Curriculum Vitae

Matthias W. Pleil
Lecturer III
Department of Mechanical Engineering
Manufacturing Training and Technology Center
mpleil@unm.edu
505-272-7157

Table of Contents

Education

1993: Ph.D. - Applied Physics, 1993, Texas Tech University. Dissertation Title: "Time Correlated Single Photon Studies of Hydrogenated Amorphous Silicon Carbon," GPA: 3.8/4.0

1987: M.S. – Physics, 1987, Texas Tech University. Thesis Title: "Time-resolved Fluorescence Spectroscopy with a Fast Analog Technique: Application to Microscopic Specimens," GPA 3.7/4.0

1984: B.S. - Physics, 1984, Southern Illinois University. GPA 3.7/4.0.

Professional Appointments

2008-Present - University of New Mexico, Department of Mechanical Engineering

2018 – Present – Lecturer III

- Created MEMS 400/500 level Foundation in MEMS Fabrication course
- Updated and taught Mechanical Engineering Design I, II, and V
- Collaborated with Jason Church to improve Design II Labs and Project
- Serve on the Undergraduate Curriculum Committee
- All courses have hands-on labs and/or projects

2017-Present - MTTC Cleanroom Manager/Associate Director MEP Program

- Interface and support cleanroom users: industry, faculty researchers and students
- Responsible for safety, equipment training, and support
- Supervise day-to-day operations, equipment technicians and student employees.
- Manage budgets, facilities, equipment repairs, installs, and upgrades

2016-2018 – Visiting Lecturer III

- Updated and teach Mechanical Engineering Design I, II
- Established Design I as a dual credit course for high school students
- All courses are web-enhanced

2015-2016 – Adjunct Professor

- Updated and taught Mechanical Engineering Design I Fall and Spring Semesters

2014-Present - Research Professor

- PI NSF ATE Support Center for Microsystems Education (2017-Present)
- Mentored summer intern technician and high school students

2008 – 2014 – Research Associate Professor

- PI NSF ATE Southwest Center for Microsystems Education (2004-2018)
- PI NM PED Nanoscience Online Course (2008)

2003 - 2018 – Central New Mexico Community College

2008-2017 - Part Time Faculty

School of Applied Technologies

- Taught courses in MEMS Design and Fabrication

School of Math Science and Engineering

- Taught Engineering survey classes
- Taught Physics classes

2003-2008 – Full Time Faculty School of Applied Technologies

PI – NSF ATE Southwest Center for Microsystems Education (2004-2008)

Courses developed, updated and taught lecture and lab courses:

- Survey of Engineering Fields – ENGR1010
- Introduction to MEMS – MEMS1001
- MEMS Fabrication – MEMS2001
- MEMS Advanced Fabrication – MEMS2092
- MEMS Design I & II – MEMS2005/MEMS2010
- Semiconductor Manufacturing Theory and Lab – SMT2001 & SMT2092
- Manufacturing Concepts – MT1001
- Applied Science – MT2001

Served on Division and Department level strategic, improvement and search teams.

Lifelong learning through professional development opportunities

- Blackboard Certified instructor
- Sandia National Laboratories SUMMiT V super user
- Attended and presented at dozens of conferences on education and industry
- Attended and participated in dozens of professional development workshops

2003 - Sandia National Laboratories, Albuquerque, NM

Visiting Summer Faculty

- Provide Sandia National Laboratories with Educational Material resources and input acting as a liaison between Sandia, SCME, and CNM.
- Created educational materials for the University Alliance Program, a MEMS Design competition.

- Evaluated, probed and characterized the Sandia "OPAL" MEMS device, Optical Programmable Array Logic.

1996-2002 - Philips Semiconductors, Albuquerque, NM

2001–2002 - Engineering Manager – Defect Reduction and Metrology

- Cultivated a team of five engineers and three technicians. Reviewed personnel, managed improvement programs, defined standard business processes, and addressed daily issues.
- Managed the maintenance of over $20M in Metrology and Defect Reduction equipment
- Focused efforts of equipment vendors and purchasing department to resolve customer support problems, negotiate service contracts, initiate tool evaluations and stay under budget.
- Promoted to newly created department to expand product line. Built a new business process to reduce defectivity, team achieved 50% reduction goal 6 months ahead of projected schedule.
- Publicized defect reduction improvements to internal and external customers.
- Served on Customer Complaint Team, led Manufacturing Performance Teams, represented Albuquerque site on Corporate Metrology Cluster Team.

1996–2001 - Senior Photolithography Process Engineer

- Proposed and defined new lithography tool sets, documented acceptance criteria and completed acceptance testing for 200mm equipment purchases and installations.
- Collaborated with a small team to rapidly transfer 150mm lithography processes to 200mm.
- Safeguarded Critical Dimension control through the use of SPC and Continuous Improvement:
- Reduced process variation by 3x resulting in 10x scrap reduction.
- Ensured SEM measurement confidence through matching, stability, and reproducibility.
- Conceived and specified Stepper Lens monitor procedure resulting in standardized lens characterization methodology and improved product yield.
- Wrote specifications and procedures used in training others resulting in optimum equipment performance.
- Represented Albuquerque site and co-chaired Photolithography Corporate Cluster Team.
- Created Intranet WEB sites for Albuquerque Lithography group as well as the Philips Photolithography Corporate Cluster Team greatly facilitating team communications.

1990-1996 - Texas Instruments, Lubbock, Texas

1990-1994- Senior Equipment Engineer, Photolithography

- Supervised 6 technicians in maintaining 14 Canon Photolithography steppers.

- Improved stepper Overall Equipment Effectiveness (OEE) up to 60% resulting in over $10M savings.
- Fab representative on the Texas Instruments Canon Stepper Users Group.
- Developed new model to separate out stepper intensity degradation contributions based on multi-exponential curve fitting. This was used to evaluate second source lamps and optical components.
- Initiated, specified, evaluated and accepted a 0.35um capable Opal 7830I automated CD SEM.
- Represented site on Texas Instruments Canon Stepper Users Group. Member of the SPC QIST (Quality Improvement Steering Team).

