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**ROSELITA FRAGOUDAKIS**

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**RESEARCH INTERESTS**

Under the umbrella of materials science I have been working on two classes of engineering materials: metals and composites.

- My research on metals focuses on the fatigue life of steel and more specifically the effect of heat and surface treatments on the performance of spring steel. The results of this research produced an optimized manufacturing model for steel leaf springs.
- Having in mind the loading conditions of leaf springs and their requirements for high cycle fatigue, I investigated Glass Fiber Reinforced Plastic (GFRP) laminated beams as a lighter material alternative to steel. My research continues to focus on these materials and more specifically a selection of an optimum stacking sequence for such structures. An optimum stacking sequence provides a high strength to stiffness ratio and high cycle fatigue at a lower weight compared to steel. The latter characteristic of composites is important when using an environmentally friendly design for heavy duty vehicles. Additionally, it also investigates the fiber orientation around the stress concentration areas of geometric discontinuities. A major component of this work is computational and as a result, part of the research concerns the development of a user-friendly optimum stacking sequence calculator, predicting the minimum bending moment required to initiate failure in FRP laminated beams.
- The optimum stacking sequence investigation in laminated FRPs, has expanded to the examination of the mechanical behavior of different devices involving piezoelectric fibers. This examination is performed having in mind new industry requirements of energy harvesting and energy scavenging. The projects completed in this area investigate the fiber orientations and mechanical behavior of the devices to maximize the energy/current output.
- Fiber Reinforced Plastics (FRP) have been replacing metals and other materials in many industries over the past two decades, as a result of their high strength, customizable stiffness, and low weight. Sailboat sails are currently being designed and manufactured using carbon fibers. The optimum weave of the fibers offers the sail the desired shape for ultimate performance at a race. This is a new and exciting topic for me and I am embarking on its exploration.

## EDUCATION

Department of Mechanical Engineering, Tufts University, Medford MA

- Doctor of Philosophy in Mechanical Engineering (February 2012)
- Master of Engineering in Mechanical Engineering (May 2006)
- Bachelor of Science in Mechanical Engineering (May 2004)

## WORK & RESEARCH EXPERIENCE

### Assistant Professor of Mechanical Engineering

Department of Mechanical Engineering, Merrimack College (2015-present)

Courses Taught at Merrimack (*italics indicate newly developed courses, \* graduate/undergraduate level*)

- *Innovation and the Future of Technology\**  
(Spring 2020)
- *Hubei Polytechnic University  
(HBPU)-Merrimack College  
Applied Technology Program  
Mechanics: Statics-Dynamics Course  
(Summer 2019)*
- MEN 3010: Machine Design  
(Two Sections Every Spring 2016-present)
- MEN 3014: Dynamics and Vibrations  
(Two Sections Every Fall 2015-present)
- *MEN 4020\*: Finite Element Analysis  
(Fall 2016, 2017, Spring 2018, Fall 2018)*
- MEN 5040: Advanced Fluid Mechanics  
(Fall 2015)
- *MEN 5050\*: Manufacturing Processes  
(Spring 2016, 2017, 2019, Fall 2019)*
- MEN 4900: Senior Seminar (FE Preparation)  
(Spring 2019, Fall 2019)

### Postdoctoral Research (2012-2015)

Department of Mechanical Engineering, Tufts University, iQLP and Ionic Materials, Inc.

Characterization of polymer materials. Investigation of the surface microstructure of polymers (including Liquid Crystal Polymer (LCP) films) and their components. Analysis of their mechanical, chemical, electrical, and thermal properties, in order to determine their applicability in energy generation and storage devices. Experimental and Finite Element Analysis of the thermal stresses in Lateral Diffused Metal Oxide Semiconductor Packages (LDMOS).

Research performed in the facilities of the Materials Innovation Lab of iQLP and Ionic Materials, Inc, the Harvard Center for Nanoscale Systems (CNS), and the MIT NanoLab.

Primary Investigator: Professor Michael Zimmerman.

