

# TEODORA RUTAR SHUMAN, PH.D.

Professor and Chair, Mechanical Engineering Department, Seattle University

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## EDUCATION

<b>Doctor of Philosophy</b>	2000
University of Washington, Seattle, Washington	
Dissertation: "NO <sub>x</sub> and CO Formation in Lean-Premixed Methane-Air Combustion in a Jet-Stirred Reactor Operated at Elevated Pressure"	
<b>Master of Science, Mechanical Engineering,</b>	1994
University of Washington, Seattle, Washington	
Thesis: "Nitrous Oxide Destruction by Reburning in a Jet-Stirred Reactor"	
<b>Bachelor of Science, Mechanical Engineering,</b>	1992
University of Belgrade, Belgrade, Yugoslavia	

## PROFESSIONAL EXPERIENCE

<b>Department Chair</b>	2012—present
Seattle University, Mechanical Engineering	
<ul style="list-style-type: none"><li>– PI on \$1.86M NSF-RED grant "Revolutionizing a Mechanical Engineering Department through Industry Immersion and a Focus on Identity"<ul style="list-style-type: none"><li>– Overseeing change towards a collaborative faculty and student culture</li><li>– Guiding creation of an inclusive teaching and mentoring culture</li><li>– Increasing students' industry immersion and professional development</li><li>– Managing resources, curriculum change, project consultants and evaluators</li><li>– Implementing changes to annual performance reviews</li><li>– Enabling pedagogical improvements for faculty</li></ul></li><li>– Recognized the growing regional demand for BSME degrees and enabled the 100 percent increase in enrollment in 9 years</li><li>– Increased staffing and managed resources to respond to the doubling of the BSME student population</li><li>– Lead and collaboratively developed the first MSME program at Seattle U</li><li>– Leading marketing campaign for sustainable MSME enrollment management</li><li>– Managed and empowered professors and staff in a successful ABET accreditation and ongoing assessment process</li><li>– Managing five separate budgets for the department and the grant</li><li>– Training: Chair as Transformative Leader, Chair's Community of Practice</li><li>– Organizer and active participant in annual ASME MEED leadership summit</li></ul>	

<b>Professor</b>	2017—present
<b>Associate and Assistant Professor</b>	2000—2017
Seattle University	
– Senior Design Coordinator	2000—2011, 2015—2016
– Paccar Professor	2007—2011, 2016—2018
– Taught 13 different courses and advised 13 senior design projects	
– PI/co-PI on three NSF and six other external grants, totaling over \$2.4 M	
– Involved over 25 undergraduate students in research	
– Co-authored 13 published journal articles, 22 peer-reviewed conference papers, and numerous other scholarly products	
– Chair and member of several personnel and procedural committees	
– Training: Richard Felder - Active Learning; Michael Prince - PBL	
<b>Affiliate Professor</b>	2000—present
University of Washington, Mechanical Engineering Department	
<b>Engineering Co-op</b>	1989, 1990
Energoprojekt, Belgrade, Yugoslavia	

#### **AWARDED EXTERNAL GRANTS AND FUNDING**

1. Shuman, T.R., Cook, K., Han, Y-L., Mason, G., Turns, J.: “IUSE/PFE:RED: Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity.” *National Science Foundation 1730354, July 1, 2017 - September 30, 2023, \$1,861,527*
2. Mason, G., Stipe, C., Cook, K., and Shuman, T: “Facilitating Problem-Based Learning with an Inverted Classroom” *National Science Foundation DUE-TUES, DUE-1245455, awarded September 12, 2013, \$171,306*
3. Stipe (PI), Lauer, Shih, Shuman, Smith, and Stenbak M. J. (contributors), Murdock Charitable Trust: Purchase of Spectroscopy Instrumentation, 2013, \$199,000
4. Shuman Rutar, T. “Rapid, low-energy settling of microalgae” *Solution Recovery Service, Dexter, MI, 2010, \$10,000*
5. Shuman Rutar, T. “Electroporation Device for Algal Lipid Extraction” *Solution Recovery Service, Dexter, MI, 2010, \$10,000*
6. Shuman Rutar, T. “Building Energy Retrofit” *Mt. Rainier National Park, 2009, \$8,000*
7. Shuman Rutar, T. “Algal Lipid Extraction Device” *The Boeing Co., 2008, \$27,000*
8. Rutar, T. and Malte, P. C. “Solar PV System Design for Mt. Rainier National Park at Sunrise” *University National Park Energy Partnership Program, UNPEPP, 2008, \$15,000*
9. Rutar, T., Mason, G, and Adamson, J. “Creating a Learning Community in a Freshman Design Course through Curriculum Coordination.” *National Science Foundation award number DUE-0126776, July 2002-2004 for \$108,804*