1990-1994 - Senior Photolithography Process Engineer & Photo Line Supervisor

- Reduced process variation and sustained photo processes.
- Partnered with small teams to successfully implement and characterize sub-micron microlithography process transfers from g-line to i-line and 5in to 6in conversions.
- Eliminated wafer edge focus excursion resulting in 2% overall EPROM Yield improvement.
- Implemented Statistical Process Control on critical equipment (stepper, coaters) and outgoing parameters (CD's). Trained manufacturing personnel on out of control root cause analysis. These efforts resulted in over 50% reduction in CD variation which improved yield, speed distribution and resulted in significant cost savings and increased revenue as well as cycle time improvement.
- Partnered with product engineering and cross-functional teams to improve yield.
- Supervised over 20 operators and specialists in day-to-day operations. Managed wafer moves and outgoing quality, scheduling personnel and machine maintenance.
- Developed real time tracking techniques to reduce cycle time and improved wafer move linearity. These principles were later applied fab-wide and contributed to cycle time reduction from 90 days to 32 days. This improved the cycles of process and product development learning from three per year to ten as well as a sixty day reduction in customer delivery time thereby contributing to maintaining the competitive edge of Texas Instruments.

1985-1990 - Texas Tech University Department of Physics, Lubbock, TX

Research Assistant MS and Ph.D.

- Ph.D. Co-Chairs/Mentors: Drs. Walter Borst and Shubhra Gangopadhyay
- Completed original research in time-resolved photoluminescence spectroscopy.
- Engineered time-correlated single photon counting, pico-second laser spectroscopy system.
- Devised novel temporal and spectral calibration techniques to insure data integrity.
- Developed data acquisition and analysis programs that could discern several multi-exponential components down to 30ps decay times with a 100ps-instrument response

function through the use of an iterative re-convolution data analysis technique making use of chi-squared hyper-surface minimization.
- Created simulation data by convoluting real instrument response functions with computer-generated synthetic multi-exponential decays with the addition of Gaussian noise (counting error). Demonstrated the validity of multi-exponential distribution analysis technique since it was able to discern up to five discrete exponential decays covering a range of 30ps to 50ns.
- Presented at conferences and wrote papers on time-resolved photoluminescence spectroscopic techniques and applications. Contributed to numerous inter-disciplinary projects in Semiconductors, Geology, and Forensics.
- Trained and assisted individual graduate students on fluorescence acquisition and analysis.

Teaching Assistant

- Instructed general physics and modern optics laboratory courses and tutored Texas Tech Naval ROTC scholarship students in physics.

HONORS AND AWARDS

- 2019/2020 – Teaching Fellowship Recipient, UNM
- ATMAE recognition for service in the Micro/Nano focus group, 2013-2017
- Invited panel member on President Bush's American Competitive Initiative Panel Discussion - 2006
- Best Paper in Education and Training award – COMS2005 Conference (Commercialization of Micro and Nano Systems Conference – Baden-Baden, Germany)
- Mentored and lead winning student team Sandia National Laboratories University Alliance MEMS Design Competition 2006, 2014 Novel Design Category, runner up teams 2005, 2007, 2013
- Texas Tech University "Outstanding Graduate Student in Physics Award, 1989"
- Member, Sigma XI National Research Honor Society
- Member, Sigma Pi Sigma National Physics Honor Society

Professional Memberships

- ASEE – American Society for Engineering Education
- ASME – American Society for Mechanical Engineering
- ATMAE – The Association of Technology, Management, and Applied Engineering
- AAAS – American Association for the Advancement of Science

Professional Services

National Science Foundation Review Panels

- IUSE – Improving Undergraduate STEM Education
- ATE – Advanced Technological Education

2018-Present - MNT^{e}SIG – Micro Nano Technology Education Special Interest Group

- Run monthly online meetings
- Organize MNT^{e}SIG annual face to face meeting

2013 – Present - ATMAE

- Micro Nanotechnology Focus Group Chair
- Conference Session Chair
- Conference Submission Review Panel

2009 – Present - High Technology Impact Education Conference

- Executive and Pre-conference Organizing Committees
- Program Committees

2018 – IAJC-ISAM International Conference - Session Chair

2014 - COMS Conference Education Organizing Committee

2011 – 2017 – MNT Conference Originator and Organizer

- Hosted 2011, 2015 conferences in Albuquerque, NM
- Review submissions, organize sessions, keynotes and industry

Outreach Services

- Mentored Summer High School Interns (2)
- Mentored Summer Technician Student Interns (2)
- Participate in High School Career Days, Counselor events
- Established ME160 (Design 1) as a HS Dual Credit course, recruit students (12)

Department Services

2018-Present – Mechanical Engineering Undergraduate Curriculum Committee

Publications

Book Chapters (2)

[1] M. Pleil, "Secondary/Postsecondary Programs of Study for Microsystems Technicians," in *Career Pathways for STEM Technicians*, D. Hull Ed., 2012, pp. 177-198.

[2] J. W. Dearing *et al.*, "How educational innovators apply diffusion and scale-up concepts," in *Scaling Educational Innovations*, C.-K. Looi and L. W. Teh Eds.: Springer, Singapore, 2015, pp. 81-104.

Journal Articles (13)

[1] S. Gangopadhyay, M. Pleil, and W. Borst, "Study of Energy Transfer in a Solution of Coumarin 460 and Rhodamine 6G by Time-resolved Laser-induced Fluorescence Spectroscopy," *Journal of luminescence,* vol. 39, no. 2, pp. 105-110, 2 December 1987.

[2] C. Landis, W. Borst, M. Pleil, G. Sullivan, and J. Crelling, "Laser-induced fluorescence microscopy of coal macerals and dispersed organic material," *Am. Chem. Soc., Div. Gas Fuel Chem., Prepr.;(United States),* vol. 31, no. 1, pp. 7-12, 1986.

