ELIZABETH J. ORWIN

EDUCATION

2000	**University of Minnesota,** Minneapolis, MN Ph.D. in Biomedical Engineering, minor Mechanical Engineering Thesis: An Engineered Collagen Sponge Matrix as an In Vitro Model for Corneal Wound Healing. Advisor: Dr. Allison Hubel
1998	**University of Minnesota**, Minneapolis, MN M.S. in Biomedical Engineering, minor in Mechanical Engineering Thesis: Culture of Human Corneal Cells on an Engineered Collagen Matrix
1995	**Harvey Mudd College,** Claremont, CA Bachelor of Science in Engineering (with Honors)

ADMINISTRATIVE APPOINTMENTS

2020-current	**Harvey Mudd College, Claremont, CA** *Co-Chair, College Core Curriculum Implementation Committee*
2018-current	**Harvey Mudd College, Claremont, CA** *Member, WSCUC Steering Committee*
2014-current	**Harvey Mudd College, Claremont, CA** *Chair, Department of Engineering*
2005-current	**Harvey Mudd College, Claremont, CA** *Director, Engman Fellowship Program*
2012-2014	**Harvey Mudd College, Claremont, CA** *Associate Dean for Research and Experiential Learning*
2011-2014	**Harvey Mudd College, Claremont, CA** *Faculty Executive Committee*

ACADEMIC APPOINTMENTS

2015-current	**Harvey Mudd College, Claremont, CA** *James Howard Kindelberger Professor of Engineering,* to support top-ranking engineering faculty to ensure that HMC students are educated and prepared for future technological leadership.
2013-current	**Harvey Mudd College, Claremont, CA** *Professor of Engineering*
2007-2013	**Harvey Mudd College, Claremont, CA** *Associate Professor of Engineering* Responsibilities included taking leadership role in our freshman design course, integrating machine shop and prototyping skills into the course.
2001-2007	**Harvey Mudd College, Claremont, CA** *Assistant Professor of Engineering and Biology* Courses taught: Design Representation and Realization, Topics in Biomedical Engineering, Introduction to Engineering Design, Introduction to Systems Engineering, Advanced Systems Engineering, Interdisciplinary Lab, Biomechanics, Introduction to Biology, Experimental Engineering Lab, BioSignal Processing Lab, Engineering Clinic.
2001	**University of St. Thomas, St. Paul, MN**

Adjunct Professor
Responsibilities included teaching a course in engineering design, advising a masters student and assisting in the setup of a student section of the Society of Women Engineers.

WORK EXPERIENCE

2000-2001 **Gel-Del Technologies,** St. Paul, MN
Technical Biological Engineer
Project involved investigation of a novel protein matrix for wound healing applications. Responsible for cell culture work, quality control studies, developing and giving pitches to angel investors, and development of a marketable product.

1996-2001 **Science Museum of Minnesota,** St. Paul, MN
Instructor, Biomedical Engineering Camp, Bioneers Camp, Camp-In Program
Taught classes to children aged 8-14 in various subjects including bones, nervous system, vision, kidney function, biomaterials, genetics, nutrition and engineering structures. Developed curriculum for all courses taught and wrote design projects for group work.

LEADERSHIP PROGRAMS AND PROFESSIONAL DEVELOPMENT

2019-20 **American Council of Education, Washington, D.C.**
Fellow
Awarded the ACE Fellowship, described as "the nation's premier higher education leadership development program preparing senior leaders to serve American colleges and universities." Placement: California Institute of Technology, Pasadena, CA.

2020 **Life Design Workshop, Stanford**
Week-long virtual conference on how to apply design principles to your own professional development and how to launch life design projects, programs, classes within engineering programs.

2020 **Designing Your Life for Women, San Diego, CA**
Two day workshop to develop strategies from design thinking to your professional work.

2018 **Society of Women Engineers Academic Leadership for Women in Engineering, Philadelphia, PA**
Three day workshop on developing effective leadership skills for women in academia.

ACADEMIC AND ADMINISTRATIVE ACCOMPLISHMENTS

2014-current ***Chair***, Department of Engineering, Harvey Mudd College, Claremont, CA (sabbatical 2019-20 academic year)

- Leads a department of 22 faculty members and 8 professional staff and manages an annual budget in excess of $5M.
- Serves on the college Department Chairs Committee, which is advisory to the Dean of the Faculty on college-level matters and is engaged in campus level planning.
- Led the department through a strategic planning process to develop a vision statement and strategic initiatives.
- Led the department through a major curricular revision to update our core engineering courses to reflect inclusive pedagogical strategies.

