Linda Vanasupa

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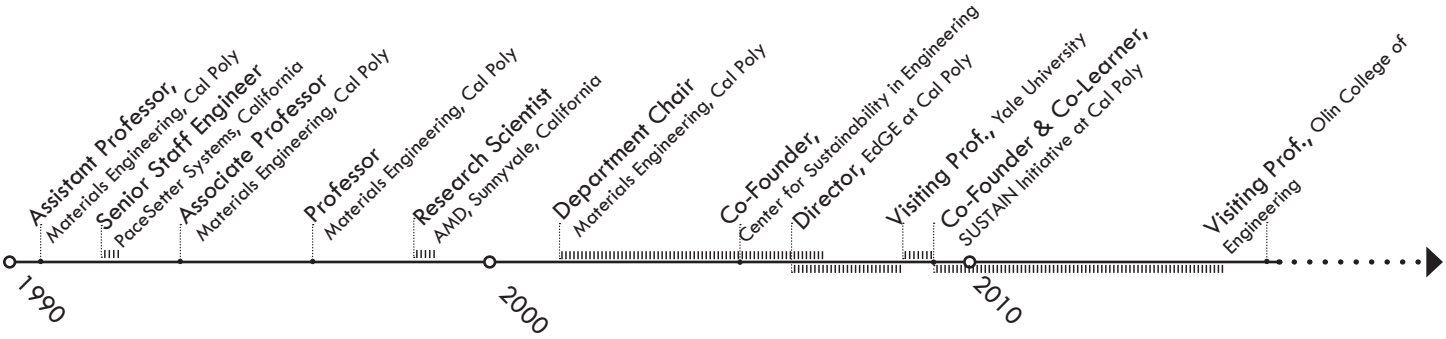
curriculum vitae : snapshot



education

Stanford University, Stanford, California USA

Ph.D. in Materials Science and Engineering—1991
Thesis: Electrical Activation of Implanted Silicon in GaAs
Advisor: James Plummer

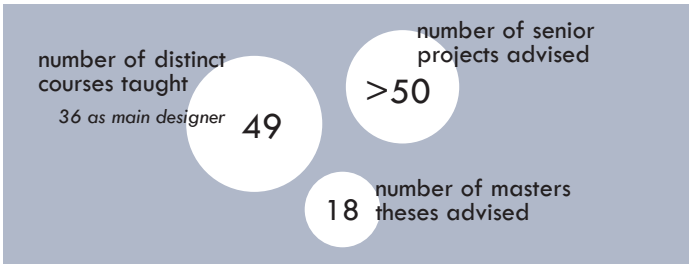
M.S. *summa cum laude*, Materials Science and Engineering—1987

Michigan Technological University, Houghton, Michigan

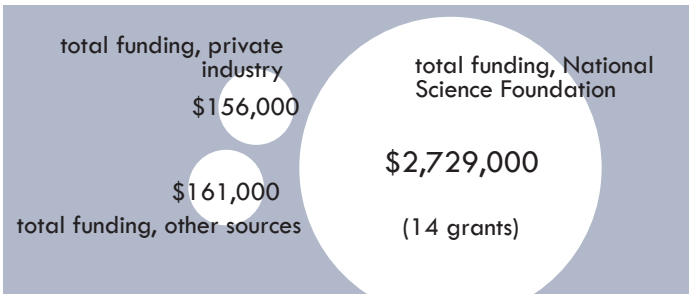
B.S. in Metallurgical Engineering—1985

magna cum laude

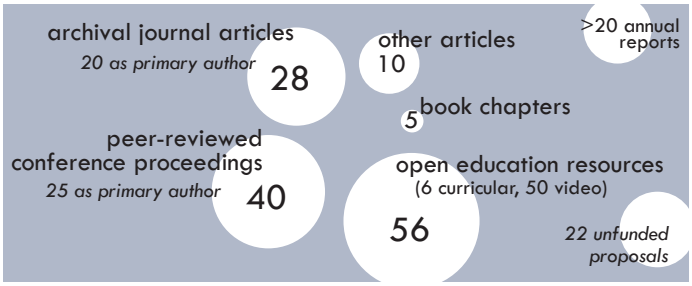
teaching



grant activities



authoring



influence indicators

75%
1 million users

ResearchGate.net | RG Score=22.3 (8•2018)
RG score higher than 75% of RG users on this social network for science

TOP 10 authors of 15270

Digital Commons Network/Mat. Sci. & Eng.
Consistently in top 10 downloads (8•2018)
Over 31,400 full downloads

>488K VIEWS

YouTube Tutorials | over 543K views (12•2018)
24 videos on sustainability concepts
26 videos on materials science concepts

80

Collaboration
80 unique co-authors representing
20 institutions & >30 academic disciplines

service

American Society for Engineering Education
Materials Division leadership, various roles including program chair (1994-1999)

Materials Research Society
Materials Education Committee, various roles including program chair (1999-2005)

honors

2

University | California Polytechnic State Univ.
President's Service Award with Mat. Eng. Dept. (2008)
Distinguished Teaching Award (2003)

3

College | College of Engineering
Societal Impact (2010); Northrop Grumman Excellence in Applied Research and Teaching (2001); TRW Excellence in Teaching (1993)

2

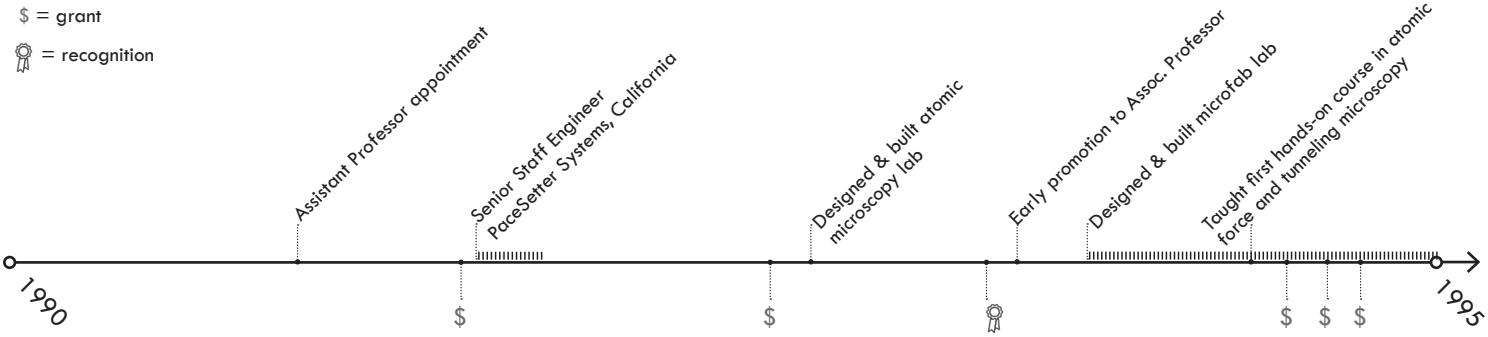
National
Amer. Soc. Engineering Education (1997)
Women in Engineering ProActive Network (2016)

1990-1995

Reflections on this period:

I came to Cal Poly because of my desire to learn and serve young peoples' future aspirations. During my first four years, I focused on securing resources needed to modernize Cal Poly's curriculum so that students could learn in labs that were relevant to California's high-tech microelectronics industry.

contribution highlights



teaching highlights

>20 courses — Taught over 20 different courses including freshmen chemistry and freshmen- through masters-level materials engineering courses.

2 new courses — Created two new courses with laboratories: microelectronics processing and atomic microscopy.

3 new — Brought three new analytical tools into the materials engineering curriculum: Fourier Transform InfraRed microscopy; Atomic Force Microscopy and Scanning Tunneling Microscopy.

microfab — Secured partnerships and resources to design and build a 900 sq. ft. class 1000 cleanroom for undergraduate education

Advised over 15 senior projects.

TRW Excellence in Teaching Award
College of Engineering, California Polytechnic State University

grants activities

FTIR Microsopy in Undergraduate Materials Labs 07/01/91-12/31/93
PI: L. Vanasupa | $43,000 NSF DUE 9152078

Atomic Force Microscopy Lab: 06/01/92 - 05/31/94
PI: L. Vanasupa | $50,000 Hughes Aircraft, Santa Barbara Research Center

Microelectronics Processing Lab: 06/01/94 - 05/31/96
PI: L. Vanasupa | $40,000 Hughes Aircraft, Santa Barbara Research Center

Physical Deposition Mechanisms of Electroless Copper for Multi-level Interconnects: 06/15/94 - 12/31/97
PI: L. Vanasupa | $170,439 NSF ECCS RUI 9322083

Undergraduate Microelectronics Processing Lab: 07/01/94 - 12/31/97
PI: L. Vanasupa | $67,756 NSF DUE 945087

publications (peer reviewed unless)

Vanasupa, L.S. (1993). Better Education Tools or Hocus-Pocus?: A Case Study from a Materials Engineering Curriculum, *Proceedings of the American Society for Engineering Education Conference*, Champagne-Urbana, Illinois, 16-19 June (pp. 478-484).