**Primary Investigator (2012-2014)**

Project Title: *"Optimization of the development and manufacturing of high performance leaf springs,"*

Grant by the Greek Secretary of Research and Technology (GSRT), Project Budget \$410,000.

Evaluation of current heat and surface treatment protocols followed by the industry in the manufacturing of steel leaf springs. Experimental analysis of new protocols and fatigue life experiments on products produced with suggested protocols, to define the ultimate heat and surface treatments that improve the fatigue life of leaf springs.

**Ph.D. Research**

Comparison of the fatigue life and damage accumulation of steel and fiber reinforced plastics. Fatigue experiments and finite element analysis were performed to determine the applicability of fiber reinforced materials on heavy-duty vehicle suspension systems. Optimization techniques and fatigue experiments were also performed in order to design hybrid suspensions.

Thesis Title: *Steel and GFRP Beams/Heavy-duty Vehicle Leaf Springs under Cyclic Loading.*

Advisors: Professor Anil Saigal and Professor Douglas Matson.

**Past Research Projects:**

- Microsoft HoloLens materials analysis (external consultant to Microsoft HoloLens Team in 2015).
- Finite element Analysis on the shape and material selection of space frames.
- Dentistry plugger geometry, designed through experimentation with liquids of different viscosities.

**Finite Element Software Instructor/Course Development (Fall 2011-2015)**

Course: Finite Elements, Professor Michael Zimmerman

**Part-time Lecturer**

Prepared and delivered lectures for the course: Mechanical Design and Fabrication (Spring 2012).

Co-taught with Professor Anil Saigal.

**Lab Coordinator (2011-2015)**

Course: Theory and Applications of Polymer Materials and Processing, Professor Michael Zimmerman

**Teaching Assistant (2007-2009)**

Applied Math for Engineers, System Dynamics and Controls, Advanced Strength of Materials, Advanced Structural Mechanics, Mechanical Behavior of Materials, Introduction to Mechanical Engineering, Mass Transfer and Transformations in Materials, Manufacturing Processes and Material Technology, Nonlinear Finite Elements for Solids, Engineering Materials.

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## GRANTS, SCHOLARSHIPS AND FELLOWSHIPS

- Mid-scale RI-1 (M1:DP) NSF, *RISE: Research Infrastructure for Student Engagement Preliminary Proposal*, Merrimack College, Request Budget \$23,000,000 (February 2019).
- “*Breaking Down Biases with Toys: An Interdisciplinary Project that Engages Students Across Disciplines*,” Merrimack College Interdisciplinary Institute Microgrants, in collaboration with Professors Kurkul (School of Education and Social Policy) and Wynn (Visual and Performing Arts), Project Budget \$2,000, Project Duration: 1 year (2018-2019).
- Merrimack College Faculty Development Grant, Project Budget \$3,500, Project Duration: 1 year (2018-2019).
- Provost Innovation Fund, building of YouTube ABAQUS/CAE Tutorials applicable to the research done at the Merrimack College School of Science and Engineering, Project Budget \$8,039, Project Duration 5 months (2018).
- “*Predicting The Optimum Stacking Sequence Of Glass Fiber Reinforced Plastic Laminated Beams Using A Genetic Algorithm*,” Merrimack College Faculty Development Grant, Project Budget \$2,000, Project Duration: 3 months (2016).
- “*Optimization of the development and manufacturing of high performance leaf springs*,” Grant by the Greek Secretary of Research and Technology (GSRT), Project Budget \$410,000, Project duration: 2 years (2012-2014). Participating as primary investigator.
- Graduate Research Funding, NASA Grant NNX08AL21G (2007-2010).
- Graduate Institute for Teaching (GIFT) Fellowship, Tufts University, Medford MA, \$2,000 (2009).
- Graduate Research Award, Office of Graduate Studies, Tufts University, Medford MA, \$1,400 (2008-2009).