[3] C. Landis, G. Sullivan, M. Pleil, W. Borst, and J. Crelling, "Pulsed laser fluorescence microscopy of coal macerals and dispersed organic material," *Fuel,* vol. 66, no. 7, pp. 984-991, July 1987.

[4] C. R. Landis, J. C. Crelling, G. W. Sullivan, M. W. Pleil, and W. L. Borst, "Results of laser-induced fluorescence of organic materials," *Organic Geochemistry,* vol. 11, no. 5, 1987.

[5] M. W. Pleil and G. Massiha, "Online Resources in MEMS Technology for Professional and Educational Development," *International Journal of Evaluation and Research Education (IJERE),* vol. 3, no. 1, pp. 37-44, March, 2014.

[6] M. W. Pleil, S. Gangopadhyay, and W. L. Borst, "Primary scintillant fluorescent decay times in binary and ternary scintillators by near UV pulsed laser excitation," *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment,* vol. 256, no. 2, pp. 348-354, 1987, doi: 10.1016/0168-9002(87)90230-0.

[7] S. Gangopadhyay, C. Landis, M. Pleil, W. Borst, and P. Mukhopadhyay, "Time-resolved Fluorescence Spectroscopy of Crude Oils and Condensates," *Fuel,* vol. 67, no. 12, pp. 1674-1679, 1988.

[8] S. Gangopadhyay, M. Pleil, and W. Borst, "Fluorescence decay kinetics of “Polyester yellow” in solutions and in polymers," *Journal of Luminescence,* vol. 46, no. 5, pp. 359-369, 1990.

[9] S. Gangopadhyay *et al.*, "Characterization of a-Si: H, Cl and a-Sic: H Films Prepared by Electron Cyclotron Resonance Plasma," *MRS Online Proceedings Library Archive,* vol. 192, 1990.

[10] S. Gangopadhyay, M. Pleil, W. Borst, C. Young, and M. Kristiansen, "Picosecond time-resolved photoluminescence characterization of a-SiC: H films prepared by electron cyclotron resonance plasma," *Journal of Non-Crystalline Solids,* vol. 137-138, 2, pp. 859-862, 1991.

[11] M. Pleil, "Plug and Play Microelectromechanical Systems (MEMS) Technology Into Your Engineering and Technology Programs," *Technology Interface International Journal,* vol. 15, no. 1, pp. 65-71, 2014.

[12] M. Pleil and G. Massiha, "Teach Microsystems Technology on a Tight Budget," *Tech Directions,* vol. 73, no. 8, p. 18, 2014.

[13] G. Massiha and M. W. Pleil, "Increase Understanding of Materials Science Concepts with Origami Crystal Activity," *Tech Directions,* vol. 75, no. 6, p. 17, 2016.

Conference Papers and Proceedings (72)

[1] W. Borst, C. R. Landis, M. W. Pleil, G. W. Sullivan, and J. C. Crelling, "Laser-Induced Fluorescence of Coal Macerals and Dispersed Organic Material," in *Abstracts of Papers of the American Chemical Society*, 1986, vol. 191: American Chemical Society 1155 16th St, NW,

Washington, DC 20036, pp. 12-Fuel.

[2] W. Borst, S. Gangopadhyay, and M. Pleil, "Fast Analog Technique For Determining Fluorescence Lifetimes Of Multicomponent Materials By Pulsed Laser," in *OE LASE'87 and EO Imaging Symposium*, 1987, vol. 0743: SPIE. [Online]. Available: https://doi.org/10.1117/12.966920. [Online]. Available: https://doi.org/10.1117/12.966920

[3] E. Menzel, M. Pleil, S. Gangopadhyay, and W. Borst, "Enhancement of fluorescent fingerprints by time-resolved imaging," in *Fluorescence Detection*, 1987, vol. 743: International Society for Optics and Photonics, pp. 198-202.

[4] M. Pleil, S. Gangopadhyay, C. Landis, and W. Borst, "Fluorescence decay times of multicomponent microscopic materials by pulsed laser excitation," in *Fluorescence Detection*, 1987, vol. 743: International Society for Optics and Photonics, pp. 86-93.

[5] M. Pleil, C. Landis, and W. Borst, "Time-resolved fluorescence from dispersed organic material of Permian Basin shales by picosecond laser microscopy," in *Fluorescence Detection II*, 1988, vol. 910: International Society for Optics and Photonics, pp. 7-12.

[6] M. Pleil, C. Landis, and W. Borst, "Time-Resolved Fluorescence From Dispersed Organic Material Of Permian Basin Shales By Picosecond Laser Microscopy," in *1988 Los Angeles Symposium: O-E/LASE '88*, 1988, vol. 0910: SPIE.

[7] S. Gangopadhyay, M. W. Pleil, and W. L. Borst, "Fluorescence Decay Kinetics Of Polyester Yellow In Solutions And In Polymers," in *Fluorescence Detection III*, May 17, 1989 1989, vol. 1054: International Society for Optics and Photonics, pp. 122-129, doi: 10.1117/12.951549.

[8] C. R. Landis, M. W. Pleil, and W. Borst, "Detection Of Microenvironments In Alginite By Laser Fluorescence Spectroscopy," in *Abstracts Of Papers Of The American Chemical Society*, 1990, vol. 200: American Chemical Society, pp. 24-GEOC.

[9] M. Pleil and S. Gangopadhyay, "Characterization of Carbon-doped Hydrogenated Amorphous Silicon by Picosecond Luminescence Decay Analysis," in *Joint Meeting of Texas Sections of APS and AAPT*, Texas, 1990.

[10] M. Pleil, F. Lopez, and R. Hall, "Microsystems Technologist Education – Community College's Role in Commercial Development," in *COMS 2004 Commercialization of Micro and Nano Systems Conference*, Edmonton, Alberta, Canada, Aug. 29 - Sept. 2, 2004 2004: MANCEF.

[11] M. Pleil and L. West, "SCME–An Emerging Education Program for Microsystems Technologists," in *Advancing Innovations in Engineering Technology Education*, San Diego, CA, 2005.