Vanasupa, L.S. (Fall 1992). Bucky Who?! *College of Engineering Update*, California Polytechnic State University, 7.

Vanasupa, L.S. (1992). A 69¢ Look At the Glass Softening Temperature, *Proceedings of the National Educators Workshop: UPDATE 1992*, Oakridge, TN, 11-14 November.

Vanasupa, L.S. (1992). Experiments for an Introductory Course in Materials Science and Engineering, *Proceedings of Synthesis Coalition Community College Engineering Education Conference*, San Luis Obispo, California, 20-22 August.

Vanasupa, L.S. (1992). Review of Critical Reviews in Solid State and Materials Sciences, *Journal of the Minerals, Metals & Materials Society*, 44(12): 52.

Vanasupa, L.S. (1991). Review of Handbook of Semiconductor Silicon Technology," *Journal of the Minerals, Metals & Materials Society*, 43(10):58.

Vanasupa, L. S., Deal, M. D., & Plummer, J. D. (1991). On H Passivation of Si Donors in GaAs Annealed with Plasma-Enhanced Chemical Vapor Deposited Silicon Nitride Caps. *Journal of The Electrochemical Society*, 138(3):870-871.

Vanasupa, L. S., Deal, M. D., & Plummer, J. D. (1991). Modeling activation of implanted Si in GaAs. *Journal of the Electrochemical Society*, 138(7):2134-2140.

Vanasupa, L. S. (1991). *Electrical activation of implanted silicon in Gallium Arsenide*. Ph.D. Thesis, Stanford University.

Vanasupa, L., Deal, M.D., & Plummer, J.D. (1990). A Model for Si Activation in GaAs, *Proceedings of the State-of-the-Art Program on Compound Semiconductors,* Montreal, Ontario, Canada. 11-13 May.

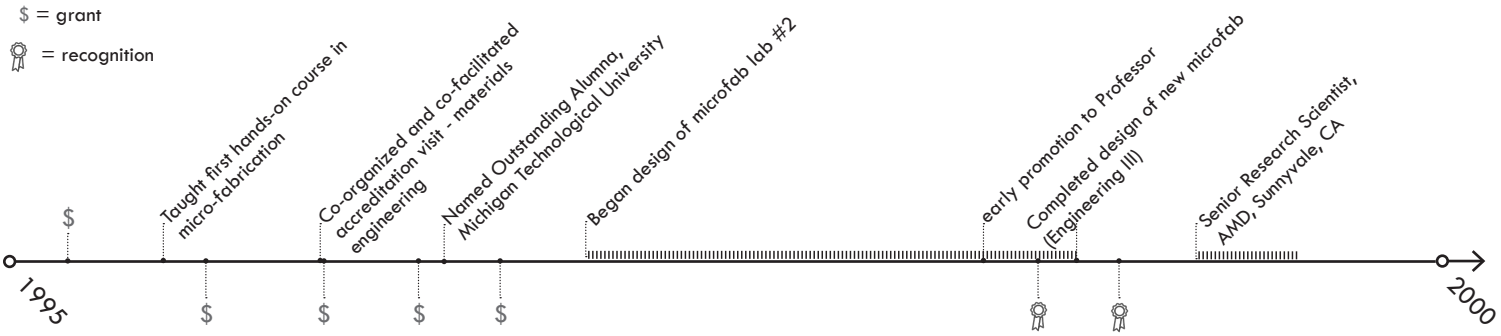
Vanasupa, L. S., Deal, M. D., & Plummer, J. D. (1989). Effects of stress on the electrical activation of implanted Si in GaAs. *Applied physics letters*, 55(3):274-276.

1995-2000

Reflections on this period:

I began to understand the value of collaboration; I partnered with colleagues and students to integrate new technologies into the materials engineering curriculum. Engaging in partnerships beyond my college and institution was a newly-discovered source of professional growth and somewhat unusual at the time.

contribution highlights



teaching highlights

>5 courses

By 2000, taught all but four MATE courses in the 32-course materials engineering curriculum.

4 new courses

Designed and taught two new graduate courses (x-ray diffraction & thin film processing); Taught an addition technology and society course; Co-developed an interdisciplinary general education history of materials course.

1 new

Served as principal investigator for an equipment grant, qualifying and integrating new x-ray diffraction instrumentation into the materials engineering curriculum.

microfab

Secured additional resources to expand processing equipment and make the first functioning transistors in the MATE microfab, a significant modernization of the MATE engineering capabilities.

Advised over 15 senior projects and six masters theses.

2

Dow Outstanding New Faculty (1997)
American Society for Engineering Education (ASEE)

Institute for Teaching & Learning Award for Research on College Teaching and Learning (1997). to A. Muscat, E. Allen, E. Green, L. Vanasupa "The Start-Up-company approach to Teaching Semiconductor Processing," San Jose State University

grants activities

Electromigration Studies of Electroless Cu on Sub Quarter Micron Test Structures: 09/01/97 - 06/30/99
PI: L. Vanasupa | $50,267 NSF ECCS 9709447

Electroless Deposition of Copper for Interconnects: 12/31/96-12/31/97
PI: L. Vanasupa | $10,000 Supplemental to NSF ECCS RUI 9322083

The Morphology of Graphite Samples: 03/01/96 - 02/28/97
PI: L. Vanasupa | $6,000 Wagstaff, Inc.

Atomic Force Microscopy for the Assessment of Ultrastructure Features & Quality of Dairy Foods & Food Processes: 07/01/95 - 09/30/98
PI: L. Vanasupa; co-PI: P. Tong | $40,770 CA Dairy Research Foundation

Microelectronics Processing Lab: 06/01/95 - 05/31/96
PI: L. Vanasupa | $10,000 AMD, Santa Clara, California

selected publications (peer reviewed unless)

Muscat[3], A.J., Allen[3], E.L., Green[3], E.D.H., & Vanasupa, L.S. (1997). The Start-Up company Approach to Teaching Semiconductor Processing, *Proceedings of the American Society for Engineering Education Annual Conference*, 19-22 June.

Vanasupa, L., Pinck[1], D., Joo[3], Y-C., Nogami[3], T., Pramanick[3], S., Lopatin S.[3], & Yang[3], K., (1999). The Impact of Linewidth and Line Density on the Texture of Electroplated Cu in Damascene-Fabricated Lines, *Electrochemical and Solid-State Letters*, 2(6):275-277.

Vanasupa, L., Joo[3], Y-C., Besser[3], P.R., & Pramanick[3], S. (1999). Texture analysis of damascene-fabricated Cu lines by x-ray diffraction and electron backscatter diffraction and its impact on electromigration performance, *Journal of Applied Physics,* 85:2583-2590.

Muscat[3], A.J., Allen[3], E.L., Green[3], E.D.H., & Vanasupa, L. S. (1998). Interdisciplinary Teaching and Learning in a Semiconductor Processing Course, *Journal of Engineering Education*, 87(4), 413-421.

Lent[1], L.E., Vanasupa, L.S., & Tong[2], P.S. (1998). Whey Protein Edible Film Structures Determined by Atomic Force Microscope. *Journal of Food Science,* 63(5):824-827.

Johnson[1], B., Amster[1], R., & Vanasupa, L. (1998). Grain nucleation and texture analysis of electroless copper deposition on a palladium seed layer. *Journal of Electronic Materials*, 27(7):923-927.

Vanasupa, L, & Braun[2], D., (1998). The 2-bit Adder, *Proceedings of the National Educators Workshop: UPDATE 1998*, Seattle, Washington.

Vanasupa, L. (1997). An economic lab design for hands-on education in microelectronics processing" *Proceedings of the Frontiers in Education Conference*, Pittsburg, Pennsylvania, 10-12 October.

Centoni[1], S. A., Vanasupa, L. S., & Tong[2], P. S. (1997). Atomic force microscopy for ultrafiltration membrane imaging. *Scanning*, 19(4):281-285.