## PUBLICATIONS

### PEER-REVIEWED JOURNAL ARTICLES (undergraduate students are underlined)

1. Han, Y-L., Cook, K., Turns, J., Mason, G., and Shuman, T. R., "Students' Experience of an Integrated Electrical Engineering and Data Acquisition Course in an Undergraduate Mechanical Engineering Curriculum" *IEEE Transactions on Education*, Vol. 65, Issue 3, August 2022, Pages 331-343, [10.1109/TE.2022.3178666](https://doi.org/10.1109/TE.2022.3178666)
2. Han, Y-L., Cook, K., Mason, G., and Shuman, T. R., "Enhance engineering design education in the middle years with authentic engineering problems" *Journal of Mechanical Design, Transactions of the ASME*, Vol. 140, Issue 12, December 2018, 122001-122001-9
3. Cook, K.E., Han, Y-L., Shuman, T. R., and Mason, G., "Effects of Integrating Authentic Engineering Problem Centered Learning on Student Problem Solving" *International Journal of Engineering Education* Vol. 33, No. 1(A), 2017, Pages 272–282
4. Shuman, T.R., Mason, G., Han, Y.L., and Cook, K., "A novel approach to educating engineers: learning in an inverted classroom through problems designed by engineering professionals" *Journal of Applied Engineering Science*, Volume 14, Number 3, 2016, Pages 329-334
5. Shuman, T. R., Mason, G., Reeve, D., Schacht, A., Goodrich, A., Napan, K., and Quinn, J. "Low-Energy Input Continuous Flow Rapid Pre-Concentration of Microalgae through Electro-Coagulation-Flocculation" *Chemical Engineering Journal*, Volume 297, 2016, Pages 97-105
6. Shuman, T. Rutar, Mason, G., Marsolek, M., Lin, Y., Reeve, D., and Schacht, A. "An Ultra-Low Energy Method for Rapidly Pre-Concentrating Microalgae" *Bioresource Technology*, Volume 158, April 2014, Pages 217-224
7. Marsolek, M.D., Kendall, E., Thompson, P. L., and Shuman, T. R. "Thermal Pretreatment of Algae for Anaerobic Digestion." *Bioresource Technology*, Volume 151, January 2014, Pages 373-377
8. Mason, G., Rutar Shuman, T., and Cook, K. "Comparing Effectiveness of an Inverted Classroom Concept to Traditional Delivery in an Upper Division Engineering Course," *IEEE Transactions on Education*, Vol. 56, No. 4, November 2013
9. Rutar, T., Lee, J. C. Y., Dagaut, P., Malte, P.C., and Byrne, A. A. "NO<sub>x</sub> formation pathways in lean-premixed-prevapourized combustion of fuels with carbon-to-hydrogen ratio between 0.25 and 0.88" *Proceedings of the Institution of Mechanical Engineers Vol. 221 Part A: Journal of Power and Energy*, 2007
10. Rutar, T., and Mason, G. "A Learning Community of University Freshman Design, Freshman Graphics, and High School Technology Students - Description, Projects, and Assessment." *Journal of Engineering Education*, Vol. 94, No.2, pp. 245-254, April 2005
11. Rutar, T., and Malte, P. C. "NO<sub>x</sub> Formation in High-Pressure Jet-Stirred Reactors with Significance to Lean-Premixed Combustion Turbines." *Journal of Engineering for Gas Turbines and Power*, Vol. 124, No. 4, pp. 776-783, October 2002

12. Rutar, T., Malte, P. C., and Kramlich, J. C. "Investigation of NO<sub>x</sub> and CO Formation in Lean-Premixed, Methane-Air, High-Intensity, Confined Flames at Elevated Pressures." *Proceedings of the Combustion Institute*, Vol. 28, pp. 2435-2441, 2000
13. Safoutin, M. J., Atman, C. A., Adams, R., Rutar, T., Kramlich, J. C., Fridley, J. L. "A Design Attribute Framework for Course Planning and Learning Assessment." *IEEE Transactions on Education*, Vol. 43, pp. 188-199, May 2000
14. Rutar, T., Kramlich, J. C., Malte, P. C. and Glarborg, P. "Experimental and Modeling Study of N<sub>2</sub>O Destruction by Reburning." *Combustion and Flame*, Vol. 107, pp. 453-463, 1996