[12] M. Pleil and L. West, "Invited Speaker: Macro-Micro-Nano Machines in a Time of Change," in *CSUPERB – California State University Program for Education and Research in BioTechnology*, Los Angeles, CA, 2005.

[13] M. W. Pleil and L. West, "Southwest Center for Microsystems Education–Model for Workforce Educational Development," in *COMS - Commercialization of Micro and Nano Systems Conference*, Baden-Baden, Germany, 2005: MANCEF.

[14] L. West and M. Pleil, "Knowledge and Skills Needed by MEMS Technologists as Ascertained by Industry Survey and Job Profiling," in *COMS 2006*, St. Petersburg, FL, 2006.

[15] M. W. Pleil and T. D. Osborn, "Enhancing Engineering Interest and Skills in Community College Students through a Project Based MEMS Design Competition," in *Proceedings of the 2008 ASEE*

Gulf-Southwest Annual Conference, 2008: American Society for Engineering Education.

[16] P. N. Rao, I. Edinbarough, and M. Pleil, "MEMS Education for Technology Students," in *National Association Industrial Technology National Conference*, Nashville, Tennesee, 2008.

[17] P. N. Rao, I. Edinbarough, and M. Pleil, "MEMS Education for Technology Students," in *NAIT*, Nashville, Tennessee, 2008.

[18] M. Pleil, B. Lopez, F. Lopez, and M. J. Willis, "Workshop: MEMS (Micro Electro Mechanical Systems) Model Kits: Hands-on Approach to Understanding How They Work and Are Made," in *High Impact Technology Exchange Conference*, Scottsdale, Arizona, 2009.

[19] M. Pleil, B. Lopez, and M. J. Willis, "Workshop: Microsystems (MEMS) Innovators Wanted—It's You! ," in *High Impact Technology Exchange Conference*, Scottsdale, Arizona, 2009.

[20] M. Pleil and P. Phelps, "What's Up with Gene Chip Arrays and BioMEMS," in *High Technology Exchange Conference*, Scottsdale, Arizona, 2009.

[21] R. Scott, S. Bryant, S. O'Grady, and M. Pleil, "Technician Success in Multidisciplinary Micro and Nanotechnologies," in *High Impact Technology Exchange Conference*, Scottsdale, Arizona, 2009.

[22] J. Hyder and M. Pleil, "Broadening the Impact to Industry and Education: Utilizing the Synergy Project to Lean SCME Workshops and Instruction," in *High Impact Technology Exchange Conference*, Orlando, Florida, 2010.

[23] M. Pleil, "Intro to Microelectromechanical Systems," in *High Impact Technology Exchange Conference*, Orlando, Florida, 2010.

[24] M. Pleil and F. Lopez, "Workshop: The World of Microsystems Fabrication: How Microelectromechanical Devices Are Made," in *High Impact Technology Exchange Conference*, Orlando, Florida, 2010.

[25] R. Ehrmann, M. Lesiecki, A. Michelen, D. Newberry, and M. Pleil, "Building Your Micro-Nano Curriculum—Learning from Others Who Are "Doing" or "Have Done" the Same," in *High Impact Technology Exchange Conference*, San Francisco, California, 2011.

[26] J. Hyder and M. Pleil, "An Innovative Approach to Scaling Advanced Technological Education," in *ATMAE*, Cleveland, Ohio, 2011.

[27] M. Pleil, "Microsystems Fabrication - Making Tiny Devices," in *ATMAE*, Cleveland, Ohio, 2011.

[28] M. Pleil, "Dynamic Cantilever - Macro Model of a Micro Nano Device," in *ATMAE*, Cleveland, Ohio, 2011.

[29] M. Pleil, C. Burns, A. Sebborn, J. Hyder, F. Lopez, and S. Trujillo, "SCME: From Making to Testing Micro Transducers in the Classroom–Hands-on Kits for STEM Education," in *High Impact Technology Exchange Conference*, San Francisco, California, 2011.

[30] J. Hyder and M. Pleil, "Value-Based Evaluation," in *High Impact Technology Exchange Conference*, Denver, Colorado, 2012.

[31] M. Pleil, "SCME Mapping Project; Micro/Nano Technicians—Where Will the Jobs Be?," in *High Impact Technology Exchange Conference*, Denver, Colorado, 2012.

[32] M. W. Pleil, "Invited Paper: From Silicon to a Packaged Device – Educating Students to be

Successful as Micro Nano Technologists," in *MM Live USA*, Chicago, 2012.

[33] M. Pleil, "Introduction to Nanoscience and Nanotechnology, a New Course at the University of New Mexico," in *ATMAE*, New Orleans, LA, 2013.

[34] M. Pleil, "Micro-Nano Industry – US Map of Companies and Hiring Trends," in *ATMAE*, New Orleans, LA, 2013.

[35] M. Pleil, "Bringing New Hires and Students Up the Micro-Nano Fabrication Learning Curve," in *COMS 2014*, Salt Lake City, Utah, 2014: MANCEF.

[36] M. Pleil, "Workshop #1: Understanding and Teaching Statistical Process Control, A Handson Approach to Preparing Your Students for High-Tech Manufacturing," in *2014 IAJC/ISAM Conference*, Orlando, Florida, 2014.

[37] M. Pleil, "Promulgating SCME Resources Globally Through the Web," in *High Impact Technology Exchange Conference*, Chicago, Illinois, 2014.

[38] M. Pleil, "Hands-on Statistical Process Control in the Classroom," in *High Impact Technology Exchange Conference*, Chicago, 2014.

[39] M. Pleil, "Bringing Microsystems Technology to Your Tech Program," in *ATMAE*, St. Louis, Missouri, 2014.

[40] M. Pleil and F. Lopez, "Hands-on Micro Pressure Sensor Transducer Function and Systems Integration," in *ATMAE*, St. Louis, Missouri, 2014.

[41] M. W. Pleil, "Hands-on Statistical Process Control In the Classroom," in *High Impact Technology Exchange Conference*, Chicago, 2014.