Muscat[3], E.J., Allen[3], E.L. Green[3], E.D.H. & Vanasupa, L.S. (1997). An interdisciplinary approach to teaching and learning," *Proceedings of the Frontiers in Education Conference*, 2:653-658. *best paper award*

Amster[1], R., Johnson[1], B., & Vanasupa, L.S. (1997). Study of nucleation of electroless Cu deposition on Pd" *Proceedings of Electrochemical Synthesis and Modification of Materials Symposium*, P.C. Andricacos, S.G. Corcoran, J.-L. Delplancke, T.P. Moffat, P.S. Searson (Eds), Materials Research Society Fall Meeting, pp. 451-455. Cambridge University Press.

Vanasupa, L.S. (1996). Leveraging the Impact of the ILI Dollar, *Proceedings of the American Society for Engineering Education Annual Conference,* Washington D.C., 20-23 June.

Jenney[1], C., & Vanasupa, L. (1996). AFM of Biocompatible Polymers. *Microscopy and Analysis, 47-47.*

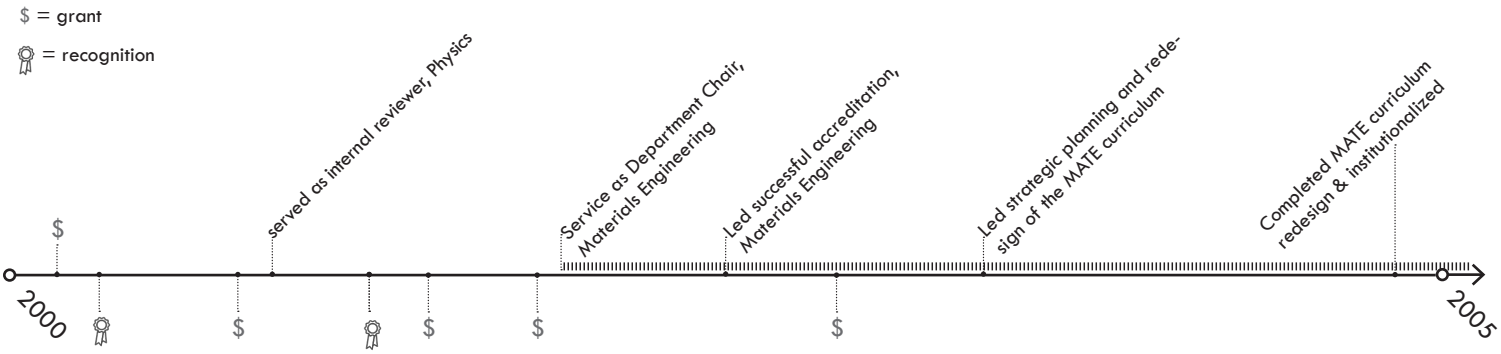
[1]*student collaborator,*
[2]*collaborator external to materials engineering,*
[3]*collaborator external to Cal Poly.*

2000-2005

Reflections on this period:

Adopting my daughter transformed my world view and sense of professional responsibility. At international conferences I noticed that engineers and scientists outside the U.S. were fervently applying themselves to the global grand challenges around climate change and social instability. When I looked into the scientific data, I found myself convinced that a responsible engineering education would include the same and sought to bring this to MATE.

contribution highlights



teaching highlights

new

Advised 6 senior projects, 1 masters thesis; New analytic tool (electron backscatter diffraction).

2

Northrop–Grumman Excellence in Teaching and Applied Research Award, College of Engineering, Cal Poly, 2000-01 | Awarded annually among ~175 College of Engineering faculty.

Distinguished Teaching Award, Cal Poly. 2002-03 Up to three awards annually among ~1200 faculty.

leadership and management

Led the materials engineering department (6 faculty, 120 students) through a complete re-invention of itself, including establishing a new vision, mission and strategic initiatives and designing an assessment system focused on direct measures.

Conceived and implemented a departmental web-based marketing strategy that increased the size and quality of the freshman applicant pool from a 55 under-qualified applicants (average merit score of 1892 toward a qualification value of 3600) to more than 88 highly-qualified applicants (average merit score of 3973);

During this half-time appointment as department chair, I continued to teach 4-5 different courses per year, managed and balanced annual department budget of $1M; Oversaw the recruitment and hiring of 3 of the 6 faculty in the department; Scheduled ~75 course sections annually to serve 1800-2200 students per year; supervised two, half-time staff members.

Revitalized and broadened the department external advisory board to include representatives from a more diverse base (women, design innovation, business and sustainability); advisor participation multiplied by 4.

grants activities

Process Engineering Modules: 01/15/00 - 12/30/02
PI: L. Vanasupa | $12,371 NSF sub-Award via San Jose State University

The Foundation Series Modules in Materials Science and Engineering: Integrating Science, Math, and Engineering Technology: 08/01/00 - 06/30/02
PI: L. Vanasupa, co-PIs: H. Smith, B. London, K.C. Chen, L. Griffin, D.V. Niebuhr | $75,000 NSF DUE 9952609

Contamination Sources in High-Purity Stainless Steel Tubing: 04/25/01 -12/31/01
PI: L. Vanasupa | $3,000 Valex Corporation

Acquisition of Scanning Electron Microscope with Electron Backscatter Diffraction System for Research and Education: 09/01/01 - 08/31/04
PI: L. Vanasupa; co-PIs:K.C. Chen, L. Moody | $150,000 NSF DMR 0113559

Analysis and Design of Guitar Saddles:09/01/03 - 07/30/04
PI: L. Vanasupa | $6,064 L.R. Baggs

selected publications (peer reviewed unless)

Vanasupa, L. & Splitt[3], F.G. (2004). Curricula For A Sustainable Future: A proposal for integrating environmental concepts into our curricula, *Proceedings Materials Research Society Spring : Symposium BB* (on line at www.mrs.org).

Vanasupa, L. & Chen, K.C. (2004). Materials Science and Engineering in the U.S.:A review of practices and trends, *Journal of Materials Education* 26:127-137.

Vanasupa, L. (2003). *Two Birds with One Stone: How to Integrate Assessment with Education, Best Assessment Processes V*, Terre Haute, Indiana (CD-ROM).

Gleixner[3], S., Young[3], G., Vanasupa, L., Dessouky[3], Y., Allen[3], E., & Parent[3], D. (2002). Teaching Design of Experiments and Statistical Analysis of Data Through Laboratory Experiments, *Proceedings of Frontiers in Education,* Boston, Massachusetts, 7-9 November.

Cecchi[1], M., Braun[2], D., Smith[2], H. & Vanasupa, L. (2002). Statistical method to optimize the efficiency of multi-layer polymer LEDs, *Electronic, Optical and Optoelectronic Polymers and Oligomers Symposium Proceedings*, MRS Publishing, pp. 93-98.

Vanasupa, L., Smith[2], H. (2002). The Fundamentals of Variation: An Inexpensive and Elegant Experiment for Engineering Students, *Proceedings of the New Educators Workshop: UPDATE 2002* (CD-ROM).

Chen, K.C., Vanasupa, L., Orling, T. (2002). A Multi-Functional Introductory Materials Science Courses: Emphasizing Engineering And Achieving Accreditation Objectives, *Proceedings of the Materials Research Society,* 22-24 November, Boston, Massachusetts.

Allen[3], E., Gleixner[3], S., Young[3], G., Parent[3], D., Dessouky[3] Y., & Vanasupa, L. (2002). Microelectronics Process Engineering at San Jose State University: A Manufacturing-Oriented Interdisciplinary Degree Program, *International Journal of Engineering Education*, 18:519-525.

Vanasupa, L., Smith[2], H., Gleixner[3], S., Young[3], G., Allen[3], E., (2001). Dealing with Variation in Measurements, *Proceedings of the Materials Research Society Spring Meeting: Symposium GG,* San Francisco, California.

Vanasupa, L., London, B., Smith[2], H., Chen, K.C., Jones[3], J., Niebuhr, D., Griffin, L. (2001). The Foundation Series on Corrosion: Integrating Science, Math, Engineering & Technology in a Lab Setting, *Proceedings of the American Society for Engineering Education Annual Conference* (CD-ROM).

Braun[2], D., Kingsbury,[2] K. & Vanasupa, L. "(2000). A Multidisciplinary Polymer Electronics Laboratory," *Proceedings of Frontiers in Education*, 18-21 October, Kansas, Missouri.