- Worked with our advancement team to raise funds to support curricular redesign and other programs in support of our strategic initiatives. We have raised a total of $3.7M under my leadership for department programming.
- Worked with our advancement team to identify equipment and tooling and to raise funds for a college makerspace facility. I have been involved in raising $1.1M to date for this project.
- Led the Department through a successful ABET accreditation in 2015 and continue to work with faculty on the development of best assessment practices.
- Led the Department Chairs Committee in the data gathering and writing of a document describing faculty workload and the impact of college growth and curricular revision, which I presented to the Board of Trustees to help us better plan for new opportunities in the future.
- Working with the Director of Institutional Research to develop new processes for collecting feedback on the program from students, which we are submitting to the American Association of Colleges and Universities annual meeting in 2021.
- Developing an Engineering Leadership Program with a steering committee. This involves creating a leadership competency model, assembling a leadership advisory board, and managing the steering committee as they develop new curriculum. It also involves working on creating space in the curriculum for this new program.
- Developing a Prototyping Mindset program for the department that is focused on: (1) prototyping your future self for students, (2) prototyping curricular innovation processes, and (3) prototyping a culture of equity and inclusion for everyone. We have submitted an NSF INCLUDES grant for this project with ASEE, Purdue and Cal Poly SLO.

2005-current **Director,** Engman Fellowship Program, Harvey Mudd College, Claremont, CA

- Recruits and mentors students on biomedical engineering research projects.
- Manages an active lab space and programming including visits to biomedical companies, resume and graduate school preparation, engaging and bringing to campus alumni and other external speakers in biomedical topics, technical conference attendance, and public speaking practice.
- Manages an annual budget of $100K, and attracts additional funding through grants and fundraising.
- Stewards the donor for this $1M endowed fellowship program.

2012-2014 **Associate Dean for Research and Experiential Learning**, Harvey Mudd College, Claremont, CA

- Coordinated the annual summer research programming, including organizing a summer presentation series, giving talks and workshops on ethics in research, and organizing summer social activities for all students doing research on campus.
- Developed new programs including lab open houses and library training sessions for literature reviews.

- Represented program needs in campaign discussions and at the Board of Trustees
- Raised funds to support summer programming and students travel to conferences.
- Managed 1 staff person and a small annual budget.

LEADERSHIP AND ENGINEERING EDUCATION SCHOLARLY WORK

Conference paper

Elizabeth Orwin, Chris Clark, Nancy Lape, Lori Bassman, Matthew Spencer, Angie Lee, TJ Tsai, Albert Dato, Roberta Ewart and Joe Betser. Definition and Application of Student Readiness Level (SRL) Metrics for Evaluating Student Preparation for Solving Real-World Problems. American Institute of Aeronautics and Astronautics (AIAA) Space 2017 Forum, Sept. 2017.

Conference presentations

Speaker, AIR Forum Impact Session, Supporting Student Success in the New Landscape of Higher Education, with Laura Palucki Blake and Kristi Hottenstein, Association for Institution Research Annual Conference (virtual), June 2020.

Panel organizer and speaker, "Demystifying Institutions and Leadership Roles." Society of Women Engineers Annual meeting, Anaheim, CA 2019 and 2020 (virtual).

Panelist, "Do disciplines matter for the engineer of 2040?" American Society for Engineering Education Annual meeting, Tampa, FL, 2019.

"Engineering the Future: What Lies Beyond Discipline-Specific Engineering Programs." With Smith College and James Madison University, AAC&U Annual Meeting, Jan 2016.

Invited talks

"Climate Change for Women". Keynote at the Women in Instrumentation and Measurement (WIM) Session at the 2018 International Instrumentation and Measurement Technology Conference (I2MTC), May 2018.

"Best Practices for Recruitment and Retention of Women in Engineering and CS." Workshop on Women in Engineering, The George Washington University, December 2016.

"Innovations in Undergraduate Engineering Education." With MIT, Olin College, and IIT Gandhinagar), IIT Global Leadership Conference, July 2015.

STEM Success for Women Telesummit, June 2015.