## PUBLICATIONS

### PEER-REVIEWED

#### *Refereed Journals*

1. “A Numerical Approach to Determine Fiber Orientations Around Geometric Discontinuities in Designing Against Failure of GFRP Laminates,” R. Fragoudakis, *International Journal of Structural Integrity*, Vol. 10, Issue 3, pp. 371-379, 2019. <https://doi.org/10.1108/IJSI-10-2018-0064>.
2. "A Computational Analysis of the Energy Harvested by GFRP and NFRP Laminated Beams Under Cyclic Loading," R. Fragoudakis, J. A. Gallagher, and V. Kim, *Procedia Engineering*, Vol. 200, pp. 221-228, 2017.

3. "Optimizing the development and Manufacturing of 56SiCr7 leaf Springs," R. Fragoudakis, G. Savaidis, and N. Michailidis, *International Journal Of Fatigue*, Vol. 103, pp. 168-175, 2017.
4. "Microstructural, Surface and Fatigue Analysis of Stress Peened Leaf Springs," G. Savaidis, S. Karditsas, A. Savaidis, and R. Fragoudakis, *International Journal of Structural Integrity*, Vol. 6, Issue 5, pp. 589-604, 2015.
5. "The Effect of Heat and Surface Treatment on the Fatigue Behavior of 56SiCr7 Spring Steel," R. Fragoudakis, S. Karditsas, G. Savaidis, and N. Michailidis, *Procedia Engineering*, Vol. 74, pp. 309-312, 2014.
6. "The effect of Yield Strength and Thickness of a Ag Ductile Layer in Minimizing Si Die Stresses in LDMOS Packages," R. Fragoudakis, M. A. Zimmerman, and A. Saigal, *Periodical of Key Engineering Materials*, Vol. 605, pp. 372-375, 2014.
7. "Microstructure, Surface Characterization and Fatigue Assessment of 56SiCr7 Spring Steel," R. Fragoudakis, F. Stergioudi, N. Michailidis, and G. Savaidis, *Periodical of Key Engineering Materials*, vol. 605, pp. 376-379, 2014.
8. "Fatigue Assessment and Failure Analysis of Shot Peened Leaf Springs," R. Fragoudakis, A. Saigal, G. Savaidis, M. Malikoutsakis, I. Bazios, A. Savaidis, G. Pappas, and S. Karditsas, *Fatigue and Fracture of Engineering Materials and Structures*, Vol. 36, pp. 92-101, 2012.
9. "Predicting the Fatigue Life in Steel and Glass Fibre Reinforced Plastics Using Damage Models," R. Fragoudakis and A. Saigal, *Journal of Materials Sciences and Applications*, Vol. 2, pp. 596-604, 2011.
10. "Using Damage Models to Predict Fatigue in Steel and Glass Fibre Reinforced Plastics," R. Fragoudakis and A. Saigal, *Journal of Materials Science and Engineering with Advanced Technologies*, Vol. 3 (No. 1), pp. 53-65, 2011.

#### CONFERENCE PROCEEDINGS & PRESENTATIONS

*Peer-reviewed, Presenter Underlined, \* Merrimack College student*

11. "Simulation of a Composite Piezoelectric and Glass Fiber Reinforced Polymer Beam for Adaptive Stiffness Applications," S. K. Gundimeda\*, S. Kunc\*, J.A. Gallagher, and R. Fragoudakis, *Proceedings of ASME 2018 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, September 10-12, 2018, San Antonio, Texas.
12. "Selection of Fiber Orientation Around Geometric Discontinuities in Designing Against Failure of GFRP Laminates," R. Fragoudakis, *Proceedings of the 5<sup>th</sup> international Conference of Engineering Against Failure (ICEAF V)*, June 20-22, 2018, Chios, Greece.
13. "A Computational Analysis of the Energy Harvested by GFRP and NFRP Laminated Beams Under