[1]student collaborator, [2]collaborator external to materials engineering, [3]collaborator external to Cal Poly.

advisee works

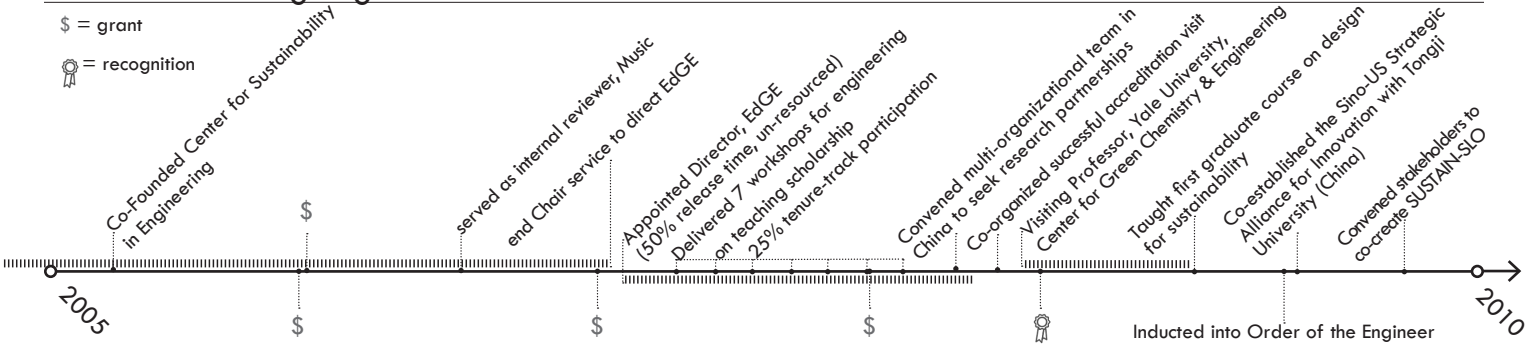
Checci, Michele Mario (2001). *Experimental design and analysis of polymer based light emitting diodes using statistical methods*. Engineering Masters thesis, California Polytechnic State University, San Luis Obispo, CA.

2005-2010

Reflections on this period:

This was a time of prolific innovation in which I worked with many different collaborators to bring forth experiments--successes and failures. I learned about the unintended consequences of change in human systems. I also realized that the kind of transformational results I sought required new partnerships which I formed during my sabbatical time at Yale University.

contribution highlights



teaching highlights

new curriculum — Integrated systems thinking, project-based learning, and sustainability concepts into courses; co-implemented new MATE curriculum.

Advised 1 senior project, 6 masters thesis.

California Polytechnic State University (2008) Awarded to all six faculty of the materials engineering department for outstanding service to the community. One award is given per year.

leadership and management

Led the materials engineering programs' comprehensive redeisgn of the materials engineering curriculum to include design, project-based learning and sustainability issues;

Brought materials engineering program into national visibility as a Research Affiliate of the National Academy of Engineering's Center for the Advancement of Scholarship in Engineering Education. Department was twice featured among the 27 CASEE Research Affiliates in the center's annual publication (*CASEE Chronicles Vol. III (2006) & IV (2007)*);

Created a College of Engineering initiative on Educating Global Engineers (EdGE), an effort to create shared commitments between engineering programs around global awareness as a core responsibility of the engineering education; this resulted in a new College of Engineering vision of serving society through innovation in engineering education.

Co-founded the Center for Sustainability in Engineering. Hosted seven campus-wide forums from 2005-2007 with nationally renowned speakers on sustainability;

grants activities

Triple Bottom Line Awareness in Design : Diversifying the Engineering Profession of the 21st Century: 9/01/2005-9/1/2009
PI: L. Vanasupa; Co-PIs:K. Chen, R. Savage, B. London | $1,004,982 | NSF EEC 0530760

Recyclability Index for Automobiles: 09/01/05 - 08/31/06
PI: Y. M. Nelson; co-PIs:H. Cota, A. Kean, M. McDonald, D. Richards, L. Vanasupa | $9,990-U.S. Environmental Protection Agency

Collaborative Research: Civil and Environmental Engineering Education Transformational Change: Sustainability Curriculum Development, Implementation, Dissemination and Assessment: 10/01/07 - 09/30/11
PI: L. Vanasupa |$91,520 -NSF DUE 0717428

Educating Engineering Innovators: Planning Visit for Finalizing Collaborative Research in China: 12/01/2007-12/1/2008
PI:L. Vanasupa; Co-PIs:K. Lancaster, M. McDonald, A. Morris | $25,278 NSF OISE 0753147

selected publications (peer reviewed unless ◎)

Vanasupa, L., Stolk, J. & Herter, R. (2009). The Four-Domain Development Diagram: A guide for holistic design of effective learning experiences for the 21st century engineer, *Journal of Engineering Education*, 98(1):68-81.

Vanasupa, L., Harding, T., & Herter, R. (2009). Transforming the culture, delivery and content of an undergraduate engineering program: process, pitfalls, and potential for lasting change. *Proceedings of Research in Engineering Education Symposium*. http://rees2009.pbworks.com/f/rees2009_submission_7.pdf

Widmann, J. & Vanasupa, L. (2008). Work in Progress:Attaining and Measuring Global Competency for Engineering Graduates, *Proceedings of Frontiers in Education*, Saratoga Springs, New York, 22-25 October.

Vanasupa, L., Rogers, E. & Chen, K.C. (2008). Work in Progress: How Do We Teach and Measure Systems Thinking, *Proceedings of Frontiers in Education*, Saratoga Springs, New York, 22-25 October.

Vanasupa, L., Chen, K.C., Breitenbach, S. & Bangs, K.R. (2008). Work in Progress: The Four Domain Development Diagram as a Design Guide to Retain Female (and Male) Students, *Proceedings of Frontiers in Education*, Saratoga Springs, New York, 22-25 October.

Vanasupa, L., & Granados, V. (2008). A Need for Systems-Oriented Outreach: Lessons from a failed, 1-dimensional approach, *Proceedings of the American Society for Engineering Education Annual Conference*, 22-26 June.

Vanasupa, L., Chen, K.C., Stolk, J., Savage, R., Harding, T., London, B. & Hughes, W., (2008). Converting traditional materials labs to project-based learning experiences: Aiding students' development of higher-order cognitive skills, *Journal of Materials Education*, 30(5-6):281-286.

Vanasupa, L., Stolk, J. Harding, T. & Savage, R. (2007). A Systemic Model of Development: Strategically Enhancing Students' Cognitive, Psychomotor, Affective and Social Development, *Proceedings of Research in Engineering Education*, Honolulu, Hawaii, 22-24 June.

Harding, T., Vanasupa, L, Savage R. & Stolk, J. (2007). Work-in-Progress - Self-Directed Learning and Motivation in a Project-based Learning Environment, *Proceedings of Frontiers in Education*, Milwaukee, Wisconsin, 10-13 October.

Savage, R., Chen, K.C. & Vanasupa, L. Integrating Project-based Learning Throughout the Undergraduate Engineering Curriculum, *Journal of STEM Education*, 8:1-13.

Vanasupa, L., Slivovsky L. & Chen, K.C. (2006). Global challenges as inspiration: A classroom strategy to foster social responsibility, *Science and Engineering Ethics,* 12:373-380.

Vanasupa, L. (2006). The future of materials undergraduate programs: Can we avoid extinction?, *Journal of Materials Education*, 28(1-2):105-112.

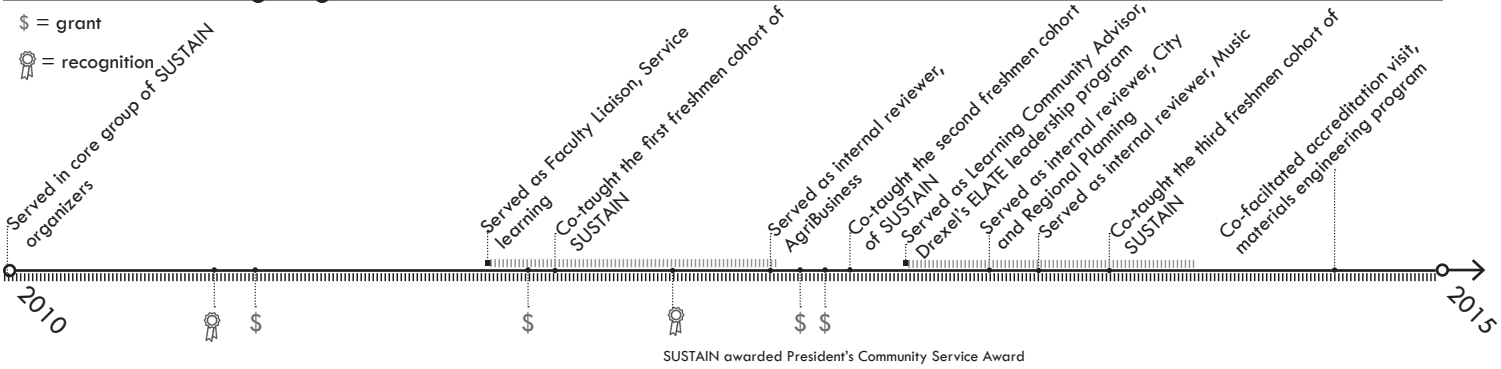
Vanasupa, L., Chen K.C. & Splitt, F.G. Classroom Techniques to Promote Engineering Solutions for a Sustainable Future, invited presentation at the International Union of Materials Research Societies, Singapore, July 3-5, (2005), published in *Journal of Materials Education* 28(3-6):171-178.