[42] M. W. Pleil, "Plug and Play Microsystems (MEMS) Technology into an Engineering and Technology Program," in *Proceedings of The 2014 IAJC/ISAM Joint International Conference*, Orlando, Florida, 2014.

[43] M. Pleil, "Creating Micro Devices Exploiting Crystal Structure: Hands-on Crystallography," in *High Impact Technology Exchange Conference*, Portland, Oregon, 2015.

[44] M. Pleil, "Micro Technology Resources and Support to Educate and Engage Your STEM Students!," in *High Impact Technology Exchange Conference*, Portland, Oregon, 2015.

[45] M. Pleil, "Take a Tour of the SCME Online Offerings," in *Micro Nano Technology Conference*, Seattle, Washington, 2015.

[46] M. Pleil, "Micro-cantilever Hands-on Kit," in *Micro Nano Technology Conference*, Seattle, Washington, 2015.

[47] M. Pleil, "Design and Manufacturing on a Head of a Pin - Enhancing Engineering Education with a Project-based Microsystems Design Course and Competition," in *ATMAE*, Pittsburgh, Pennsylvania, 2015.

[48] M. Pleil and A. Bell, "Modeling a Micro Pressure Sensor," in *Micro Nano Technology Conference*, Seattle, Washington, 2015.

[49] M. Pleil and R. K. Ehrmann, "Classroom Ready Micro–Nanotechnology Multidisciplinary Resources," in *ATMAE* Pittsburgh, Pennsylvania, 2015.

[50] M. Pleil, J. Hyder, and D. McClure, "Micro-Nano Industry Mapping and Survey Results – Data You Can Use to Evolve Your Program," in *Micro Nano Technology Conference*, Seattle, Washington, 2015.

[51] B. Lopez and M. Pleil, "**SCME's Hands-online Academy – A Remote Approach to Hands-on Instruction**," in *Micro Nano Technology Conference*, Albany, NY, 2016.

[52] B. Lopez and M. Pleil, "SCME's Hands-online Academy – A Remote Approach to Hands-on Instruction," in *ATMAE*, Orlando, Florida, 2016.

[53] B. Lopez and M. Pleil, "How SCME's Plug-and-Play MEMS Technology Programs Have Broadened STEM Curricula Worldwide," in *5th IAJC/ISAM International Conference*, Orlando, Florida, 2016.

[54] M. Pleil, "Microsystems Educational Resources for the Cleanroom and the Classroom," in *International Symposium on Research Cleanroom Operations*, Salt Lake City, Utah, 2016.

[55] M. Pleil and B. Lopez, "Mapping Educational Materials Usage and Impact - Some Tools You Can Use," in *Micro Nano Technology Conference*, Albany, NY, 2016.

[56] M. Pleil and B. Lopez, "Microsystems Resources to Engage and Educate Yourself and Your Students!," in *Micro Nano Technology Conference*, Albany, NY, 2016.

[57] M. Pleil and B. Lopez, "Enhance and Evolve Your Tech and Engineering Program with Microsystems – a Rapidly Growing Technology," in *ATMAE*, Orlando, Florida, 2016.

[58] M. Pleil and B. Lopez, "Workshop #2: Understanding and Teaching Statistical Process Control. A Hands-on Approach to Preparing Your Students for High-Tech Manufacturing," in *5th IAJC/ISAM Joint International Conference*, Orlando, Florida, 2016.

[59] M. Pleil, M. Rajasekaran, and B. Lopez, "Poster: Microsystems and Nanotechnology Industry Interactive Maps and Workforce Survey Results," in *Micro Nano Technology Conference*, Albany, New York, 2016.

[60] B. Lopez and M. Pleil, "SCME's Hands-online Academy: A Remote Approach to Hands-on Instruction," in *High Impact Technology Exchange Conference*, Pittsburgh, PA, 2017.

[61] A. Bell, M. Pleil, and B. Lopez, "Design, Build, and Test Arduino Modules Using NI Software and Discovery-Based Learning for MEMS," in *High Impact Technology Exchange Conference*, Miami, Florida, 2018.

[62] B. Lopez and M. Pleil, "MEMS Foundations Topics and Certification for Instructors and Students," in *High Impact Technology Exchange Conference*, 2018.

[63] M. Pleil, "Applied Micro Bi-Morph Cantilever Fabrication, Design, and Engineering Concepts," in *ATMAE*, Kansas City, Missouri, 2018.

[64] M. Pleil, "ATMAE Certification for MEMS Foundations Topics," in *ATMAE*, Kansas City, Missouri, 2018.

[65] M. Pleil, "Microfabrication Process Course Using a Simple Pressure Sensor Design," in *IAJC International*, Orlando, Florida, 2018.

[66] A. Bell and M. Pleil, "Pre-Conference Workshop: Using Arduino Uno and LabView to Learn MEMS Concepts," in *High Impact Technology Exchange Conference*, St. Louis, Missouri, 2019.

[67] M. Pleil, "Available for Immediate Integration: MEMS Foundations and BioMEMS Asynchronous Online Short Courses with ATMAE Certifications," in *ATMAE Conference*, Charlotte, North Carolina, 2019.

[68] M. Pleil and P. Sharma**, "Micro Bi-Morph Cantilever: Understanding Micro Sensors and Actuators," in *High Impact Technology Exchange Conference*, St. Louis, Missouri, 2019.

[69] M. Pleil and P. Sharma**, "Support Center for Microsystems Education," in *ATMAE Conference*, Charlotte, North Carolina, 2019.

[70] M. Pleil, R. Travis, and B. Lopez, "Integrating MEMS and BioMEMS Materials into STEM Curricula," in *High Impact Technology Exchange Conference*, St. Louis, Missouri, 2019.

[71] P. Sharma** and M. Pleil, "Student Journey in the Micro Manufacturing of a Bi - Morph Cantilever Device," in *ATMAE*, Charlotte, North Carolina, 2019, pp. 173-180.