- Cyclic Loading," R. Fragoudakis, J. A. Gallagher, and V. Kim\*, 3<sup>rd</sup> International Conference on Natural Fibers, (ICNF 17), June 21-23, 2017, Braga, Portugal.
14. "Predicting the Optimum Stacking Sequence of Fiber Reinforced Plastic Laminated Beams under Bending," R. Fragoudakis, SAMPE Seattle, May 22-25, 2017, Seattle, Washington.
  15. "Low-weight – high-stiffness glass fiber reinforced polymer beams using embedded piezoelectric fibers with interdigitated electrodes," J. Gallagher, R. Fragoudakis, V. Kim\*, and A. Larsson\*, Proceedings (Vol. 10164), Active and Passive Smart Structures and Integrated Systems, 2017, SPIE Smart Structures and Materials, Portland, Oregon.
  16. "Optimization of the Fatigue Properties of 56SiCr7 Spring Steel," R. Fragoudakis, G. Savaidis, and N. Michailidis, Proceedings of the 5<sup>th</sup> International Conference on Integrity-Reliability-Failure (IRF16), July 24-28, 2016, Porto, Portugal.
  10. "Influence of Thermal and Mechanical Surface Treatment on Fatigue Properties of Spring Steel 56SiCr7," E. Giannakis, R. Fragoudakis, and G. Savaidis, Proceedings of Ilmenauer Federntag, September 16, 2015, Ilmenau, Germany.
  11. "Quantifying the Directionality of Liquid Crystalline Polymers in Extrusion Processes Using an Order Parameter," A. Sullivan, A. Saigal, R. Fragoudakis, M. A. Zimmerman, and A. Ahmadzadegan, Proceedings of IMECE2015, November 13-19, 2015, Houston, Texas.
  12. "Cantilever Box-Beam Application of Composite Stacking Sequence Optimization Using Adaptive Genetic Algorithm," D. Gutierrez, R. Fragoudakis, A. Saigal, and M. A. Zimmerman, Proceedings of the 144<sup>th</sup> TMS Annual meeting & Exhibition, March 16-19, 2015, Florida.
  13. "Selection of Joint Design for a Modular Wind Turbine Blade," S. Tusavul, R. Fragoudakis, A. Saigal, K. Smith, and M. A. Zimmerman, Proceedings of the 4<sup>th</sup> International Conference on Composites: Characterization, Fabrication and Application (CCFA-4), December 16-17, 2014, Tehran, Iran.
  14. "Thermoplastic Materials for Wind Turbine Blade Design," S. Tusavul, R. Fragoudakis, A. Saigal, and M. A. Zimmerman, The 2014 World Congress in Civil, Environmental, & Materials Research (ACEM14), August 24-28, 2014, Busan, Korea.
  15. "The Effect of Heat and Surface Treatment on the Fatigue Behavior of 56SiCr7 Spring Steel," R. Fragoudakis, S. Karditsas, G. Savaidis, and N. Michailidis, XVII International Colloquium on Mechanical Fatigue of Metals (ICMFM17), June 25-27, 2014, Milan, Italy.
  16. "Leaf Springs - Design, Calculation and Testing Requirements," S. Karditsas, G. Savaidis, A. Michailidis, A. Savaidis, and R. Fragoudakis, Workshop on Mechanics of Materials, June 3-7, 2014, Rhodes, Greece.
  17. "The effect of Yield Strength and Thickness of a Ag Ductile Layer in Minimizing Si Die Stresses in LDMOS Packages," R. Fragoudakis, M. A. Zimmerman, and A. Saigal, Proceedings of the 3<sup>rd</sup> International Conference on Materials and Applications for Sensors and Transducers (IC-MAST 2013),

Prague, September 13-17, 2013, Czech Republic.