2010-2015

Reflections on this period:

By removing many of the artificial boundaries in the learning process, I discovered that systemic transformation begins with me, since I was a participant in the system. I abandoned the heroic leader model and focused on self-transformation to prepare for authentic collaboration. A challenging result of this process was the transition from imagined "expert" to genuine "co-learner."

contribution highlights



teaching highlights

Advised 12 senior projects, 5 masters thesis.

First recipient of the Societal Impact Award, College of Engineering, Cal Poly, 2010.

selected advisee works at Cal Poly

Kaylor, Sean (2009). Development of a Low Cost Handheld Microfluidic Phosphate Colorimeter for Water Quality Analysis, Engineering masters thesis.

Kevin Ka-Wan Ng (2010). Time-temperature Curing Relationship of an Adhesive Binder with Rice Straw. Engineering masters thesis.

Jorgensen, Eric (2011). Using Living Materials to Intervene in the Natural Succession Process to Accelerate the Re-Development of a Self-Sustaining Ecosystem that has been Damaged by Human Intervention, Senior project.

Hyland, Patrick J. (2011). Effect of Au Content on Microstructural Evolution of SnAgCu Solder Joints that Undergo Isothermal Aging and Reliability Testing, Engineering masters thesis.

Hahn, Eric (2012). Determing an inorganic mineralization process to inhibit organic degredation and preserve the dimensional stability of bamboo. Senior project.

Herbert, Leah, Hosek, Ian, & Kripalani, Rishi (2012). The characterization and comparison of biochar produced from a decentralized reactor using forced air and natural draft pyrolisis. Senior project.

Riley, Chris (2012). The Mitigation of Eutrophication Using Microporous Polymer Membranes to Control Algae Growth. Senior project.

Dunn, Chris (2013). Analyzing the Acoustical Properties of Alternative Materials in Guitar Soundboards to Reduce Deforestation. Senior project.

Liu, Nicholas (2013). Fabrication and Characterization of a Palladium/ Porous Silicon Layer. Engineering masters thesis.

Gonzales, Hilda (2014). Material Composition and Toxicology of Cosmetic Products. Senior project.

grants activities

Establishing a Distributed Community of Educators To study a transformational education experiment: 9/01/2010-9/01/1/2015
PI: L. Vanasupa, co-PI: L. Schlemer | $464,110 NSF EEC 1025265

Creating a replicable transformation path for change: A pilot study on overcoming the barriers to individualized teaching and learning: 9/15/2011-2015
PI: L. Schlemer, co-PI: L. Vanasupa | $294,496 NSF DUE 1044430

WIDER: EAGER - Catalyzing Wide Scale Innovation: Creating the Conditions for Viral Transformation: 9/15/2012-9/15/2014
PI: L. Vanasupa, co-PI: L. Schlemer | $294, 241 NSF DUE 1256265

A community that learns by doing: 9/21/2012-7/1/2013
PI: L. Vanasupa | $45,000 SCU Service Learning, $10,000 So-Cal Gas

selected publications (peer reviewed unless @)

Vanasupa, L. (2014) Relational versus transactional community engagement: An experience of the benefits and costs. *Proceedings of the ASEE Annual Conference*, Indianapolis, Indiana, 15-18 June.

Pawley, A., Hoffmann, S.R., Cardella, M.E., Ohland, M.W., . Rao, R.L., Jahiel, A.R. Seager, T. & Vanasupa, L. (2014). Assessing Sustainability Knowledge: A Framework of Concepts. *Proceedings of the ASEE Annual Conference*, Indianapolis, Indiana, 15-18 June.

Vanasupa, L., Schlemer, L., Burton, R., Brogno, C., Hendrix, G., & MacDougall, N. (2014). Laying the Foundation for Transdisciplinary Faculty Collaborations: Actions for a Sustainable Future. *Sustainability*, 6(5): 2893-2928.

Burton, R., Schlemer, L., & Vanasupa, L. (2012). Transformational Innovation: Reflections on How to Foster it in Engineering Education Systems. *International Journal of Engineering Education*, 28(2): 275-285.

Vanasupa, L., McCormick, K. E., Stefanco, C. J., Herter, R. J., & McDonald, M. (2012). Challenges in Transdisciplinary, Integrated Projects: Reflections on the Case of Faculty Members' Failure to Collaborate. *Innovative Higher Education,* 37(3):171-184.

Vanasupa, L., Zhang, Q., & Mihelcic, J. R. (2011) Assessing Engineering Students' Readiness To Collaborate for Sustainable Design: An Open Access Instrument For Experimentation. *Proceedings of the ASEE Annual Conference*, Vancouver, British Columbia, 26-29 June.

Vanasupa, L. (2011). The Human Dimension of Systemic Department-Level Change: A Change Agent's Retrospective on a Case of Reform. *Advances in Engineering Education,* 2(4): http://advances.asee.org/?page_id=208

Vanasupa, L., Stolk, J., & Harding, T. (2010). Application of self-determination and self-regulation theories to course design: Planting the seeds for adaptive expertise. *International Journal of Engineering Education,* 26(4):914.

Vanasupa, L., Burton, R., Stolk, J., Zimmerman, J. B., Leifer, L. J., & Anastas, P. T. (2010). The Systemic Correlation Between Mental Models and Sustainable Design: Implications for Engineering Educators. *International Journal of Engineering Education,* 26(2):438-450.

institutional entreprenuership

Convened groups of stakeholders from the university and community around shared commitments. This group of over 30 people co-created what became the SUSTAIN-San Luis Obispo learning initiative. From 2010-2015, this self-organized learning community engaged a variety of partners (over 16 faculty, over 200 freshmen of 50 majors, over 30 community organizations) who were committed to exploring together new models of collaborative, project-based learning in 42 community projects.

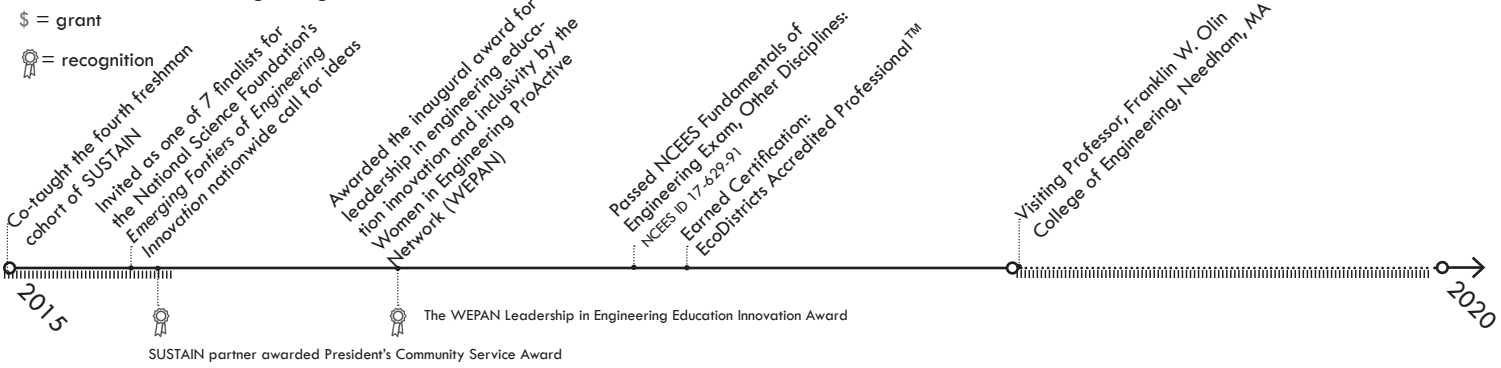
I conceived of SUSTAIN during attempts to partner with researchers in China around sustainability. However, what SUSTAIN became was what the many people brought to it, to include my core collaborators, Roger Burton and Lizabeth Schlemer.