Workshops

Virtues and Vocations Engineering Roundtable, 2020.

Speaker and session chair, Clive L. Dym Mudd Design Workshop, June 2017.

Participant, Catalyzing a Research Agenda for Enhancing Engineering Education through Institutional Collaborations, Olin College, April 2017.

RESEARCH AND CONSULTING ACTIVITIES

Evaluation of Corneal Haze in Explanted Corneal Inlay Samples.
June 2017-present

Consultant with Optics Medical. Project involves evaluation of explanted samples to identify factors that lead to haze seen clinically, and development of a cell-based assay to assess candidate materials for implantation.

Design of a Tissue Engineered Corneal Construct
July 2001 - present
Supported by NIH. Project involves the development of a scaffold system that supports corneal cell attachment and growth and the design of an in vitro culture system to mimic physiological stimuli in an attempt to create a more functional construct.

Neural Tissue Engineering
May 2006 - present
Supported by DARPA, TATRC. This project focuses on harnessing regenerative medicine techniques and investigating novel combinations of cell source and scaffold materials to create a cell delivery system for the treatment of traumatic brain injury. Delivering an optimal combination of neural stem cells and stimulatory bioactive factors organized within a supportive extracellular matrix configuration is a promising strategy for neural tissue repair.

Development of a Device to Measure Nasal Cartilage Stiffness
2009-present
In collaboration with Dr. Brian Wong, Beckman Laser Institute. This project involves the design and construction of a device to measure the dynamic mechanical properties of nasal tip cartilage to inform surgical outcomes. The device imparts a cyclic displacement to the nasal tip and measures the resultant force. Data are analyzed on the computer and the device is LabView controlled.

Mechanical Analysis of Lizard Eggshells
2009-present
In collaboration with Dr. Steven Adolph, HMC Biology. This project involves the dynamic characterization of several species of lizard eggshell materials as well as the analysis of eggshell components.

Dynamic Mechanical Analysis of Spider Silk.
2007-2011
In collaboration with Dr. V A Ravi at Cal Poly Pomona. This project involves preparation of silk samples and using the dynamic mechanical analyzer to assess response of the silk over a wide range of frequencies.

Device to Simulate Eye Rubbing for Keratoconus Studies
2010-2012
Supported by Dr. Albert Jun, The Wilmer Eye Institute, The Johns Hopkins School of Medicine. This project involved the design and construction of a medical device to simulate eye rubbing in a rabbit model. The device consisted of a probe, load cell, platform, computer and LabView control. This device controls the amount of force applied over time.

Evaluation of the Epithelialization of Corneal Onlays made from a Novel Biomaterial.
July 2006 – July 2007
Consultant with Calhoun Vision, Inc. This company is involved in creating corneal onlays, a type of implantable contact lenses for permanent vision correction. The overall goal of this

study is to characterize the ability of rabbit corneal epithelial cells to attach to and migrate over a corneal onlay made from a novel biomaterial. These *in vitro* tests will provide some insight into the cytocompatibility of this material and aid in the selection of material parameters to advance to animal studies.

Wound Healing Characteristics of HemCon Bandages
Summer 2005 – Summer 2006
Sponsored by HemCon, Inc. Project involves designing and performing experiments to assess wound healing properties of chitosan bandage materials.

Biomechanical Properties of Treated Corneas
May 2004 – May 2005
Consultant with Refractec, Inc. This project involves tensile testing of conductive keratoplasty (CK) treated corneal tissue and analysis of the effect of the procedure on the mechanical properties of the tissue.

Electrospinning of Polymer Coatings
Summer 2004
Sponsored by Oregon Medical Laser Center. Project involves the design and construction of an electrospinning apparatus to create polymer coatings of a specified fibril diameter and overall thickness for novel medical applications.

Bioreactor Design for Tissue Engineered Meniscal Cartilage
Summer 2002-May 2003
Sponsored by TissueGenesis, Inc. Project involves the design of a bioreactor culture system to mechanically simulate the specific in vivo environment for the optimum growth of meniscal tissue.