[72] M. Pleil, "Foundations in Microsystems Fabrication Course for Engineering Students," in *Proceedings of the 2020 ASEE Gulf-Southwest Annual Conference*, University of New Mexico, 2020: ASEE.

Government Documents (1)

[1] (2006). *President Participates in American Competitiveness Panel in New Mexico*. [Online] Available: https://georgewbush-whitehouse.archives.gov/news/releases/2006/02/text/20060203-6.html

Grants Awarded, Declined and Pending (18)

[1] 2003, Awarded, M. Pleil, F. Lopez, H. Weaver, and J. Wood, Requested: $2,798,063, Received: $2,798,063, “Southwest Center for Microsystems Education”, National Science Foundation, Central New Mexico Community College, NSF DUE# 0402651,2004-2008.

[2] 2007, Encouraged, S. Fonash, M. Pleil, P. Hallacher, K. Halvorston, and M. Lesiecki, Requested: $5,000,000, Received: $0, “National ATE Nanoscale Technology Education Center”, National Science Foundation, Penn State, NSF DUE# 0735616.

[3] 2007, Encouraged, M. Pleil, T. Osborn, M. Lesiecki, and J. Wood, Requested: $2,245,798, Received: $0, “Southwest Center for Microsystems Education”, National Science Foundation, Central New Mexico Community College, NSF DUE# 0735821.

[4] 2008, Awarded, M. Pleil, Requested: $81,500, Received: $81,500, “Nanoscience Online Course”, New Mexico Public Education Department, University of New Mexico, February, 2008 - June, 2008.

[5] 2008, Awarded, M. Pleil, F. Lopez, N. Vadiee, and J. Wood, Requested: $2,446,434, Received: $2,444,434, “Southwest Center for Microsystems Education”, National Science Foundation, University of New Mexico, NSF DUE# 0902411, 2008-2012.

[6] 2008, Awarded - Transfer from CNM to UNM, M. Pleil, F. Lopez, H. Weaver, and J. Wood, Received: $730,593, “Southwest Center for Microsystems Education”, National Science Foundation, University of New Mexico, From DUE# 0402651 to DUE# 0830384, 2008-2010.

[7] 2010, Awarded, Z. Leseman, M. Pleil, M. Hosseein-Zadeh, and C. Luhrs, Requested: $200,000, Received: $200,000, “NUE: An Integrated Multidisciplinary Nanotechnology Undergraduate Education Program at the University of New Mexico”, National Science Foundation, University of New Mexico, #1042602, 2010-2014.

[8] 2011, Awarded, M. Pleil, A. Bell, K. Jean, A. Hoff, and J. Wood, Requested: $4,999,910, Received: $3,360,144, “Southwest Center for Microsystems Education”, National Science Foundation, NSF DUE# 1205138, 2012-2019.

[9] 2012, Declined, M. Pleil, Requested: $850,439, Received: $0, “Value Creation and the ATE Community: Researching the Efficacy of an Evaluation Framework”, National Science Foundation, University of New Mexico, NSF DUE# 1304846.

[10] 2013, Declined, Z. Leseman, M. Hosseein-Zadeh, M. Pleil, and A. Datye, Requested: $200,000, Received: $0, “NUE: An Integrated Multidisciplinary NanoScience & Nanotechnology Undergraduate Program at the University of New Mexico”, National Science Foundation, University of New Mexico, #1343754.

[11] 2014, Declined, Z. Leseman, M. Hosseein-Zadeh, M. Pleil, and A. Datye, Requested: $199,999, Received: $0, “NUE: An Integrated Nanotechnology Undergraduate Education Program at the University of New Mexico”, National Science Foundation, University of New Mexico, #1446103.

[12] 2016, Declined, M. Pleil, A. Bell, K. Jean, J. Wagner, and J. Wood, Requested: $3,988,642, Received: $0, “Southwest Center for Microsystems Education”, National Science Foundation, University of New Mexico, DUE# 1601120.

[13] 2017, Awarded, M. Pleil, P. Auburn, D. Kainer, and J. Wood, Requested: $1,592,089, Received: $1,592,089, “SCME: Scaling Microsystems Support”, National Science Foundation, University of New Mexico, NSF DUE# 1700678, 2017-2021.

[14] 2018, Declined - Pre-Proposal, N. Jackson and M. Pleil, Requested: $594,020, Received: $0, “MEMS Packaging: Education and Research Cluster”, Department of Defense, University of New Mexico.

[15] 2018, Awarded, M. Pleil, Requested: $43,995, Received: $43,995, “SCME: Scaling Microsystems Support - Supplemental”, National Science Foundation, University of New Mexico, NSF DUE# 1831042 - supplemental to Due# 1700678.

[16] 2019, Declined Pre-Proposal, N. Jackson, M. Pleil, and M. Hosseein-Zadeh, Requested: $1,775,161, Received: $0, “Multidisciplinary Microsystems Manufacturing Education Enhancement Program”, Department of Defense, University of New Mexico.

[17] 2019, Pending, N. Jackson, M. Pleil, and V. Law, Requested: $473,859, Received: TBD, “IGE: Applied Graduate Education Through Innovative Emerging Technology Experiences”, National Science Foundation, University of New Mexico, NSF #1954189.

[18] 2020, Pending - Subaward, J. Ashcroft, I. Cossette, N. Habibi, P. Kazarinoff, and G. Kepner, Requested: $7,498,965, Received: TBD, “The Micro Nano Technology Education Center (MNT-EC)”, National Science Foundation, Pasadena City College, NSF DUE# 2000281.

Reports (5)

[1] M. Pleil, "Stepper Intensity Degradation Multi-exponential Decay Model," Texas instruments, Texas, 1995.

[2] M. Pleil, "Opal 7830I Automated SEM – Final Acceptance Report," Texas Instruments, LMOS, 1996.

[3] M. Pleil, "Opal 7830I F23 Engineering Guide," Philips Semiconductors - F23, Albuquerque, 1998.

[4] M. Pleil, "Southwest Center for Microsystems Education NSF Annual Reports," National Science Foundation, Washington DC, 2005, 2006, …, 2017.