2015-2020

Reflections on this period:

In this era, I can see the gap between our scientific models of how the world works and "reality." This means that most of what is taught is for a world that doesn't exist. What does education for a complex, dynamic, emergent system look like? How can we prepare people for the actual world in which they will live?

contribution highlights



National Science Foundation service

NSF invites the national engineering research community to submit ideas representing the frontiers of engineering innovation; selected ideas are invited to NSF to shape a $16-22 M open call for proposals. An idea that I authored around developing the Science of Complexity and Emergence in close collaboration with R. Burton and L. Schlemer was 1 of 7 invited ideas amongst the 300 submissions.

I have served on over 10 research review panels for the NSF.

complexity & transformation

After the recognition by NSF of the importantce of the science of emergence, my close collaborators and I began convening communities of researchers who shared our interests in holistic intelligence, social equity and systemic transformation in higher education. Our inquiry was whether shared practices that strengthen embodied cognition would favor emergent, systemic transformational action toward social equity in education. The initial community represented engineering, philosopy, sociology, linguistics, and Ayurvedic medicine.

From 2015-2018 we have held five convenings that have been increasingly diverse in terms of social identity, discipinary grounding and age. Our methodology is emancipatory action research as we build the capacity to innovate across institutions toward our aims.

One form that has emerged is the nascent on-line open and transparent journal, *Murmurations: Emergence, Equity and Education (murmurations-journal.org)*.

selected publications (peer reviewed unless 👁)

Vanasupa, L., Schlemer, L.. (2018). Replacing Syllabi with Pledges: Creating a Peace Frame for Learning. *Proc. World Eng. Educ. Frontiers.*

Vanasupa, L., Sochacka[2,3], N.W., & Streveler[2,3], R. (2018). Dynamic interactions of neurological states: Reflections on implications for learning engineering. *Murmurations,* 1(1): 8-19.

Vanasupa, L., Thurman[2,3], C.J. (2018). Indicators for the assessment of transdisciplinary research approaches and community-engaged learning that foster sustainable design: Opening a dialogue. *Proc. American Society for Engineering Education.*

Vanasupa, L., Kripalani[1], R. (2017). An Origami Microfluidic Battery: A low-cost, hands-on activity on the materials science of batteries. *Proc. American Society for Engineering Education.*

Vanasupa, L., Schlemer[2], L., & Burton[2,3], R. (2016). Transcending Industrial Era Paradigms: Exploring Together the Meaning of Academic Leadership for Diversity. Paper #14698. *Proc. American Society for Engineering Education.*

Schlemer[2], L. & Vanasupa, L. (2016). Grading for Enhanced Motivation and Learning. Paper #14981. *Proc. American Society for Engineering Education.*

Vanasupa, L., Wiley[2], A., Schlemer[2], L., Ospina[2], D., Schwartz[2], P., Wilhelm[2], D., Waitinas[2], C., & Hall[2], K. (2016). What does it mean to open education? In *Open Education: International Perspectives in Higher Education, International Higher Education Teaching and Learning Association.*

Zhang[2,3], Q., Vanasupa, L., Mihelcic[2,3], J. R., Zimmerman[2,3], J. B., & Platukyte[2,3], S. (2012). Challenges for integration of sustainability into engineering education. *Proc. American Society for Engineering Education.*
best paper award

[1]student collaborator, [2]collaborator external to materials engineering, [3]collaborator external to Cal Poly.

selected advisee works at Cal Poly

Cook, Caitlyn (2015). Minimizing Sheet Resistance of Organic Photovoltaic Cell Top Contact Electrode Layer: Silver Nanowire Concentration vs. Conductive Polymer Doping Concentration, Senior Project.

Fitzgerald, Dylan & Justin Boothe, (2016). Manufacture and Characterization of PolyLactic Acid/Carbon Black Conductive Composites for FDM Feedstock: An Exploratory Study, Senior Project.

Powell, Wes, and Allison Turri (2017). Direct Printing to Textiles. Senior Project.

Perry, Connor (2017). A Comparison Study of Two Synthesis Methods for Polymer of Intrinsic Microporosity 1 (PIM-1) Senior Project.

Jiang, Skyler (2017). Inkjet Printing of Nano-silver Conductive Ink on PET-Based Substrate. Senior Project

Righi, Gaia (2017). Qualification of Blue Laser Cutting Tool and Design of Test Procedure for Determining Cutting Parameters. Senior Project

Mountain-Tuller, Laura (2018). Development of Low Cost, Environmentally-Friendly and High Strength Carbon Foams from Bread and Cake. Senior Project.

Del Aguila, Jeremy (2018). In situ Solidification Study of Ga-system Using Scanning Electron Microscopy. Senior Project.

Cannady, Jamie, Joe DeCesaro, Juan Ortiz-Salazar, Andrew Rudnick (2018). Next Generation Protocol: Innovating a Resilient Future. Senior Project.

Yamanaka, Hajime & Juan Ortiz-Salazar (2018). Injet printed electrochemical, organic field-effect transistors.

Perry, Connor (2018). A Comparison Study of Two Synthesis Methods for Polymer of Intrinsic Microporosity 1. Senior Project.

PHYS 104. Introductory Physics (4)*

Elementary introduction to mechanics, gases, liquids and solids, heat, vibrations and waves, light, electricity and magnetism. Intended to provide non-science students with an understanding of basic physical concepts. Not open to students who have credit in a college physics course. 4 lectures.

PHYS 121. College Physics I (4)*

Introductory course in mechanics emphasizing motion, force, and energy. Not open to students having a grade of C- or better in PHYS 131 or PHYS 141. 4 lectures.

PHYS 122. College Physics II (4)*

Continuation of PHYS 121. Topics include properties of materials, fluids, waves and vibrations, sound, heat, light and optics. Not open for credit to students having a grade of C- or better in PHYS 132. 3 lectures, 1 laboratory.

PHYS 141. General Physics IA (4) co-taught with Physics professor

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Not open to students with credit in PHYS 131. 4 lectures.

PHYS 132. General Physics II (4) co-taught with Physics professor

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory.

CHEM124- General Chemistry (3)

CHEM124L-General Chemistry Lab (1)

Introduction to chemical thermodynamics (energy balance in chemical reactions), equilibrium, rates of reaction, acids and bases, coordination compounds, oxidation-reduction reactions, electrochemistry, corrosion, nuclear chemistry.

MATE 120 Introduction to Materials Engineering Practice (1)*

Introduction to various topics in materials engineering with emphasis on industrial and laboratory practices. 1 activity.

MATE122-Introduction to Materials Engineering Analysis (1)*

Introducation to materials engineering laboratory practices through demonstrations of laboratory equipment for evaluation of materials properties. 1 activity.

MATE 130. Introduction to Materials Engineering Design III (I)*

Third design laboratory in a sequence. Includes working in teams on project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability. 1 laboratory.

MATE 200. Special Problems for Undergraduates. 1-4 units

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

ENGR140-The Way Things Work (4)*

Designed for students of all disciplines to learn the science behind technology. Learn how and why basic technology functions. Examples include: silicon's chemical structure used to make computers; the theory behind radio; thermodynamics and the four-stroke engine; how electricity is generated and delivered. 4 lectures

MATE 210. Materials Engineering (3)*

Structure of matter. Physical and mechanical properties of materials including metals, polymers, ceramics, composites, and electronic materials. Equilibrium diagrams. Heat treatments, materials selection and corrosion phenomena. 3 lectures.

MATE215-Materials Engineering Laboratory (1)

Laboratory experiments on the heat treatment and resulting properties of metals. Effects of cold deformation of metals. Brittle-ductile fracture behavior, equilibrium phase relationships, corrosion. Mechanical behavior of polymers. Properties of semiconductor devices. 1 laboratory. Prerequisites:MATE210

MATE 225 Structure of Materials Laboratory (1)*

Relationship of atomic bonding to material properties. Building of crystals with physical models and by computer. Characterization of materials by x-ray diffraction (XRD) for phase identification, crystal structure determination and lattice constant measurements. Microstructural analysis by qualitative and quantitative metallography.

MATE232 Nanotechnology, Human Biology, Ethics and Society (4) co-taught with Biology professor

This course focuses on four nanotechnology examples as focal points for themes of technology, human biology, society, ethics, and systems thinking.

MATE270-Materials Sustainability (4)*

Sustainability and resilience as viewed through systems thinking and materials.

