednesday May 8, 2012.
15. "Tim Chester builds his future in green energy" Kaimen, Wednesday October 24, 2012 by Alison Mills <http://www.montanakaimin.com/news/tim-chester-builds-his-future-in-green-energy-1.2935442#.UImdo4ZU2So>
16. "Energy from the sun: Solar-powered car on display for energy fair in Butte" Montana Standard, Friday July 20, 2012 by Piper Haugan  
[http://mtstandard.com/news/local/energy-from-the-sun-solar-powered-car-on-display-for/article\\_e4d86d10-d21e-11e1-b221-0019bb2963f4.html](http://mtstandard.com/news/local/energy-from-the-sun-solar-powered-car-on-display-for/article_e4d86d10-d21e-11e1-b221-0019bb2963f4.html)
17. "One in 15,000 feature of UM Solar Car Team" Kaimin Friday April 6<sup>th</sup> 2012
18. "UM Solar Car competes in Houston" Missoulia Monday, April 23<sup>rd</sup> 2012
19. "Layton interview with Peter Christian on Christian Communications Network on success of UM Solar Car at 2012 Shell Eco-marathon" May 3, 2012.
20. "Grant Myhre interview with Monte as UMCOT prepares for 2012 Shell Eco-marathon  
<http://www.nbcmontana.com/video/30711008/index.html>
21. "Missoula COT's recycled parts bicycle wins at local contest" May 22, 2011 By Chelsea Moy of the Missoulia [http://missoulia.com/news/local/article\\_bd9d7ad0-84f7-11e0-a1da-001cc4c03286.html?mode=story](http://missoulia.com/news/local/article_bd9d7ad0-84f7-11e0-a1da-001cc4c03286.html?mode=story)

22. “Drexel Students Take on the Solar Challenge” National Geographic story, Spring 2011. <http://news.nationalgeographic.com/news/energy/2011/04/110419-shell-ecomarathon-solar-car-drexel/> and <http://drexel.edu/mem/news/news/2011/April/ECE-Solar-Design/>
23. “Bringing Dehydrated Plants 'Back to Life'” March 31, 2010 EurkaAlert article by Sophia Balcomb. [http://www.eurekaalert.org/pub\\_releases/2010-03/ajob-bdp033110.php](http://www.eurekaalert.org/pub_releases/2010-03/ajob-bdp033110.php)
24. “Fans, foes: Status report due on stimulus jobs,” January 20, 2010. Interview with Philadelphia Inquirer Staff Writers Jane M. Von Bergen and Diane Mastrull.
25. “City weighs large-scale bike-sharing program,” May 19, 2008. Philadelphia Metro Appearance with Mayor Michael Nutter
26. “New Mexico Governor Bill Richardson addresses Drexel University,” May 19, 2008. Channel 10 news images of Layton’s Human-Electric Hybrid Vehicle.
27. “Drexel to Advance Nanotube Probes with \$1M from Keck,” August 24th, 2007. Philadelphia Business Journal. Press coverage for recent Drexel Keck Institute recently created at Drexel University for which I serve as CO-PI.
28. Philadelphia Fox 29. “Drexel University hosts FIRST Robotics Competition” Monday, March 27, 2006. Represented Drexel University College of Engineering on local Philadelphia TV station.
29. ABC Primetime Special Report on Nanotechnology at Drexel University, Aaron Gloster, Saturday October 15, 2005. Laboratory featured on local Philadelphia TV station.
30. Philadelphia Tribune, “From Philly to Japan” Janae Hoffler, Friday, August 19, 2005, Cover page and page B1. Mentorship of local middle school robotics team featured in local Philadelphia newspaper.
31. Philadelphia Daily News, “City Kids Gearing up for a Science Trip to Japan” Elmer Smith, Friday, August 19, 2005, Page 19. Mentorship of local middle school robotics team featured in local Philadelphia newspaper.
32. Philadelphia Daily News, “Shaw Students Come Back as Winners” Elmer Smith, Wednesday, August 31, 2005 Page 15. Mentorship of local middle school robotics team featured in local Philadelphia newspaper.
33. The Neighborhood Leader, “Shaw Middle School Robotics Team Compete in Japan”, Carole I. Smith, August 20-September 2, 2005, Page 10. Mentorship of local middle school robotics team featured in local Philadelphia newspaper.

### **Local Governmental Recognition**

1. Missoula College Energy Technology Program mentioned by Councilman Jason Wiener his weekly update on City Council committee work, January 20, 2015.
2. Cited in the Notes of Testimony at the Philadelphia City Council meeting November 3, 2005 for assisting the Shaw Middle School FIRST Robotics Team in their Japan Competition.

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## **HONORS AND AWARDS (INCLUDING NOMINATIONS)**

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1. Rising Star Award. 2017. iUniverse for “Zero Waste in the Last Best Place”
2. Editor’s Choice Award. 2017. iUniverse for “Zero Waste in the Last Best Place”
3. Faculty Sustainability Award, 2017. Awarded by the University of Montana Sustainability Office.

