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I am pleased to present to you the 2015 Annual Report for the School of Mechanical and Materials Engineering (MME) at Washington State University. One of the purposes of this annual report is to measure and track various performance indicators for the School in a concise and meaningful format. This includes such metrics as degrees awarded, enrollment trends, number of faculty, extramural research support, research publications, student scholarships, and student demographics, so that we can continually improve our programs and their impact. By continuing to track our progress in the first quarter of each calendar year through our annual report, we provide a clear picture to our constituents, both internal and external to WSU, of our progress. Of course, the state of our programs is much more than just a list of these growing metrics, publications, and accomplishments. The true value of the School of Mechanical and Materials Engineering lies in our contributions to the mission of the university by (1) educating and preparing students for professional careers and leadership in mechanical and materials engineering through a transformative educational experience; (2) conducting fundamental and applied research that leads to new knowledge, technology, and designs; and (3) engaging with people, industry, and communities to improve quality of life and enhance economic development. I hope you will sense the scope and progress of the School of MME as we strive to make significant contributions to positively impact society.

Record number of students

In 2015 we continued to see growth in the number of undergraduate students in the School of MME. We exceeded 1000 enrolled undergraduate students for the first time in the history of the program, with 936 undergraduate mechanical engineering students and 80 materials science and engineering students across our Pullman, Bremerton, and Everett programs. The number of certified students is at an all-time high and has more than doubled since 2008. We awarded 170 baccalaureate degrees in 2015, including 8 BS degrees in materials science and engineering and 162 BS degrees in mechanical engineering (120 BS ME degrees to Pullman students, 17 BS ME degrees to our Everett students, and 25 BS ME degrees to Bremerton students). We continue to be the largest producer of bachelor’s level mechanical engineering graduates in the Pacific Northwest. The year 2015 was also a historic high for our graduate programs. In fall 2015 there were 171 graduate students advised by faculty in the School of MME, over 70% higher than a decade ago. And, we awarded a record-tying number (18) new PhD degrees last year.

Faculty and staff changes

To keep up with this rapid growth, we hired several new faculty and staff:

- We welcomed six new tenured or tenure track faculty to Pullman
  - Min Kyu Song (PhD, 2011, Georgia Tech) joined the faculty in January 2015 as a new assistant professor from Lawrence Berkeley National Lab, where he as a postdoc from 2012-2014. His research expertise is in materials for energy technologies.
o Scott Beckman (PhD, 2005, UC Berkeley) joined the faculty in summer 2015 as an associate professor from Iowa State University. His research expertise is computational materials science.

o Dustin McLarty (PhD, 2013, UC Irvine) joined the faculty as an assistant professor in summer 2015 after a stint as a Fulbright scholar in Genoa, Italy. His research expertise is in high temperature fuel cells and distributed generation systems.

o Kshitij Jerath (PhD, 2014, Penn State) joined the faculty as a new assistant professor after a postdoc at Penn State University. His research expertise is in self-organized dynamics in complex systems.

o John Swensen (PhD, 2012, Johns Hopkins) joined the faculty as a new assistant professor in summer 2015 after a postdoc at Yale University. He is establishing the Modeling, Motion, and Medical Robotics Laboratory at WSU.

o Kuen-Ren (Roland) Chen (PhD, 2013, Univ. of Michigan) joined the faculty in January 2016, from the University of Michigan. He works in additive manufacturing and biomedical manufacturing.

- We hired four new clinical faculty and instructors: Dave Torick, Sophia Guo, Dana Ray Nilsson, and Andy Shu.
- In January 2015, we welcomed Professor Amir Ameli from the University of Toronto to an assistant professor position on the Tri-Cities campus with a tenure home in the School of MME.
- We welcomed Monika Jones (senior secretary) and Marissa Naylor (academic coordinator) to our staff.

We also said goodbye to some faculty and staff:

- Brad Thompson retired as the program coordinator in Everett.
- Steve Brown retired as the instructor and coordinator of our freshman and sophomore level design courses (ME 116 & ME 216).
- Uma Jayaram and Jay Jayaram retired as WSU faculty to pursue their start-up virtual reality company, VOKE.
- Instructors Giancarlo Corti and Iman Salehinia both left for tenure track faculty jobs in the Midwest.
- Advisor Tyler Strom moved to Minnesota.