MATE 310. Noncrystalline Material Systems. (4)*

Design and synthesis of noncrystalline material systems. Synthesis, processing techniques, properties and fabrication methods of organic and inorganic polymeric materials. 3 lectures, 1 laboratory.

MATE320-Ceramics (4)*

Development, utilization, and control of properties in ceramic materials (inorganic-non-metal solids). Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Physical chemistry of ceramics. 4 lectures.

MATE 325. Transport Phenomena I (1)*

Directed group laboratory study of energy transport. Focus on conduction and convection. 1 laboratory.

MATE 326. Transport Phenomena II (1)*

Directed group laboratory study of fluid static and dynamic properties and behavior. Focus on non-compressible conditions. 1 laboratory.

MATE 327. Transport Phenomena III (1)*

Introduction to radiative heat transfer and the material properties that control it. 1 laboratory.

MATE340-Electronic Properties of Materials (3)*

Basic concepts in electron theory of solids (quantum mechanics, energy band theory, Fermi Energy, distribution and density of states), electrical properties and conduction in metals, semiconductors, polymers, ceramics, and superconductors, magnetic phenomena and optical properties in materials with applications in recording media. 3 lectures.

MATE345-Electronic Properties of Materials Laboratory (1)*

Exploration of electrical, optical and magnetic properties of materials. Optical absorption, electrical conductivity, ferromagnetism, superconductivity. 1 laboratory.

MET301 & 301L-Physical Properties of Materials & Lab(3)*

Solid state theory of materials as pertaining to crystallography, X-ray diffraction, scanning electron microscopy, internal energy, interatomic bonding, specific heat, thermal expansion, thermal conductivity, electrical conductivity, semiconductors, magnetism, temperature effects and diffusion. 3 lectures, 1 lab.

**designed or contributed substantially to the design of the taught course*

MET302-Mechanical Metallurgy (4)*

Uniaxial and complex static stress, stress strain elastic and plastic relationships. Mechanical property tests, mechanisms of plastic deformation, dislocation theory, strengthening mechanisms. Brittle, ductile and high temperature fracture. Fatigue, creep, stress-rupture. Strain rate and environmental effects. 4 lectures.

MATE421, 442-Thermodynamics of Materials I, II (3)*

Physical chemistry of metals. Thermodynamics of liquid and solid metallic systems. Material and energy balances, transport phenomena. Computer applications and simulations of thermodynamic processes. 3 lectures.

MATE 360. Metallurgical Materials Systems (4)*

Physical metallurgy of engineering alloys including ferrous (steel) and nonferrous (aluminum, copper) systems. Connection to phase diagrams, microstructural development and phase transformations, physical and mechanical properties, precipitation hardening, cold work and annealing treated in detail. Laboratory focuses on microstructure development in steels and aluminum alloy casting. 3 lectures, 1 laboratory.

MATE 370. Kinetics of Materials and Process Design (4)*

Design of processes for engineering materials. Topics include kinetics in materials: solid-state diffusion (steady-state and non-steady-state), nucleation and growth kinetics, solid state phase transformations. 3 lectures, 1 laboratory.

MATE 380-Thermodynamics of Materials (4)* [Formerly: MATE360]

Mass and energy balances, thermochemistry of reactions, design of materials processes including evaluation of energy needs and input/output stream compositions. 4 lectures

MATE 400. Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

MATE 401. Materials Characterization Techniques. (3)*

Hands-on experience with materials characterization instruments, such as scanning electron microscopy (SEM), light optical microscopy, x-ray diffraction (XRD), and atomic force microscopy (AFM). Open-ended projects to develop expertise with trouble-shooting ability, and the process of materials characterization and analysis 2 lectures, 2 laboratories

MATE430-Microelectronic Materials Processing (3)*

Integrated circuit fabrication, oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. 3 lectures.

MATE435-Microelectronic Processing Laboratory (2)*

Basic processes involved in integrated circuits; cleanroom protocol, oxidation, diffusion, photolithographic and etching processes, sputtering and evaporation, device testing. Each student will be part of a 4-6 person team that will fabricate an integrated circuit. 2 laboratories.

MATE441, 442, 443-Advanced Materials Lab I, II, III(1)*

Laboratory examination of properties and microstructure-optical and SEM, or superalloys, stainless steels, titanium alloys, dual phase steels, Al-Li alloys and recently developed composite materials.

MATE 482. Senior Project I (1)

Foundations of senior project design. Completion of the preliminary stages of selecting a senior project, designing experiments, evaluating realistic constraints, conducting initial experiments, and managing a project timeline. 1 laboratory.

MATE 483. Senior Project II (2)

Continuation of senior project. Completion of a senior project experimental component under the guidance of a faculty supervisor. Research methodology, experimental design, experimental work and data analysis. 2 laboratories.

MATE 484. Senior Project III. (2)

Continuation of MATE 483. Completion of a senior project data analysis and communication under the guidance of a faculty supervisor. Mathematical modeling and technical communication. 2 laboratories.

MATE510 & 515-Scanning Force Microscopy Theory and Application & Laboratoy (3)*

Theory and application of scanning force microscopy, including scanning tunneling microscopy, atomic force microscopy, lateral force microscopy. Interpretation of scanning force images. 3 lectures.

MATE 520-X-Ray Diffraction (3)*

Theory and application of x-ray diffraction as applied to advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Course will cover techniques in sample preparation, operation of equipment and interpretation of diffraction data. 3 lectures.

MATE 525-X-Ray Diffraction Laboratory (2)*

X-ray diffraction laboratory experiments of advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Radiation safety training, techniques in sample preparation, operation of equipment and interpretation of diffraction data. 2 laboratories.

MATE560-Thin-Film Processing (3)*

Thin film science and technology: deposition techniques, surface crystal notation, energy and kinetic processes, epitaxy. Schottky barriers and surface states, stress analysis, characterization techniques, electronics devices incorporating thin films. 3 lectures.

MATE565- Thin-Film Processing Laboratory (2)*

Thin film processing and analytical techniques: direct current and radio frequency magnetron sputtering, reactive sputtering, co-evaporation, epitaxy, grazing incidence x-ray diffraction, magnetic force imaging. 2 laboratories.

MATE570 Design for Sustainability (4)*

Life cycle assessment, Engineering design approaches for sustainability, Environmental footprint.

MATE 599. Design Project (Thesis). (2-5)

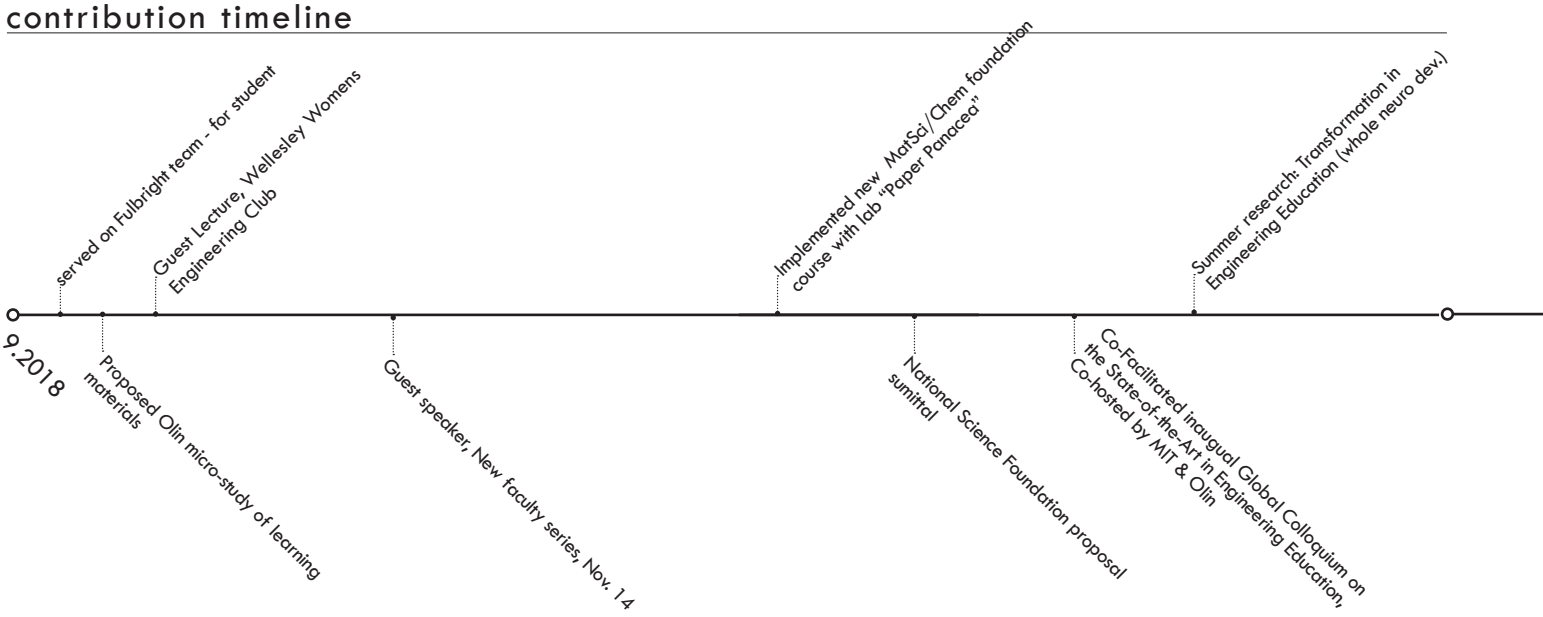
Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