18. "Microstructure, Surface Characterization and Fatigue Assessment of 56SiCr7 Spring Steel," R. Fragoudakis, F. Stergioudi, N. Michailidis, and G. Savaidis, Proceedings of the 3rd International Conference on Materials and Applications for Sensors and Transducers (IC-MAST 2013), September 13-17, 2013, Prague, Czech Republic.
19. "Introduction of a Ductile Layer to Minimize Thermal Stresses in LDMOS Packages," R. Fragoudakis, M. A. Zimmerman, and A. Saigal, Proceedings of the 3<sup>rd</sup> International Conference of Engineering Against Failure (ICEAF III), June 26-28, 2013, Kos, Greece.
20. "Techniques to Identify the Dielectric Properties and Morphology of LCP Composites in Different Directions," L. Chao, R. Fragoudakis, M. A. Zimmerman, A. Saigal, and M. N. Afsar, Proceedings of the 3<sup>rd</sup> International Conference of Engineering Against Failure (ICEAF III), June 26-28, 2013, Kos, Greece.
21. "Preparing TEM Samples of Polymeric Materials," R. Fragoudakis, M. A. Zimmerman, and A. Saigal, Proceedings of the 24<sup>th</sup> Canadian Congress of Applied Mechanics, June 2-6, 2013, Saskatoon, SK, Canada.
22. "Optimization Techniques for Composite Laminates Using Genetic Algorithms," X. Xiao, M. A. Zimmerman, A. Saigal, and R. Fragoudakis, Proceedings of SAMPE 2013, May 6-9, 2013, Long Beach, California.
23. "A Comparison of GFRP and Hybrid Beams Under Cyclic Loading Applications," R. Fragoudakis and A. Saigal, Proceedings of the 15<sup>th</sup> International Conference on Experimental Mechanics (ICEM 15), July 22-27, 2012, Porto, Portugal.
24. "Using Failure Theories to Determine Optimal Stacking Sequences of Laminates," R. Fragoudakis and A. Saigal, Proceedings of the 15<sup>th</sup> European Conference on Composite Materials (ECCM 15), June 24-28, 2012, Venice, Italy.
25. "Predicting Damage Accumulation in Glass Fibre Reinforced Plastics Through Cumulative Damage Models," R. Fragoudakis and A. Saigal, Proceedings of the 18<sup>th</sup> International Conference on Composite Materials (ICCM18), August 21-26, 2011, Jeju Island, South Korea.
26. "Surface Properties and Fatigue Behavior of Shot Peened Leaf Springs," R. Fragoudakis, A. Saigal, G. Savaidis, M. Malikoutsakis, I. Bazios, A. Savaidis, G. Pappas, and S. Karditsas, Proceedings of the 2<sup>nd</sup> International Conference of Engineering Against Failure (ICEAF II), June 22-24, 2011, Mykonos, Greece.
27. "The Effect of Carburizing on the Fatigue Life of 4130 Steel," R. Fragoudakis and A. Saigal, Proceedings of TMS 2010 Annual Meeting, EPD Congress 2010, 463-470, February 14-18, Seattle, Washington.
28. "Energy Absorption Capacity of 3D "S" Space Frames Partially Reinforced with Aluminum Foam," R. Fragoudakis and A. Saigal, Proceedings of the 8<sup>th</sup> International Conference on Sandwich Structures

(ICSS8), May 6-8, 2008, Porto, Portugal.

29. "Effect of Aluminum Foam and Foam Density on the Energy Absorption Capacity of 3D "S" Space Frames," R. Fragoudakis and A. Saigal, Paper # 70\_Sai, Proceedings of the 13<sup>th</sup> International Conference on Experimental Mechanics (ICEM-13), Springer, E.E. Gdoutos (Ed.), June 1-6, 2007, Alexandroupolis, Greece.

### OTHER PUBLICATIONS

*Peer-reviewed Technical Papers and Book Chapters*

30. "Strengths and Limitations of Traditional Theoretical Approaches to FRP Laminate Design against Failure," R. Fragoudakis, Engineering Failure Analysis, ed. K. Thanapalan, Intech, October 2019, DOI:10.5772/intechopen.89729.
31. "Comparison of NFRP and GFRP under Cyclic Loading," R. Fragoudakis, Fibrenamics-UMinho, ([www.web.fibrenamics.com/en/artigos-tecnicos/22427/](http://www.web.fibrenamics.com/en/artigos-tecnicos/22427/)), November 2017.
32. "Failure Concepts in Fiber Reinforced Plastics," R. Fragoudakis, Failure Analysis and Prevention, ed. A. Aly, Intech, Croatia, pp. 82-98, 2017.