[5] M. Pleil, "Support Center for Microsystems Education NSF Annual Reports," National Science Foundation, Washington DC, 2017, 2018, 2019.

Thesis (2)

[1] M. W. Pleil, "Time Resolved Fluorescence Spectroscopy with a Fast Analog Technique: Applications to Microscopic Specimens," MS, Physics, Texas Tech University, 1987.

[2] M. W. Pleil, "Time-Correlated Single Photon Studies of Hydrogenated Amorphous Silicon Carbon," Ph.D., Physics, Texas Tech University, 1993.

Unpublished Work (1)

[1] M. W. Pleil, "Invited Speaker: Time-resolved Photoluminescence Characterization of Hydrogenated Amorphous Silicon," Texas Tech, Colloquium, April 26, 1990, 1990.

Web Page (4)

[1] M. Pleil, B. Lopez, and M. J. Willis. "Southwest Center for Microsystems Education." http://scme-nm.net/ (accessed 2020).

[2] M. Pleil. "SCME YouTube Channel." YouTube. https://www.youtube.com/channel/UCY5kdNUUoAp548-sWdwTCYA (accessed 2020).

[3] M. Pleil and B. Lopez. "SCME Support Center." SCME-Support.org (accessed 2020).

[4] M. Pleil. "Micro Nano Technology Education Special Interest Group." https://www.mntesig.net/ (accessed 2020).

Citations

Dr. Pleil's academic career focuses on teaching and providing professional development for educators wishing to integrate Microsystems into their STEM programs. Publications are secondary to workshops, creating educational materials and educationally focused conference presentations. It is estimated that over 600 educators have attended Dr. Pleil's led workshops, presentations and webinars since 2004.

This section summarizes citations as per Google Scholar.

Summary citations

Table 1 Google Scholar citation summary.

	All	Since 2015
Citations	131	12
h-index	6	2
I10-index	4	0

Table 2 Citations per Google Scholar as of January 2020.

TITLE	CITED BY	YEAR
Pulsed laser fluorescence microscopy of coal macerals and dispersed organic material CR Landis, GW Sullivan, MW Pleil, WL Borst, JC Crelling Fuel 66 (7), 984-991	25	1987
Fast analog technique for determining fluorescence lifetimes of multicomponent materials by pulsed laser WL Borst, S Gangopadhyay, MW Pleil Fluorescence Detection 743, 15-23	19	1987
Enhancement of fluorescent fingerprints by time-resolved imaging ER Menzel, M Pleil, S Gangopadhyay, W Borst Fluorescence Detection 743, 198-202	16	1987
Primary scintillant fluorescent decay times in binary and ternary scintillators by near UV pulsed laser excitation MW Pleil, S Gangopadhyay, WL Borst Nuclear Instruments and Methods in Physics Research Section A: Accelerators …	13	1987
Fluorescence decay kinetics of “Polyester yellow” in solutions and in polymers S Gangopadhyay, MW Pleil, WL Borst Journal of luminescence 46 (5), 359-369	8	1990
Fluorescence decay times of multicomponent microscopic materials by pulsed laser excitation MW Pleil, S Gangopadhyay, C Landis, W Borst Fluorescence Detection 743, 86-93	8	1987
How educational innovators apply diffusion and scale-up concepts JW Dearing, C Dede, D Boisvert, J Carrese, L Clement, E Craft, P Gardner, ... Scaling educational innovations, 81-104	6	2015
Laser-induced fluorescence microscopy of coal macerals and dispersed organic material WL Borst, MW Pleil, GW Sullivan, JC Crelling, CR Landis	6	1986

TITLE	CITED BY	YEAR
Am. Chem. Soc., Div. Gas Fuel Chem., Prepr.;(United States) 31 (CONF-860425-)		
Picosecond time-resolved photoluminescence characterization of a-SiC: H films prepared by electron cyclotron resonance plasma S Gangopadhyay, M Pleil, W Borst, C Young, M Kristiansen Journal of non-crystalline solids 137, 859-862	5	1991
Time-resolved fluorescence from dispersed organic material of Permian Basin shales by picosecond laser microscopy MW Pleil, CR Landis, WL Borst Fluorescence Detection II 910, 7-12	5	1988
Study of energy transfer in a solution of coumarin 460 and rhodamine 6G by time-resolved laser-induced fluorescence spectroscopy S Gangopadhyay, MW Pleil, WL Borst Journal of luminescence 39 (2), 105-110	4	1987
Time resolved fluorescence spectroscopy with a fast analog technique: applications to microscopic specimens MW Pleil Texas Tech University	4	1987
Time-resolved fluorescence spectroscopy of crude oils and condensates S Gangopadhyay, CR Landis, MW Pleil, WL Borst, PK Mukhopadhyay Fuel 67 (12), 1674-1679	3	1988
Microsystems Technologist Education–Community College's Role in Commercial Development MW Pleil, F Lopez, R Hall COMS2004, Edmonton, Canada	3	
Plug and Play Microsystems (MEMS) Technology into an Engineering and Technology Program MW Pleil Proceedings of The 2014 IAJC/ISAM Joint International Conference	2	2014

TITLE	CITED BY	YEAR
Southwest Center for Microsystems Education–Model for Workforce Educational Development MW Pleil, LA West, TVI Albuquerque COMS2005–Commercialization of Micro and Nano Systems Conference, Baden-Baden …	2	2005
Enhancing Engineering Interest and Skills in Community College Students through a Project Based MEMS Design Competition MW Pleil, TD Osborn Albuquerque, NM: Sandia National Laboratories	1	2008
Needs assessment manufacturing technology smalltech program January 2008 M Pleil Central New Mexico Community College, Southwest Center for Microsystems …	1	2008

Courses Taught

2015 – Present – University of New Mexico

- **ME160L – Mechanical Engineering Design I
- **ME260L – Mechanical Engineering Design II
- ME460 – Mechanical Engineering Design V (Capstone)
- *ME462/562 – Mechanical Engineering Special Topics MEMS Fabrication
- Undergraduate Special Topics/Projects

* New courses
** Significantly updated courses

Undergraduate Problems - ME 451

- Fall 2017 – Patrick Roddy – CNC/Machining under Jason Church
- Summer 2019 Blanca F. Ruiz Garcia – 3 credit hour project to learn how to fabricate mems devices and develop a bi-morph micro cantilever. Blanca is now working at 3D Glass solutions due to the skills obtained.
- Fall 2019 - Zachary J. Sanchez Archuleta - 3 credit hour project on 3D digital mapping and density determination at Los Alamos National Laboratories.