EXTERNAL GRANTS AND FUNDING

- The Engman Fellowship Endowment supports my research program with funds from a private donor. The current market value is $943,000. A total of $3.1M has been raised to support the program under my stewardship.
- NIH AREA # 1R15EY018248-01A2; PI: Orwin, Elizabeth, Jane. *Controlling Cell Phenotype in a Tissue-Engineered Corneal Model.* In collaboration with Richard Haskell (HMC Physics) and Marta Bechtel (James Madison University.) Jan. 2015-Dec. 2018. $391,529.
- NIH AREA # 1R15EY018248-01A1; PI: Orwin, Elizabeth, Jane. *Controlling Cell Phenotype in a Tissue-Engineered Corneal Model.* In collaboration with Richard Haskell (HMC Physics) and Marta Bechtel (James Madison University.) Sept. 2009 – March 2013. $191,274.
- Telemedicine and Advanced Technologies Research Center (TATRC) through the Shelton Foundation. *Military Neurotrauma Database and Medical Research Development.* July 2007 – Sept 2008. $278,430.
- DARPA. *Cell Delivery System for the Treatment of Traumatic Brain Injury*. Sept 2006 – Feb. 2008. $100,000
- I have been co-PI on three additional NSF grants for acquisition of research equipment and facilities, and was on the steering committee for the Howard Hughes Medical Institute 2004 Undergraduate Science Education Program grant to HMC with $1.6 M in direct costs. I have attracted $265,000 in foundation support for my tissue engineering work and an additional nearly $300,000 in industry support for projects. I have done consulting projects in wound healing, tissue biomechanics and biomaterials with Calhoun Vision, Inc. (now RxSight, Aliso

Viejo, CA), HemCon, Inc. (Portland, OR), Refractec, Inc. (Bloomington, MN), Oregon Medical Laser Center (Portland, OR), Synedgen (Claremont, CA), Tissue Genesis (Honolulu, HI), and most, recently Optics Medical (Aliso Viejo, CA) . Details available upon request.

BOOK PUBLICATIONS

Dym, Little, and Orwin. Engineering Design: A Project Based Introduction, 4th edition, 2013.

Dym, Little, Orwin and Spjut. Engineering Design: A Project Based Introduction, 3rd edition, 2008.

JOURNAL PUBLICATIONS

*HMC student

Travis Beckman*, Deval Gupta*, Nathaniel Miller*, Robyn Low*, Sophie Parks*, Elissa Leonard*, Taylor Derby, Lina Chuy Hy, Marta K. Bechtel, Elizabeth J. Orwin. Effect of Electromagnetic Stimulation on Wound Healing in Corneal Keratocytes. Preparation for submission, the Annals of Biomedical Engineering, Spring 2020.

Russell E. Thompson*, Liana C. Boraas*, Miranda Sowder*, Marta K. Bechtel, Elizabeth J. Orwin. Three Dimensional Culture Environment Induces Partial Recovery of the Native Corneal Cell Phenotype from a Subcultured Population. *Tissue Eng Part A*. 19(13-14): 1564-1572, 2013.

Elissa Leonard*, Vincent Pai*, Phillip Amberg*, Jens Gardner*, and Elizabeth J Orwin. Design and Validation of a Corneal Bioreactor System. *Biotechnology and Bioengineering.* 109(12): 3189-3198, 2012.

Donna Phu*, Lindsay S. Wray*, Robert V. Warren*, Richard C. Haskell, and Elizabeth J. Orwin. Effect of Substrate Composition and Alignment on Corneal Cell Phenotype. *Tissue Eng Part A*. 17(5):799-807, 2011.

Donna Phu* and Elizabeth Orwin. Characterizing the Effects of Aligned Collagen Fibers and Ascorbic Acid Derivatives on Behavior of Rabbit Corneal Fibroblasts. *Proceedings of the IEEE EMBS Annual Meeting*, Sept. 2009.

Wray L* and Orwin EJ. Recreating the Microenvironment of the Native Cornea for Tissue Engineering Applications. *Tissue Eng Part A*. 15(7):1463-72, 2009.

Shah A*, Brugnano J*, Sun S*, Vase A*, Orwin E. The Development of a Tissue-Engineered Cornea: Biomaterials and Culture Methods. *Pediatr Res* 63(5), 2008. (invited review article)

Shah, A.*, Voorhees, A.*, Ravi, V. and Orwin, E. J. "Bioreactor Design for Cornea Tissue Engineering: Material - Cell Interactions." *Acta Biomaterialia*. 3(6): 1041-1049, 2007.