**PEER-REVIEWED CONFERENCE PAPERS** (*presenter's name is in italics*)

1. *Shuman, T.* "Online Labs and DEI in Introduction to Thermodynamics Course" *Proceedings of 2023 ASEE Annual Conference and Exposition*, Baltimore, MD, 2023
2. *Han, Y.-L., Turns, J., Cook, K., Mason, G., & Shuman, T.R.* "Building a culture of "Engineering with Engineers"" *Proceedings of 2023 ASEE Annual Conference and Exposition*, Baltimore, MD, 2023
3. *Turns, J., Han, Y.-L., Cook, K. E., Shuman, T.R., & Mason, G.* "Work in progress: Creating effective prompts for "Teaming" sessions." *Proceedings of 2023 ASEE Annual Conference and Exposition*, Baltimore, MD, 2023
4. *Han, Y.-L., Cook, K. E., & Turns, J.* "Will the change last? That's the question" *Proceedings of the 2022 Frontiers in Education (FIE) Conference*, Uppsala, Sweden: IEEE, 2022
5. *Shuman, T.R., Han, Y.L., and Cook, K., Mason, G., Turns, J.,* "Revolutionizing Engineering Department by Changing It's Culture." *Proceedings of the 8<sup>th</sup> International Symposium on Industrial Engineering – SIE 2022, Plenary Session*, Belgrade, Serbia, September 29-30, 2022
6. *Turns, J., Han, Y.-L., Cook, K., Mason, G., and Shuman, T.R.* (2022). "Work in progress: Designing a sustainable mechanism for discursively navigating change." *Proceedings of 2022 ASEE Annual Conference and Exposition*, Minneapolis, MN, 2022. <https://peer.asee.org/41516>
7. *Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., and Turns, J.* (2022). "Cultivating a Culture to Foster Engineering Identity." *Proceedings of 2022 ASEE Annual Conference and Exposition*, Minneapolis, MN, 2022. <https://peer.asee.org/41950>
8. *Hamel, J., Strebinger, C., Gilbertson, E., Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., and Turns, J.* "Building Design Experience and a Greater Sense of Community through an Integrated Design Project" 2021 Frontiers in Education (FIE) Conference, Lincoln, NE, 2021
9. *Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., and Turns, J.* "Engineering with Engineers: Fostering Engineering Identity", *Proceedings of 2021 ASEE Annual Conference and Exposition*, virtual conference, 2021.
10. *Mason, G., Han, Y.-L., Cook, K., Hamel, J., Strebinger, C., Gilbertson, E., Shuman, T.R., and Turns, J.* "Lessons Learned - Making the "New Reality" More Real: Adjusting a Hands-On Curriculum for Remote Learning", *Proceedings of 2021 ASEE Annual Conference and Exposition*, virtual conference, 2021.

11. Han, Y.-L., Mason, G., Cook, K., Shuman, T.R., and Turns, J. "Integrating Electrical Engineering Fundamentals with Instrumentation and Data Acquisition in an Undergraduate Mechanical Engineering Curriculum" 2020 Frontiers in Education (FIE) Conference, Uppsala, Sweden: FIE, 2020, pp. 1-5, doi: 10.1109/FIE44824.2020.9274210.
12. Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., and Turns, J. "Engineering with Engineers: Fostering Engineering Identity through Industry Immersion", *Proceedings of 2020 ASEE Annual Conference and Exposition*, virtual conference, 2020.
13. Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., and Turns, J. "Engineering with Engineers: Revolutionizing a Mechanical Engineering Department through Industry Immersion and a Focus on Identity", *Proceedings of 2019 ASEE Annual Conference and Exposition*, Tampa, FL, 2019.
14. Cook, K., Han, Y.-L., Mason, G., Shuman, T.R., & Turns, J. "Implicit Engineering Identity in the Mechanical Engineering Major", *Proceedings of 2019 ASEE Annual Conference and Exposition*, Tampa, FL, 2019.
15. Han, Y., Cook, K. E., Shuman, T. R., and Mason, G., Turns, J., "Engineering with Engineers: Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity", *Proceedings of the 2018 ASEE Annual Conference & Exposition*, 2018.
16. Cook, K. E., Han, Y., Shuman, T. R., and Mason, G., Turns, J., "Engineering Identity across the Mechanical Engineering Major", *Proceedings of the 2018 ASEE Annual Conference & Exposition*, 2018.
17. Cook, K. E., Han, Y., Mason, G., Shuman, T. R., and Turns, J., "Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity" AERA 2018 Annual Meeting, New York City, NY, April 13-17, 2018.
18. Han, Y. L., Cook, K. E., Shuman, T. R., and Mason, G. S., "Development of Authentic Engineering Problems for Problem-Centered Learning", *Proceedings of the 2016 American Society of Engineering Education Annual Conference & Exposition*, 2016.
19. Shuman, T.R., Mason, G., Han, Y.L., and Cook, K., "Facilitating Problem-Based Learning with an Inverted Classroom" *Proceedings of the 6<sup>th</sup> International Symposium on Industrial Engineering – SIE 2015, Plenary Session*, Belgrade, Serbia, September 24-25, 2015
20. Mason, G., Cook, K., Han, Y.L., and Shuman, T. R., "Facilitating Problem-Based Learning with an Inverted Classroom" *Proceedings of the 2015 American Society of Engineering Education Annual Conference & Exposition*, 2015.
21. Mason, G., Rutar Shuman, T., and Cook, K. "Inverting (Flipping) Classrooms – Advantages and Challenges." *Proceedings of the 2013 American Society of Engineering Education Annual Conference & Exposition*, 2013. **ME Division Best Paper award.**
22. Rutar Shuman, T. and Mason, G., "Novel Approach to Conducting Labs in an Introduction to Thermodynamics Course." *Proceedings of the 2012 American Society of Engineering Education Annual Conference & Exposition*, 2012. **PIC 3 and ECC Division Best Paper award.**