Masters Committees

- 2019 - Aseem Poudyal – MS in Mechanical Engineering

2003-2016 TVI/Central New Mexico Community College

School of Science, Mathematics and Engineering

- Physics 1010 – Physics for non-majors
- *Engineering 1010 – Engineering Survey

School of Applied Technologies

- *MEMS1001 – Introduction to MEMS
- *MEMS2001 – MEMS Fabrication
- *MEMS2092 – MEMS Advanced Fabrication
- *MEMS2005 – MEMS Design I
- *MEMS2010 – MEMS Design II
- SMT2001 – Semiconductor Manufacturing Theory
- SMT2092 – Semiconductor Manufacturing Lab
- **MT1001 – Manufacturing Concepts
- **MT2001 – Applied Science

* New courses
** Significantly updated course
First Applied Technologies instructor to be online certified and have hybrid courses.

Course Evaluations

2015-2019 Mechanical Engineering

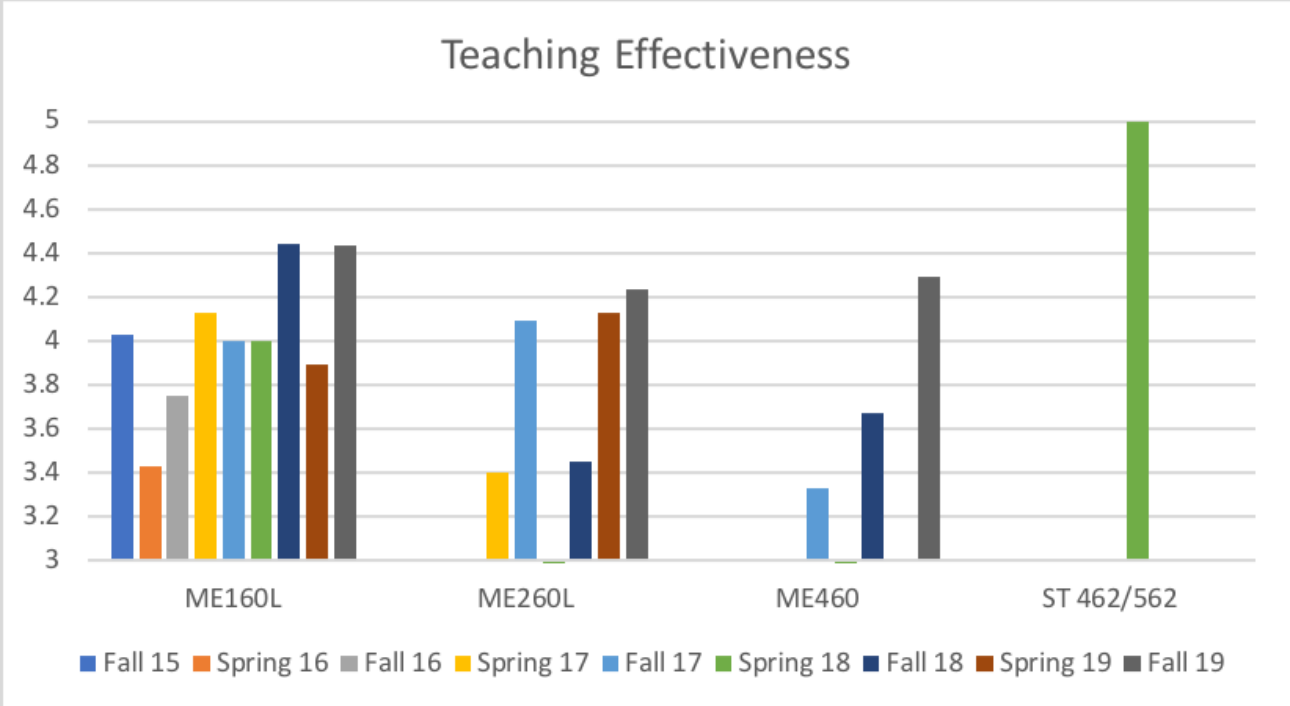
Teaching Effectiveness

Please rate the instructor's overall teaching effectiveness:

5 – Highly Effective
4 – Effective
3- Unsure
2 – Ineffective
1 – Highly Ineffective

Table 3 Overall teaching effectiveness (mean) by course and semester.

Please rate the instructor's overall teaching effectiveness:									
	Fall 15	Spring 16	Fall 16	Spring 17	Fall 17	Spring 18	Fall 18	Spring 19	Fall 19
ME160L	4.03	3.43	3.75	4.13	4	4	4.44	3.89	4.43
ME260L				3.4	4.09	2.96	3.45	4.13	4.23
ME460					3.33		3.67		4.29
ST 462/562						5			



Teaching Approachability

How comfortable do you feel approaching the instructor with questions or comments?

5 - Very comfortable
4 – Somewhat comfortable
3 – Unsure
2 – Somewhat uncomfortable
1 – Very uncomfortable

Table 4 Overall approachability (mean) by course and semester.

How comfortable do you feel approaching the instructor with questions or comments?									
	Fall 15	Spring 16	Fall 16	Spring 17	Fall 17	Spring 18	Fall 18	Spring 19	Fall 19
ME160L	4.3	3.92	4.1	4.53	4.52	4.14	4.69	4.5	4.68
ME260L				4.24	4.61	3.75	4.05	4.75	4.73
ME460					3.78		3.89		4.86
ST462/562						5