Shuguang Guo, River Hutchison*, Ryan P. Jackson*, Anu Kohli*, Tristan Sharp*, Elizabeth Orwin, Richard Haskell, Zhongping Chen, and Brian J. F. Wong. "Office-based optical coherence tomographic imaging of human vocal cords." *Journal of Biomedical Optics*. 11(3), 2006.

C. B. Raub *, E. J. Orwin, R. Haskell. "Immunogold Labeling to Enhance Contrast in Optical Coherence Microscopy of Tissue Engineered Corneal Constructs." *Proceedings of the IEEE EMBS Annual Meeting*, Sept. 2004.

E. J. Orwin, S. Lee *, C. Raub *, T. Icenogle *, M. Arman *, A. Cho *, R. Lovec *, A. Malone *, R. C. Haskell, B. M. Hoeling, D. C. Petersen. "Optical Coherence Microscopy for the Evaluation of a Tissue-Engineered Artificial Cornea." *Proceedings of the IEEE EMBS Annual Meeting*, Sept. 2004.

Orwin, E. J., Borene, M. L. and Hubel A. "Biomechanical and Optical Characteristics of a Corneal Stromal Equivalent." *Journal of Biomechanical Engineering*, 125: 1-6, 2003.

Orwin E. J. and Bennett, R.J. "Trials and Tribulations of a Freshman Design Course." *ASEE annual conference*, Montreal, Quebec, June 2002.

Hubel, A. and Orwin, E. J. "Migration of Corneal Epithelium on a Collagen Sponge In Vitro and In Vivo." *Trans Am Soc Mech Eng*, 2001. BED-vol50: p351-352.

Orwin, E.J. and Hubel, A. "In Vitro Culture Characteristics of Corneal Epithelial, Endothelial and Keratocytes in a Native Collagen Matrix." *Tissue Engineering*, 6(4): 307-319, 2000.

PATENTS

Minimally invasive surgical applicator, Insight Surgical Instruments. Application # US 8603097 B2. Ajay Shah*, Jeffrey Manassero*, Elizabeth Orwin, Vincent Pai*, Anne Jensen*, Matthew Phillips*, Timothy Challener*, Cassie Nguyen*, Kristen Schunter*, issued August, 2013.

Methods of making a chitosan product having an ultra-low endotoxin concentration and the ultra-low endotoxin chitosan product derived therefrom and method of accurately determining inflammatory and anti-inflammatory cellular response to such materials. Application # WO 2008063503 A3. Shenda Baker, Elizabeth Orwin, Shannon Ryan, William P Wiesmann, issued 2008.

CONFERENCE PRESENTATIONS

*HMC student

Elizabeth Orwin. Important Signals for the Controlling the Behavior of Corneal Fibroblasts in an In Vitro Corneal Model. Biomedical Engineering Society Annual Meeting, Atlanta, GA, October 2012.

Russell Thompson* and Elizabeth Orwin. The Effect of IL-1ra and 3D Culture on the Expression of alpha-SMA, TKT and ALDH by Subcultured Rabbit Corneal Keratocytes. Beckman Symposium, Irvine, CA, August 2011.

Sam Meyer,* Johnson Qu*, William Villagomez*. Mechanical and Structural Analysis of Lizard Eggs. Southern California Conference for Undergraduate Research, Pepperdine University, Nov. 20, 2010.

Edward Wang* and Spencer Tung*. Device for measuring nasal tip stiffness. Southern California Conference for Undergraduate Research, Pepperdine University, Nov. 20, 2010.

Donna Phu* and Elizabeth Orwin. Characterizing the Effects of Aligned Collagen Fibers and Ascorbic Acid Derivatives on Behavior of Rabbit Corneal Fibroblasts. Proceedings of the IEEE EMBS Annual Meeting, Sept. 2009.

Lindsay Wray* and Elizabeth Orwin. "Approximating the Extracellular Matrix of the Cornea by Electrospinning Collagen Scaffolds." 6th Annual California Tissue Engineering Meeting at UCLA, Nov 30-Dec 1, 2007.

Emily Hogan*, Richard Haskell and Elizabeth Orwin. "Immunogold Labeling of Human Cornea Cells for Use with Optical Coherence Microscopy." 4th Annual Los Angeles Tissue Engineering Meeting, UCLA Dec. 2006.