23. *Rutar Shuman, T. and Mason, G., "Description of Three Algae-Related Interdisciplinary Senior Design Projects in Mechanical Engineering and Their Impact on Students." Proceedings of the 2011 American Society of Engineering Education Annual Conference & Exposition, 2011. ECC Division 2<sup>nd</sup> Best Paper award.*
24. *Rutar, T. and Shuman, B., "A Module Oriented Project Management Approach to Undergraduate Design Projects." Proceedings of the 2011 American Society of Engineering Education Annual Conference & Exposition, 2011*
25. *Rutar, T. and Mason, G., "Design of Experiments in Introduction to Thermodynamics Course." Proceedings of the 2011 American Society of Engineering Education Annual Conference & Exposition, 2011*
26. *Rutar, T. and Mason, G., "Three Freshman Team Design Projects." Proceedings of the 2005 American Society of Engineering Education Annual Conference & Exposition, 2005*
27. *Rutar, T. and Mason, G., "Assessing Student Design Team Performance in a Learning Community of University Freshman and High School Students." Proceedings of the 2004 American Society of Engineering Education Annual Conference & Exposition, 2004*
28. *Mason, G. and Rutar, T., "Creating a Learning Community in a Freshman Design Course with a Senior High-School Class and a Freshman Graphics Class." Proceedings of the 2002 American Society of Engineering Education Annual Conference & Exposition, 2002*
29. *Davis, D., Trevisan, M., McKenzie, L., Beyerlein, S., Daniels, P., Rutar, T., Thompson, P., and Gentili, K., "Practices for Quality Implementation of the TIDEE 'Design Team Readiness Assessment'." Proceedings of the 2002 American Society of Engineering Education Annual Conference & Exposition, 2002*
30. *Rutar T., and Malte, P. C. "NO<sub>x</sub> Formation in High-Pressure Jet-Stirred Reactors with Significance to Lean-Premixed Combustion Turbines." Presented at the 46<sup>th</sup> ASME International Gas Turbine and Aeroengine Technical Congress, Exposition, and Users Symposium, New Orleans, Louisiana, June 2001*
31. *Rutar, T. and Mason, G., "Short-Term Course Assessment, Improvement, and Verification Feedback Loop." Proceedings of the 2001 American Society of Engineering Education Annual Conference & Exposition, 2001*
32. *Rutar, T., Horning, D. C., Lee, J. C. Y., and Malte, P. C. "NO<sub>x</sub> Dependency on Residence Time and Inlet Temperature for Lean-Premixed Combustion in Jet-Stirred Reactors." Presented at the 43<sup>rd</sup> ASME Gas Turbine and Aeroengine Congress, Exhibition and Users Symposium in Stockholm, Sweden, June 2-5, 1998*
33. *Rutar, T., Martin, S. M., Nicol, D. G., Malte, P. C. and Pratt, D. T. "Effects of Incomplete Premixing on NO<sub>x</sub> Formation at Temperature and Pressure Conditions of LP Combustion Turbines." Presented at the 42<sup>nd</sup> ASME Gas Turbine and Aeroengine Congress and Exhibition in Orlando, Florida, June 2-5, 1997*
34. *Nicol, D. G., Rutar, T., Martin, S. M., Malte, P. C. and Pratt, D. T. "Chemical Reactor Modeling Applied to the Prediction of Pollutant Emissions from an LP Combustor." Presented at the 33rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit in Seattle, Washington, July 7-9, 1997*