### OTHER CONFERENCES

*Peer-reviewed no proceedings or presentation*

1. Experimental and Computational Analysis of Glass Fiber Reinforced Plastic Beams with Piezoelectric Fibers," S. Kunc\*, S. K. Gundimeda\*, J.A. Gallagher, R. Fragoudakis, accepted for presentation at the International Conference on Computational and Experimental Mechanics in Istanbul (ICCEM 2018), July 23-24, 2018, Istanbul, Turkey .
2. "Flow Induced Vibrations in Energy Scavenging," T. Ellamushi\*, R. Fragoudakis, accepted for presentation to the 14th International Conference on Vibration Engineering and Technology of Machinery (VETOMAC XIV), September 10-13, 2018, Lisbon, Portugal.
3. "Underwater Energy Scavenging Using Flow Induced Vibrations," T. Ellamushi\*, R. Fragoudakis, accepted for presentation in the International Conference on Green Nanotechnology and Computational Fluid Dynamics (GCFD 2018), March 22-23, 2018, Cambridge, UK.

### OTHER PRESENTATIONS

*Non Peer-reviewed, Presenter Underlined*

1. "Breaking Down Biases with Toys: An Interdisciplinary Design Project that Engaged Students Across Disciplines," N. Wynn, K. Kurkul, and R. Fragoudakis, RGD's DesignThinkers Conference 2019, October 24 - 25, 2019, Toronto, Canada.



2. "The Economic Situation of the Spring Industry in Different Parts of the World (Case Study: Greece)," R. Fragoudakis, invited talk at the 8<sup>th</sup> International Congress of the European Spring Federation (ESF 8), September 24-25, 2015, Prague, Czech Republic.
  3. "The Economic Situation of the Spring Industry in Different Parts of the World (Case Study: Greece)," R. Fragoudakis, invited talk at the 7<sup>th</sup> International Congress of the European Spring Federation (ESF 7), September 20, 2013, Berlin, Germany.
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## PROFESSIONAL SOCIETY MEMBERSHIP AND SERVICE

### Professional Societies

- Member of the Society for the Advancement of Material and Process Engineering (SAMPE) (2017-2019).
- Member of the Society of Automotive Engineers (SAE) (2017-present).  
Academic Advisor on future Merrimack College Student Chapter
- Member of the Society of Women Engineers (SWE) (2016-2019).
- Member of the Circle of Hellenic Academics in Boston (2016-present).  
Member of the Board (2016-present)
- Member of the Council of Undergraduate Research (CUR) (2016-present).
- Member of the Technical Chamber of Greece (TEE) (2013-present).
- Member of the American Society for Mechanical Engineers (ASME) (2013-present).

### Reviewer in

- *International Journal of Fatigue* (2017-present).
- *Third International Workshop on Materials Science and Mechanical Engineering (IWMSME 2020)*.
- *Journal of the Brazilian Society of Mechanical Sciences and Engineering* (2019).
- ASME Power 2019.
- *Transactions of the Canadian Society of Mechanical Engineering* (2018).
- MEIE (2018).
- *Inderscience* (2018).
- *British Journal of Applied Science & Technology* (2015).
- *Materials Research Innovations* (2014).
- *International Journal of Design Engineering* (2014).
- International Conference on Materials Science (2014).
- ASME International Mechanical Engineering Congress (2014).
- *Modeling and Numerical Simulation of Material Science* (2012-2013).

### Faculty Senate Committees at Merrimack College

- Admissions Standards and Academic Policy Committee (2018-2020).
- Global Education Committee (2018-2020).
- STEM Committee (2017-present).

- Calendar Advisory Committee (2017-2019).
- Advisement at Orientation (2017-2018).
- Technology Resources Committee (2016-2018).
- Member of the Murray Scholarship Selection Committee (2016, 2019).

### **Thesis Defence**

- Master of Science Qualifier Exam in Manufacturing Processes (April 2016).
- Master of Science Defence committee member (December 2015).  
Merrimack College, Student Ben Driver.
- Master of Science Thesis Defense committee member (January 2014).  
"Radical Innovations in Wind Turbine Blade Design," Suzan A. Tusavul, Tufts University.