Madineh Sarvestani*, Jeff Manassero*, Justin Kim*, Maureen St Georges*, Nicole Esclamado* and Elizabeth Orwin. "Development of a Cell Delivery System for Traumatic Brain Injury Using Novel Matrices and Human Bone Marrow Stem Cells." 4th Annual Los Angeles Tissue Engineering Meeting, UCLA Dec. 2006.

Ajay Shah*, Andrew Voorhees* and Elizabeth Orwin. *"Three-dimensional stress as a signaling tool for developing a tissue engineered cornea."* 5th World Congress of Biomechanics, Munich, Germany, August 2006.

Lindsay Wray*, Brandon Smith*, Megan Little, Andy Voorhees*, Ajay Shah*, Elizabeth Orwin. "Designing a Tissue-Engineered Corneal Model." Los Angeles Tissue Engineering Meeting, Los Angeles, CA; Dec. 3, 2005.

Jamie Shoffeitt*, Megan Arman*, Clarence Chan, Andy Voorhees*, Sarah Rodenburg*, Annie Tan*, Richard Haskell, Dan Petersen, Marta Bechtel, Elizabeth Orwin. "Monitoring the Phenotype of Corneal Keratocytes in a Tissue Engineered Corneal Model." Los Angeles Tissue Engineering Meeting, Los Angeles, CA; Dec. 3, 2005.

Crofut, A. M.* and Orwin, E. J. "The Impact of Dynamic Loading in Tissue Engineering of Meniscal Cartilage." Southern California Conference on Undergraduate Research, California Institute of Technology, Nov. 2002.

INVITED TALKS

*HMC student

Elizabeth Orwin. Controlling Cell Phenotype in a Tissue-Engineered Corneal Model. Joint Science Seminar Series, April 2010.

Elizabeth Orwin and Lindsay Wray*. Tissue-Engineering a Cornea. Galileo Society Meeting, Claremont, CA, April 16, 2008.

Elizabeth Orwin and Lindsay Wray*. A Clear Vision for Undergraduate Research: Tissue-Engineering a Cornea. HMC event at the California Club, Los Angeles, CA, Oct. 25, 2007.

Elizabeth Orwin, Jamie Shoffeitt*, Ronalee Lo and Brooke Basinger. "More Than Meets the Eye." HMC Alumni Event, San Diego, CA, March 2007.

Elizabeth Orwin, Madineh Sarvestani*, Jeff Manassero*, Justin Kim*, Maureen St Georges*, Nicole Esclamado*, Isabella Wulur, Shannon Ryan, Shenda Baker, William Wiesmann. "Cell Delivery System for Traumatic Brain Injury." 8th Annual USArmy Battlefield Tissue Replacement and Repair Review Program. Portland, OR, Dec. 2006.

Elizabeth Orwin. "Controlling Cell Phenotype in a Tissue-Engineered Corneal Model." 7th Annual UC System-Wide Bioengineering Symposium at UCLA, June 2006.

Elizabeth Orwin. "A Tissue-Engineered Corneal Model." UCIrvine Spring Symposium on Engineering in Medicine, Irvine, CA, May 2006.

Elizabeth Orwin. "A Tissue-Engineered Corneal Model." UCIrvine Medical Grand Rounds, Feb 8, 2006.

Elizabeth Orwin, Nicole Esclamado*, Jens Gardner*, Ajay Shah*, Isabella Wulur, M.S. "Cellular Wound Healing Response on Chitosan Bandages." 7th Annual USArmy Battlefield Tissue Replacement and Repair Review Program." Portland, OR, Dec. 2, 2005.

E. Orwin. "A Model for Tissue-Engineered Corneal Matrices." Western Eye Research Conference, Laguna Beach, CA; Sept. 25-28, 2005.

POSTER PRESENTATIONS

I have presented 64 posters with 93 students at national and international meetings such as Biomedical Engineering Society annual meeting, Tissue Engineering and Regenerative Medicine annual meeting, Gordon Research Conferences, American Society for Cell biology and Materials Research Society, the most recent in October 2019.