4. [Clean Energy Innovator Award](#), 2015, Montanans for Good Jobs and Clean Air & Bridger Brewing. Awarded by the Honorable Governor Steve Bullock.
5. John Ruffatto Memorial Award, 2014
6. Nominated for Professor of the Year Award by Department Chair, Thomas Gallagher, 2012.
7. Nominated for John Ruffatto Memorial Award by University of Montana Faculty Development Coordinator, Amy Kinch 2011.
8. Nominated for the Allen Rothwarf Award for Teaching Excellence, spring 2007 by Department Head Mun Choi.
9. Advisor for Best Freshman Design Project, “Design of a Portable Educational Atomic Force Microscope” with Rahul Singh, Vinay Gadia, Sristi Roy, Nischitha Venkatesh, Sagar Lunagaria, Rohan Patel, Drexel University, 2005
10. Honored by the Illinois Math and Science Academy for “Commitment to Mentoring and to the Developing Talent of Young Scientists and Engineers” April, 2005
11. Honored with a certificate of appreciation by the School District of Philadelphia for service to the NASA Explorer School’s students, parents, staff and community, July 2005.
12. Honored by the National Parks Service for volunteer work at the Wright Brothers Centennial Celebration, Kitty Hawk, NC, 2003.
13. Robert M. Caddell Award for research contributions in materials manufacturing, U of M, 2001
14. Best Solid Mechanics and Materials Poster for Graduate Symposium, U of M, 2001

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## **PROFESSIONAL MEMBERSHIPS**

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1. International Code Council
2. Professional Engineer, National Society of Professional Engineering
3. Financial Technologies Taskforce, National Society of Professional Engineering
4. Thompson Reuters Expert Witness
5. [LexVisio Expert Witness](#)
6. International Big History Association
7. American Society of Engineering Education
8. American Society of Mechanical Engineers
9. Biomedical Engineering Society
10. IEEE-EMBS Society (Editor)
11. Order of the Engineer
12. World Society of Sustainable Energy Technologies
13. Energy Educators Association

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## **GRADUATE STUDENT ADVISEES**

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1. Kayla Nagle (pre-doctoral student)
2. Kathleen Allen, Ph.D. (2009) National Science Foundation Fellow, Drexel University
3. Mert Sasoglu, Ph.D. (2009), Drexel University
4. Stephanie Sullivan, B.S. Ph.D. Candidate, Drexel University (SuperNOVA Fellow)
5. Adam Zeiger, B.S. M.S. (2007) Department of Defense Fellow, MIT
6. Andrew Bohl, M.S. (2010)
7. Benjamin Legum, Ph.D. pre-candidate (2011)
8. Michael Brent Boyd, Ph.D. pre-candidate (2012)
9. Herb Francisco, Ph.D. pre-candidate (2012)



10. Cameron Douglas, B.S. M.S. (2010)
11. Steve Helms B.S. M.S. (2010)
12. Mohammed Abba B.S. M.S. Ph.D. pre-candidate (2013)
13. Abemelek Abay, M.S. (2010)

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## DISSERTATION COMMITTEES

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1. Peter McDonough 2015 UMontana Environmental Studies
2. Reuben Darlington 2015 Michael DeGrandpre UMontana Chemistry and Biochemistry
3. Kevin Trout 2015 Andrij Holian UMontana Biomedical and Pharmaceutical Sciences
4. Jonathan Ayutsede 2005 (Frank Ko, Drexel MSE)
5. Teeranoot Chanthasopeephan 2007 (Jaydev Desai, Drexel MEM)
6. Andrew Darling 2005 (Wei Sun, Drexel MEM)
7. Adam Ertel 2009 (Aydin Tozeren, Drexel BME)
8. Connie Gomez 2006 (Wei Sun, Drexel MEM)
9. Michael Gormley 2009 (Aydin Tozeren, Drexel BME)
10. Tie Hu 2007 (Jaydev Desai, Drexel MEM)
11. Saif Khalil 2005 (Wei Sun, Drexel MEM)
12. Devrim Kilinc 2010 (Ken Barbee, Drexel BME)
13. Andrew Kossenkov 2010 (Aydin Tozeren, Drexel BME)
14. Lin Lu 2009 (Jack Zhou, Drexel MEM)
15. Michael Marks 2011 (Anthony Lowman, Drexel CBE)
16. Chris Massey 2009 (Michelle Marcolongo, Drexel MSE)
17. Bao Mosinyi, 2006 (Jonathan Awerbuch, Drexel MEM)
18. Rafael Mulero, 2011 (MinJun Kim, Drexel MEM)
19. Kalyani Nair 2009 (Wei Sun, Drexel MEM)
20. Anand Pillarisetti 2008 (Jaydev Desai, MEM)
21. Simara Price 2013 (Shivanthi Anandan, Drexel Biology)
22. Gwenaelle Proust 2005 (Surya Kalidindi, Drexel MSE)
23. Kishan Rijal 2009 (Raj Mutharasan, Drexel CBE)
24. Alia Sabur (Selçuk Güçeri, Drexel MSE)
25. Temitope Sodunke 2008 (Moses Noh, Drexel MEM)
26. Edward Steager 2009 (MinJun Kim, Drexel MEM)
27. Jason Toy, 2010 (Sorin Siegler, Drexel MEM)
28. Alexandra Vamvakidou 2009 (Aydin Tozeren Drexel BME)
29. Chun Xu 2005 (David Wootton, Drexel MEM)
30. Eda Yildirim 2006 (Wei Sun, Drexel MEM)
31. He Zhao 2009 (Bahrad Sokhansanj, Drexel BME)

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## EXTRACURRICULAR INTERESTS

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- bicycling, recycling, kayaking, sustainable energy, zero waste practices
- 1995 US National Rowing Team: Qualified US Quadruple Sculls for Atlanta Olympic Games
- 1997 US National Rowing Team
- [Queen Mother Cup](#) Champion in quadruple sculls, Henley Royal Regatta, [1995](#), [1997](#)
- 2000 – 2003 rowing instructor for Ann Arbor Rowing Club