**INVITED PUBLICATIONS AND PRESENTATIONS**

1. *Shuman, T.R., Han, Y.L., and Cook, K., Mason, G., Turns, J., "Revolutionizing Engineering Department by Changing Its Culture." Proceedings of the 8<sup>th</sup> International Symposium on Industrial Engineering – SIE 2022, Plenary Session, Belgrade, Serbia, September 29-30, 2022*
2. *Shuman, T.R., "Engineering with Engineers," ASME International Mechanical Engineering Education Leadership Summit (ASME MEED), Plenary session, Virtual, March 10-11, 2022*
3. *Shuman, T.R., "Engineering Identity in the Engineering Profession from College to the Engineering Practice." Konferencija Integrisanje rodne ravnopravnosti u projekte iz oblasti inženjerstva, Virtual event, Savez inženjera i tehničara Srbije, Belgrade, Serbia, October 28, 2021*
4. *Shuman, T.R. et al. panelist for post-secondary educators, at National Science Teaching Association's STEM20: Virtual event, July 27-30, 2020, <https://my.nsta.org/event/stem20-virtual-event>, accessed January 5, 2020*
5. *Shuman, T.R., Han, Y.-L., Cook, K., Mason, G., Turns, J. "Update on NSF Revolutionizing Engineering Departments grantees" ASME International Mechanical Engineering Education Leadership Summit (ASME MEED), New Orleans, LA, March 21-23, 2019*
6. *Rutar Shuman, T., Mason, G., and Kathleen Cook, "Experimental Design in Thermodynamics Lab. Inverting the Classroom in a Control Systems Course." Seminar, Faculty of Mechanical Engineering, University of Belgrade, Serbia, December 16, 2014*
7. *Mason, G., Shuman, T, Cook, K. "Experiences with Inverting a Classroom", webinar speaker, sponsored by PTC, 2014. Invited speaker.*
8. *Rutar Shuman, T. and Mason, G., "Novel Approach to Conducting Labs in an Introduction to Thermodynamics Course." Main Plenary II, ASEE Annual Conference, Atlanta, GA, June 25, 2013*
9. *Rutar Shuman, T. "Low-Energy Consumption and Rapid Settling of Microalgae," Mechanical Engineering Energy Seminar, University of Washington, Seattle, WA, May 18, 2011*
10. *Rutar Shuman, T. "Low Energy Consumption and Rapid Dewatering of Microalgae" presented at Second Conference on Sustainability for the Pacific Northwest Region, Seattle, WA, April 29-May 1, 2011*
11. *Rutar Shuman, T. "Algae to Fuel Processing and Oil Extraction" presented at First Conference on Sustainability for the Pacific Northwest Region, Seattle, WA, March 25-26, 2010*
12. *Rutar Shuman, T. "Challenges Facing Engineering Education" SIE 2009, 4<sup>th</sup> International Symposium of Industrial Engineering – Plenary Session\_speaker, Belgrade University, Belgrade, Serbia, December 10-11, 2009*
13. *Rutar Shuman, T. "Sustainable Algal Fuel Production – Projects at Seattle University" presented at Puget Sound AIChE (American Institute of Chemical Engineers), October 13, 2009.*

14. *Rutar Shuman, T.* "Algae senior design project at Seattle University," presented at *Northwest Biodiesel Network* meeting, October 28, 2008
15. *Rutar, T., and Mason, G.* "A Learning Community of University Freshman Design, Freshman Graphics, and High School Technology Students - Description, Projects, and Assessment; article summary and reflective essay on lessons learned." *Annals of Research on Engineering Education*, Vol. 2, No. 1, Winter 2006
16. *Mason, G., Rutar, T., and Adamson, J.* "Creating a Learning Community in a Freshman Design Course through Curriculum Coordination." Keynote address at WCERTE Conference, Seattle, WA, April 2004
17. *Rutar, T., Mason, G., and Adamson, J.* "Creation of a Learning Community through Curriculum Coordination – Phase Two." NSF Grantee Poster Session presentation at the *2003 American Society of Engineering Education Annual Conference & Exposition*, Nashville, TN, 2003

#### WORKSHOPS

1. *Cook, K., Han, Y.-L., Turns, J., Shuman, T.R., & Mason, G.* "The Sustainability of Change: A Process and Framework" workshop given at 2023 ASEE Annual Conference and Exposition, Baltimore, MD, 2023
2. *Han, Y.-L., Cook, K. E., & Turns, J.* "Will the change last? That's the question." *workshop presented at the 2022 Frontiers in Education (FIE) Conference, Uppsala, Sweden: IEEE, 2022*
3. *Cook, K., Han, Y.L., Turns, J., and Mason, G.,* "Sustaining and Transforming the Organization" NSF RED Monthly Meeting, Virtual, November 17, 2022
4. *Cook, K., Han, Y.L., Turns, J., and Mason, G.,* "Sustaining and Transforming the Organization" NSF RED Consortium Meeting, Crystal City, VA, September 21-23, 2022
5. *Cook, K., Han, Y.-L., Mason, G., Shuman, T.R., Turns, J.* "Implicit Association Test (IAT) - Measuring the unconscious mind" *NSF RED grantees Workshop*, Alexandria, VA, November 4-5, 2019.
6. *Shuman, T.R., Han, Y.L., Cook, K., and Mason, G.* "Improving Your Heat Transfer Course Using Problems Supplied by Engineering Professionals and a Flipped Classroom" workshop given at 2016 American Society of Engineering Education Annual Conference & Exposition, New Orleans, LA, 2016
7. *Mason, G., Cook, K., and Han, Y.L.,* "Improving Your Course Using an Inverted Classroom" at Seattle University, Seattle WA 2016