### **Workshops and Retreats**

- Merrimack-NASA Technology Transfer Program Competition (Academic year 2019-2020).
- Faculty Retreat on Team Teaching and Faculty Collaboration, "Interdisciplinary Team Teaching and Curriculum Transformation: Linking Innovative Pedagogies, Student Success, and Faculty Development," led by Dr. Joye Hardiman, Merrimack College, Interdisciplinary Institute, April 26-27, 2019, North Andover, Massachusetts.
- Best Teachers Institute, June 19-21, 2017, West Orange, New Jersey.

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## **INVITED LECTURES and PANELS**

### **Merrimack College**

- "Breaking Down Biases with Toys: An Interdisciplinary Design Project that Engaged Students Across Disciplines," The Interdisciplinary Institute, with Kate Kurkul and Nancy Wynn (October 4 & 18, 2019).
- Diversity and inclusive Excellence roundtable, The Interdisciplinary Institute (September 27, 2019).
- Capstone Research Panel (April 26, 2019).
- Phoenix Program Faculty Panel (April 10, 2019).
- "Introduction to Building Composites," Design I (November 14, 2018).
- Lessons Learnt from the Best Teachers Institute, CETL, with Alicia Malone and Nancy Wynn (February 26, 2018).
- "Women in Mechanical Engineering," Women in STEM, First Year Experience (October 20, 2017).
- "Steel and GFRP Beams in Cyclic Loading," Introduction to Engineering (November 14, 2016).
- "Introduction to engineering," Introduction to Engineering (November 10, 2015).
- "What do Mechanical Engineers Do?," Introduction to Psychology (September 21, 2016)
- "FE exam: Machine Design and Electrostatics Prep Course," Senior Seminar (April 14, 2016).
- "FE exam: Dynamics Prep Course," Senior Seminar (February 11, 2016).
- "Composites, Research and Engineering," Intro to Engineering (November 10, 2015).
- "Suspension System Design," Senior Design Class (October 21, 2015).

- "Material Selection and Manufacturing Processing," Materials Class (September 22, 2015).

### **Middlesex Community College**

- Engineering Panel Night (October 25, 2018).

### **Tufts Department of Mechanical Engineering**

- "Failure Theorems for Metals and Composite Materials Analysis in Finite Elements (ANSYS)," Advanced Finite Element Analysis (November 2014).
- "FRP Laminated Structures and Composite Materials Analysis using Finite Elements (ANSYS)," Advanced Finite Element Analysis (October 2014).
- "Corrosion," Engineering Materials (November 2013).
- "Predicting the Stiffness of Composites," Theory and Applications of Polymer Materials and Processing (October 2013).
- "Introduction to Diffusion," Engineering Materials (November 2012).
- ABAQUS Tutorial in Finite Element Methods (September 2011, March 2012, November 2012).
- "Failure Theories of Composite Materials," Theory and Applications of Polymer Materials and Processing (March 2011, November 2012).
- "Manufacturing Composite Structures by the Vacuum Bagging Technique," Theory and Applications of Polymer Materials and Processing (March 2011).
- "Substitutional and Interstitial Diffusion," Engineering Materials (October & November 2009).

## **SOFTWARE AND EXPERIMENTAL APPARATUS**

### COMPUTATIONAL SOFTWARE

ABAQUS, fe-safe, fe-safe/composites, ANSYS, AutoCAD, AUTODESK Inventor, EZCAM, FEMLAB (COMSOL), LabVIEW, Bluehill II, Solidworks.

### EXPERIMENTAL APPARATUS

Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM), Digital Scanning Calorimetry apparatus (DSC), Thermogravimetric Analysis (TGA), Thermomechanical Analysis (TMA), ATR-FTIR, Optical Profilometry, X-Ray Photoelectron Spectroscopy (XPS), Nanoindentation, CNC, Instron Load Frame.

## **LANGUAGES**

**English:** Proficient

**Modern Greek:** Proficient (Native Speaker)

**French:** Proficient (Sorbonne II)

**Italian:** Intermediate