PROFESSIONAL AFFILIATIONS

- Tissue Engineering and Regenerative Medicine International Society (TERMIS), 2008 to present
- American Society for Engineering Education (ASEE), 2001 to present.
- Association for Researchers in Vision and Ophthalmology (ARVO), 1997 to present
- Biomedical Engineering Society (BMES), 1995 to present
- Society of Women Engineers (SWE), 1992 to present

PROFESSIONAL SERVICE

- ASEE Engineering Dean's Institute (EDI) Steering Committee member, 2021 insitute.
- SHPE Adhoc Leadership Group Member, Society for Professional Hispanic Engineers (SHPE's) Academic Partnership Council, 2020-present.
- Cooper Union Dean Transition Advisory Board, Spring 2019.
- Soka University Life Science Concentration Advisory Board, Sept 2017- 2019.
- Rose-Hulman Mechanical Engineering Advisory Board, 2015- 2019.
- ASEE Pacific Southwest Section Board Director, 2011-2017.
- MRS symposium organizer, Materials in Tissue Engineering, Fall 2008 meeting.
- Listed as one of the Players in the Los Angeles Tissue Engineering Initiative
- Manuscript review for Journal of Zhejiang University SCIENCE (JZUS), The Ocular Surface Journal, Investigative Ophthalmology and Visual Science (IOVS), Acta Biomaterialia**,** Journal of the Mechanical Behavior of Biomedical Materials, and Tissue Engineering journals.
- Grant reviewer, HHMI Undergraduate Science Education Program, American Heart Association.
- Member of steering committee for HHMI grant to Harvey Mudd College, 2004.
- Howard Hughes Medical Institute Office of Grants and Special Programs, 2004 Professors/Program Directors Meeting Advisory Committee.
- Society of Women Engineers: Subcommittee Lead for Leadership Competency Model, Curriculum Committee 2018-19, 2019-20; Member, Women in Academia Committee 2018-19, 2019-20; Advisor, HMC student section, 2016-17, 2017-18, 2018-19; Outreach Co-Chair, Professional Section, 1997-98, 98-99, 99-00; President, Student Section, 1994-95
- Biomedical Engineering Society: Student Section President, 1997-98; Faculty Liaison, 1998-99

ACADEMIC LEADERSHIP AND SERVICE

- Department Chairs Committee. 2014-present. Advisory to the Dean of Faculty.
- Makerspace Planning Group. 2017-present. Give input on design, staffing, and equipment for new makerspace.
- WSCUC Steering Committee 2018-present. In charge of the college's upcoming thematic pathway review.
- Hixon Steering Committee, 2020-present. Planning for college center in environmental science and sustainability.
- Advancement Advisory Committee. 2013-2019.
- Faculty Executive Committee, 2011-2014. Elected by peers to represent the faculty to the administration and the Board of Trustees, set agendas for faculty meetings.
- WASC Committee, 2009-10. Committee led WASC review for the campus.
- Served on various other college committees from 2005 to 2014, including the Shop Advisory Committee (Chair, 2010-2014), the Scholarly Standing Committee, the

Presentation Days Committee, the Teaching and Learning Committee (Chair 2004-05), and the HMC 50th Anniversary Committee.
- Served on various Engineering Department Committees including the Infrastructure Committee (Chair, 2011-14), the Graduate School Workshop, and the Awards Committee.
- Served on numerous search committees at the college and in the department, including the Dean of Faculty search for an external dean in 2006.

SELECTED OUTREACH ACTIVITIES
- Panelist, "Women in STEM: Navigating Industry and Academia," Harvey Mudd College, April 2019 and February 2020.
- Graduate Women in Science podcast, "Confidence is Key", Spring 2020.
- Profiled on Engineer Girl "I'm an Engineer" series.
- "Leadership in Academia" talk to University of Washington Advancing the Next Generation of Leaders in Engineering program, March 2019.

COMMUNITY SERVICE
- Girl Scouts of the USA, Troop leader to two troops (2008-2020)
- First Lego League Mentor 2015-16, 2016-17
- Peppertree Elementary Science Fair Committee Chair 2013-2015; member 2016
- Harvey Mudd College Alumni Board of Governors, 2018-present

HONORS AND AWARDS
- ACE Fellow, American Council on Education, 2019-20
- 2017 Orange County Engineering Council Distinguished Educator Award
- 2017 Orange County Engineering Council President's Award
- Barbara Stokes Dewey Assistant Professorship, Fall 2004-Fall 2007
- NSF Research Training Grant Recipient, 1996 to 1999
- Biomedical Engineering Society Spring Poster Symposium Award Winner
  Best Poster - Tissue Engineering Category, 1999
  Best Overall Poster, 1998
- Associated Students of Harvey Mudd College President, 1994-95