#### PEER-REVIEWED CONFERENCE ABSTRACTS (undergraduate students are underlined)

1. Teodora Rutar Shuman, Ben Loveless, Jeremy Bjelajac, and Peter Griff "Continuous-flow Electro-Coagulation-Flocculation for rapid and ultra-low energy pre-concentration of microalgae", *2017 Algae Biomass Summit*, Salt Lake City, UT, October 29 - November 1, 2017.
2. Teodora Rutar Shuman, Anthony Rock, Ben Loveless, and Jeremy Bjelajac, "Continuous-flow method for pre-concentrating microalgae with flow rates up to 5 L/min and energy inputs as low as 0.05 kWh/m<sup>3</sup> of processed algal slurry", *2016 Algae Biomass Summit*, Phoenix, AZ, October 25<sup>th</sup>, 2016.



3. *Rutar Shuman, T., and Mason, G., "Rapid and Ultra-low Energy-use Pre-Concentrating of Microalgae" 2014 Algae Biomass Summit, San Diego, CA, September 29-October 2, 2014*
4. *Rutar Shuman, T., Lin, Y., Bowman, C., Kurtz, V., Pawlak, G. D., "Microalgal Cell Vitality After Ultra-Low Energy Input Rapid Dewatering Process" 2012 Algae Biomass Summit, Denver, CO, September 24-27, 2012*
5. *Rutar Shuman, T., Mason, G., and Hudson, M., "Rapid Microalgae Concentration and Settling In Low-Energy Use Batch and Continuous Flow Systems" 1<sup>st</sup> International Conference on Algal Biomass, Biofuels & Bioproducts, St. Louis, MO, July 17-20, 2011*
6. *Marsolek, M., Kendall, E., Thompson, P., and Rutar Shuman, T., "The Impact of Thermal Pretreatment on Biogas Yields from Anaerobic Digestion of Algae." 1<sup>st</sup> International Conference on Algal Biomass, Biofuels & Bioproducts, St. Louis, MO, July 17-20, 2011*
7. *Rutar Shuman, T., Hudson, M., Mason, G., and students: Bratzel, Beach, Chang, De Vitis, and Umagat, "Settling of Microalgae Using Low Energy Input" 2010 Algae Biomass Summit, Phoenix, AZ, September 27-30, 2010*
8. *Rutar Shuman, T., Hudson, M., Jackels, S., and students: Bratzel, Mayther, Woolsey, Taitano, Shikuma, and Dayringer, "Algae Lipid Extractor Designs" 2009 Algae Biomass Summit, San Diego, CA, October 7-9, 2009*
9. *Rutar Shuman, T., Hudson, M., and students: Tyler, Krumwied, Rodgers, Haryono, Carson, Lum, Reha, Dietzen, and Ahmad, "Photobioreactor Design- Capstone Design Project" 2008 Algae Biomass Summit, Seattle, WA, October 23-24, 2008*

#### CONFERENCE POSTERS, PAPERS, AND PRESENTATIONS

1. Han, Y.-L., Berger, E., Briody, E., Cook, K., Mason, G., Morrison, E., Shuman, T.R., Turns, J., and Wirtz, E. "Revolutionizing Mechanical Engineering Departments", *ASME International Mechanical Engineering Congress and Exposition*, Pittsburg, PA, 2018.
2. Han, Y.-L., Cook, K., Mason, G., Shuman, T.R., Turns, J. "How Seattle University Plans to Revolutionize Engineering Through Industry Immersion", *Investment Casting Institute 65th Technical Conference and Exposition*, Kansas City, MO, 2018.
3. *Cook, K. E., Han, Y., Mason, G., Shuman, T. R., and Turns, J., "Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity" AERA 2018 Annual Meeting, New York City, NY, April 13-17, 2018.*
4. *Bean, J. C., and Rutar, T. "Teaching Proposal Writing to Engineering Students: A Writing Center/Engineering Collaboration." Proceedings of the Second European Association for the Teaching of Academic Writing (EATAW) Conference, Budapest, June 2003*
5. *Rutar Shuman, T. and Malte, P. C. "Experimental Measurements of NO<sub>x</sub> and CO in a Jet-Stirred Reactor at Pressures of 3.0, 4.7 and 6.5 atm and Variable Residence Times." Presented at the WSS/CI conference at University of Washington, Seattle, WA, October 26 and 27, 1998*
6. *Rutar Shuman, T., Nicol, D. G., Lee, J. C. Y., and Malte, P. C. "NO<sub>x</sub> Behavior in Lean-Premixed Combustion." Work-in-progress poster at 27<sup>th</sup> International Symposium on*