**designed or contributed substantially to the design of the taught course*

2018-2019

Visiting Professor at Olin

contribution timeline



service to engineering education

External advisor to Fulbright University of Vietnam
Since 2017, I have been acting as a thought-partner to Provost Derby-Talbot of Fulbright University of Vietnam. In this role I serve as a reflector on the development of their curricular programming. Starting January 2020, I have been asked to take a more formal role in advising their engineering program.

External Advisor, University of San Diego
I am one of three individuals who have been engaged to serve on a panel of advisors to the University of San Diego's Engineering department. They have received a National Science Foundation grant on Revolutionizing Engineering Departments and are developing a program in engineering that is focused on Social Justice. My service contract is from January 2018-2020.

Member, ASEE Committee on Diversity, Equity and Inclusion-Strategic Directions Group. Service initiated August 2018.

ISIM beyond Olin
I am serving as the corresponding author to share what I feel is the brilliance of Brian Storey's Introduction to Sensing, Instrumentation and Measurement with the larger engineering education community. Brian, Brad Minch and I have a poster slotted for the ASEE 2020 conference to test if there is broad interst in this course as it is.

Facilitator, *Murmurations: Emergence, Equity and Education* *(https://murmurations-journal.org)*
I am among the founding group who created this on-line open source journal. Our belief was that legacy journals were filtering out perspectives that did not align with legacy knowledge. Murmurations is itself an experiment in emergence and collective transformation. It focuses on achieving impact in education systems in a way to create more equity. This journal is radically open; for submissions within the journal scope are advanced to an open, pre-publication reflection process that is world viewable as it unfolds.

grants activities

Creating ethical cultures of STEM research
As principal investigator, I was the primary author on a collaborative research proposal to the National Science Foundation Creating Cultures of Ethical STEM Research program (February, 2019). The ideation and finalization of the ideas involved collaboration with a group of 8 core people (including Alison Wood). The proposal involved 8 researchers from different institutions and was declined for funding. We will submit in February 2020.

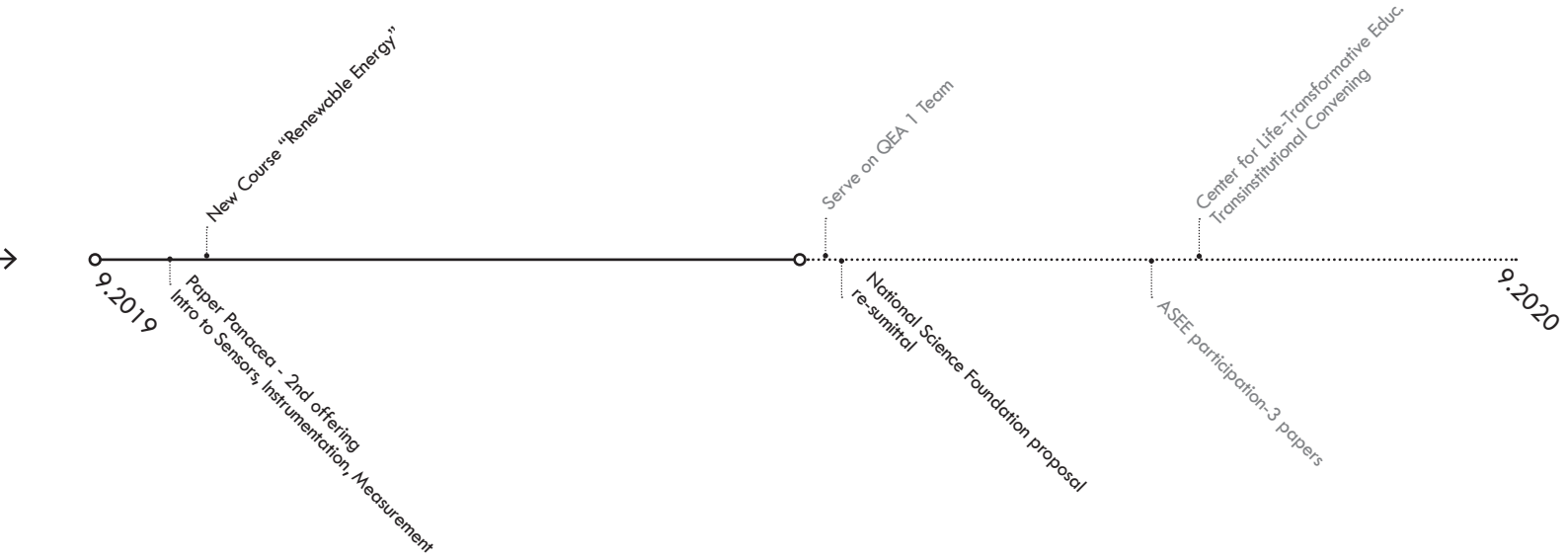
Understanding how design learning materials to support a diversity of learners, *(Olin internal, $1K funding)*
This is an internally-funded research project on the *ISIM* students' experience of the alternative learning materials that I created. I am currently co-authoring a of the results with colleagues Lizabeth Schlemer and Yevgeniya Zastavker for ASEE 2020.

Building capacity for transformational collaborations through the linguistic mind, the people mind, the body mind, the mindful mind
(Olin IPF funding ~$7K)
My collaborator, Alison Wood, and I initiated this 2-day capacity-building retreat. It extended prior work that seeks to develop wholistic neurological intelligence as a means for equitable and transformative outcomes. The main practice was a facilitated, emergent dialogue. The retreat involved 20 participants in summer 2019. Jon Stolk contributed some Argosy funds to expand the diversity of participation: specifically African American, staff participation, and lay participation. Its impact has been lasting in that the participants continue their collaborative research efforts together, for example in our efforts to obtain additional funding and resubmit to NSF..

Transformative learning by doing - seeding a sea change across engineering education: Proposal to the Center for Life-Transformative Education, submitted November 2019 (*Kern Foundation Funding $25K + Olin internal match $25K*)
This work extends, broadens and deepens the collaboration that was funded via an IPF grant, listed above, in summer 2019. This proposal engages student and staff partnership in envisioning an engineering education that embodies the conditions for thriving: well-being and justice. This work involves several Olin and external partners.

2019-2020

These pages contain content specific to my time at Franklin W. Olin College of Engineering. Olin was an attractive institution to me for its commitment to transformation in engineering education.



teaching contributions

ENGR1125-02 & -04 Introduction to Sensing, Instrumentation and Measurement (Fall 2018, Fall 2019)
I was one of four faculty assigned to ISIM. Brian Storey was the lead faculty coordinator. My role was largely that of jester--to model what is looked and felt like to be confused. I was able to learn the content sufficiently to function as a coach in the course. My contributions were in the area of broadening the accessibility of the content to the diversity of learners through authoring alternative learning documents.

SCI1410 - Materials Science and Solid State Chemistry
This course was designed by Jon Stolk. I intentionally engaged the course using a majority of his structure and course content. I did this as an experiment in "adopting" an Olin course. It was also an opportunity for me to understand the capabilities of the Olin student community.

SCI1339 - Special Topics: Paper Panacea: Part I (Spring 2019, Fall 2019)
I designed this new course after consultation with Olin on the curricular needs. It is a project-based course intended to advance the development of paper microfluidic sensing and detection platforms to enable citizen science around water toxics.

ENGR3199 - Special Topics in Engineering: Renewable Energy (Fall 2019)
This course description was created by Rebecca Christianson. I proposed to teach this course around July 14, 2019, when Olin had found itself with 26 students and no professor. I proposed content that preserved the description for which students signed up for the course; it was therefore focused on current renewable technologies for the generation of electricity.

Last updated: January 1, 2020