- Combustion, Boulder, CO, Combustion Institute, August 2-7, 1998
7. Rutar, T., Martin, S. M., Nicol, D. G., Malte, P. C. and Pratt, D. T. "An Engineering Modeling Study of NO<sub>x</sub> Dependency on Incomplete Premixing at Gas Turbine Engine Conditions." Presented at the WSS/CI Spring Meeting at SANDIA National Laboratories, Livermore, CA, April 15 and 16, 1997
  8. Rutar, T., Kramlich, J. C., Malte, P. C. and Glarborg, P. "Experimental and Modeling Study of N<sub>2</sub>O Destruction by Reburning." Presented at the WSS/CI conference at Stanford University, October 30 and 31, 1995
  9. Rutar, T., Kramlich, J. C., Malte, P. C. and Glarborg, P. "N<sub>2</sub>O Destruction by Reburning." Work-in-progress poster at 25<sup>th</sup> International Symposium on Combustion, Irvine, CA, Combustion Institute, 1994

## TEACHING

Seattle University 2000—present

Developed course curriculum, laboratory, design and research projects and taught:  
 MEGR 1000 *Introduction to Mechanical Engineering*, MEGR 181 *Innovative Design*,  
 CEEGR 3310 *Fluid Mechanics*, MEGR 321 *Thermodynamics*; MEGR 3220  
*Thermodynamics II*, MEGR 421 *Applied Thermodynamics*, MEGR 426 *HVAC*, MEGR  
 491 *Fuel Cells*, MEGR 492, 493 *Energy and Environment*, MEGR 4870, 4880, 4890  
*Engineering Design I, II, III*, MEGR 2980/498 *Directed Research*

Faculty advisor for senior design projects:

<i>St. James Cathedral-Energy Audit and Retrofit Recommendations</i> St. James Cathedral, Seattle, WA	2011—2012
<i>Low Energy Consumption Device for Rapid Settling of Microalgae</i> Solution Recovery Services Energy, Dexter, MI	2010—2011
<i>Building Energy Efficiency Retrofit</i> Mt. Rainier National Park	2009—2010
<i>Electroporation of Algae – Design and Testing</i> Solution Recovery Services Energy, Dexter, MI Provisional patent submitted	2009—2010
<i>Photovoltaic System Design and Energy Audit for Sunrise at</i> <i>Mt. Rainier National Park</i> University National Park Energy Partnership Program	2008—2009
<i>Algae Oil Extractor</i> Boeing	2008—2009
<i>Photobioreactor Design for Algal Production</i> Bioalgene, LLC	2006—2007
<i>Passive Cab Extender</i> Kenworth Truck Company, Kirkland, WA US patent application submitted	2005—2006
<i>Fan Shroud Design</i> Kenworth Truck Company, Kirkland, WA US patent application submitted	2004—2005

<i>Fuel Concentration Measurements in Experimental Pulse Detonation Engine</i>	2003—2004
Pratt & Whitney Seattle Aerosciences Center, Bellevue, WA	
<i>Finite Element Simulation of Ultrasound Probe Temperature Rise</i>	2002—2003
Siemens Medical Solutions, Issaquah, WA	
<i>Dynamic Cab Extender: Design, Construction, and Testing</i>	2001—2002
Kenworth Truck Company, Kirkland, WA	
US patent number 6846035	
<i>Alternative Power for Remote USCG Communication Stations</i>	2000—2001
US Coast Guard, Seattle, WA	

University of Washington 1992—1999

Instructor: ENGR 100 *Intro. to Eng. Design*; ME 333 *Intro. to Fluid Mechanics*  
 Teaching Assistant: *Graduate Gas Dynamics, Intro. to Eng. Design, Solar Energy, Thermodynamics 1 and 2, Turbomachinery, Heat Transfer and Mech. of Materials*

**SERVICE**

Professional:

Co-organizer, <i>ASME International Mechanical Engineering Education Leadership Summit (ASME MEED)</i> , Virtual, March 10-11, 2022	2022
WCERTE Representative	2017—present
Reviewer, <i>ASEE Annual Conference</i>	2010—present
Seattle U representative at Pacific Northwest Cooperative Ecosystem Studies Unit	2017—2019
Division Chair, <i>ASEE Energy Conversion and Conservation Division</i>	2016—2017
Program Chair, <i>2015 ASEE Annual Conference, ECC Division</i>	2014—2015
Officer, <i>ASEE Energy Conversion and Conservation Division</i>	2012—2017
Nomination committee member, <i>ASME Ben C. Sparks Medal</i>	2015
Radio-show participant “ <i>Setting the Course for Women in Engineering</i> ” <a href="http://www.blogtalkradio.com/edutalk2/2015/03/20/setting-the-course-for-women-in-engineering-from-the-stem-ed-coalition">http://www.blogtalkradio.com/edutalk2/2015/03/20/setting-the-course-for-women-in-engineering-from-the-stem-ed-coalition</a> , March 20, 2015	2015
Proposal Reviewer, <i>NSF-GRFP</i>	2014—2015
Proposal Reviewer, <i>NSF - DUE</i>	2000, 2009
Award Committee Member, <i>ASEE Sharon A. Keillor Award for Women in Engineering Education</i>	2010—2012
PhD thesis committee member, <i>University of Washington</i>	2011—2013
MS thesis committee member, <i>University of Washington</i>	2003, 2004, 2008
Reviewer, <i>Chemical Engineering Journal</i> , Elsevier, IF=5.3	2014
Reviewer, <i>Proceedings of the Institution of Mechanical Engineers, Part A, Journal of Power and Energy</i>	2007—2011
Paper Reviewer, <i>ASME/IGTI Turbo Expo</i>	1997, 1998, 2001, 2002

Reviewer, <i>Journal of Engineering for Gas Turbines and Power</i>	2000, 2001
Scientific Committee, <i>Journal of Engineering Management and Competitiveness</i>	2011—present
Scientific Committee, <i>5<sup>th</sup> International Symposium of Industrial Engineering 2012</i> , June 14-15, 2012, Belgrade, Serbia	2012
Executive Committee Member, <i>WSSCI</i>	2001—2003

Seattle University:

Faculty Handbook Revision Committee, member	2019—2021
Billodue Maker Space Advisory group, member	2019—2021
Chair, MSME Program development	2017—2018
Faculty Reviewer of Academic Assessment Reports for the Office of the Provost	2015, 2016
Facilitator, Provost Celebration of Faculty Scholarship	2014
Faculty Handbook Revision Committee member	2007
Summer in Seattle Freshman Orientation program, lecturer	2006, 2007
New Faculty Institute, planning committee member	2005—2006
Summer Faculty Fellowship Committee, member	2004—2006
Board of Trustees meeting, Seattle University	2004
Senior Synthesis Committee, Seattle University	2003

College of Science and Engineering, Seattle University:

College Personnel Committee, member	2009—2011, 2019—2022
Boeing diversity grant committee, member	2017—2021
Subcommittee for APR reviews, member	2018
Ad-hoc EXCO committee, member	2015, 2018
Substantial assistance to College Development Officer	2015—present
Chair, Master of Science in Mechanical Eng. program development	2015—2016
Co-chair, Master of Eng. in Systems Engineering, program design, development and hiring committee	2013—2015
Clare Boothe Luce Faculty Planning committee, member	2012—2016
Puget Sound Engineering Council Mentor Day for students, organizer	2000—2006
Local Community College visits	2001—2004
TIDEE assessment coordinator and grader	2001—2004

Mechanical Engineering Department, Seattle University:

Chair, faculty and staff hiring committees	2012—present
Chair or member, Department (ME,CEE,CSE) Personnel Committees	2006—2012
Mechanical Engineering Department Seminar organizer	2009—present
ABET accreditation assistance or leader	2005—present
ASHRAE student chapter advisor; three awarded scholarships	2009—2012
Found paying sponsors for six mech. eng. senior design projects	2008—2010
Assisted in developing Project Management lectures/workshops	2009—2010

SciEng, ME, and Syst. Eng. Advisory board meeting presentations	2002—present
Faculty search committees, member	2003, 2004
Department Chair search committee, member	2000
ASME Advisor	2000—2001
Acting Chair for Department of Mechanical Engineering	Summer 2000

## **OUTREACH**

Lake Washington School District Engineering and Manufacturing Technologies (EMTAC) Advisory Committee member	2014—present
Represented SU at Engineering and Computer Science night, Lake Washington Highschool	2014—2020
Refugee Women Alliance (ReWA) Board Member	2014—2018

## **AWARDS**

Dean's Award for demonstrated leadership and tireless commitment to excellence to Department of Mechanical Engineering, College of Science and Engineering, Seattle University	2019
Dean's Outstanding Teaching Award for Teaching Assistant for 1998 College of Engineering, University of Washington	1998
Society of Women Engineers: Outstanding Female Graduate Student Award	1997

## **MEMBERSHIPS**

ASEE member	2000—present
Algal Biomass Organization member	2009—present
ASME member	2018—present
The Combustion Institute member	1996—2009