Awards and honors

Our faculty, staff, and students continued to win personal recognition in 2015:

- Hussein Zbib earned the VCEA Anjan Bose Research Award.
- Bob Richards earned the VCEA Reid Miller Teaching Award.
- Pam Loughlin was awarded the VCEA Employee of the Year.
- Susmita Bose was recognized as a “women to watch in life sciences” at the Washington Biotechnology and Biomedical Association’s annual Life Science Innovation Northwest conference.
- Yuehe Lin was again listed among the world’s most cited researchers by Thomson Reuters.
• Prashanta Dutta was awarded the Spring 2015 GPSA Excellence Award for Academic Advisor and Susmita Bose was awarded the Fall 2015 GPSA Excellence Award for Academic Advisor.
• Katherine Li was awarded the 2015 TMS Young Leaders International Scholar-JIM Award from The Minerals, Metals and Materials Society and the Japan Institute of Metals.
• Ian Richardson, MSEP graduate student in Jake Leachman’s research group, was awarded the Klaus and Jean Timmerhaus scholarship at the Cryogenic Engineering Conference.
• MME faculty involved in "advanced composite and bio-based materials" research were contributors to Washington State University’s CleanTech Achievement Award from CleanTech Alliance Washington.
• A team of mechanical engineering students from WSU Everett took second place in a student design and manufacturing competition at the American Society of Engineering Education annual conference.

New programs
We started several new programs in 2015.

In teaching/education,

• The university broke ground for the construction of the new WSU-University Center building in Everett. With a targeted move-in of July 2017, the ME facilities in Everett will take up most of the first floor of the building.
• We implemented a new policy that all students must take the FE exam as a condition for graduation and we initiated an FE exam review course.
• We provided several new electives to our students, including an applied rocketry class and a marine engineering class. Some of the students from the rocketry class went on to compete for the first time in the international rocket competition.

Over 5 million dollars of new research grants were awarded in 2015, including the following awards.

• Hussein Zbib and Dave Field received multiple grants from the Qatar Natl. Res. Foundation on projects involving multiscale modeling.
• Indranath Dutta received funding from the NSF to investigate the influence of electric field and stress on diffusional sliding at hetero-interfaces.
• Susmita Bose and Amit Bandyopadhyay received funding from NIH for research on surface modified metal implants using doped hydroxyapatite.
• Amit Bandyopadhyay and Susmita Bose received funding from NIH on 3D printed porous metal coatings for load-bearing implants.
• The WSU cleanroom in ETRL, operated by the Center for Materials Research, obtained a new atomic layer deposition machine for use by our faculty.
• Annie Du and Yuehe Lin received funding from HHS-CDC for an integrated approach for environmental health monitoring of exposure signatures of pesticides.
• Katie Zhong received funding from the NSF for a project on gum-like multifunctional composites for high performance electrolytes.
Lei Li received funding from the NSF on investigating a multiphase printing process for freeform optics manufacturing.

John McCloy received funding from the DOE-Office of Nuclear Energy to understand the influence of thermal history and glass chemistry on kinetics of phase separation and crystallization in borosilicate glass-ceramic waste.

Rahul Panat received funding from the DOE-Office of Fossil Energy for development of durable high temperature wireless sensors by direct write additive manufacturing.

Jake Leachman received funding from the DOE to develop an efficient and inexpensive hydrogen liquefaction system.

Several faculty received funding from the Joint Center for Aerospace Technology Innovation (JCATI) projects in 2015.

And, of course, we continued to do great science and engineering. In 2015 our faculty led advances in fields ranging from biomaterials to energy storage. Some significant accomplishments the past year include:

- Developments by Yuehe Lin and collaborators of natural protein cages to improve cancer drug delivery.
- Lloyd Smith’s Sports Science Lab has led to safer amateur baseball games and more accurate head impact sensors.
- A team of Washington State University students, advised by Jake Leachman, were selected to compete in clean tech challenge to design a small-scale, cost-effective hydrogen refueling station.
- Research led by Rahul Panat and Indranath Dutta results in stretchable metallic conductors for flexible electronics.

It is an exciting time in the history of the School of MME at WSU. I welcome hearing from you about your thoughts for the School’s future. Please feel free to contact me by phone at 509-335-8654 or by email at MichaelR.Kessler@wsu.edu.

Mike Kessler
Berry Family Director and Professor
MME Statistics

Undergraduate Education

BS Degrees Awarded

Female BS Enrollment

Mechanical Engineering

BS Enrollment

Minority BS Enrollment

Materials Science & Engr.

BS Enrollment

Undergraduate Diversity

Percent Female Enrollment - ME: 8.1%
Percent Female Enrollment - MSE: 16.3%
Percent Minority Enrollment - ME: 26.1%
Percent Minority Enrollment - MSE: 28.8%
MME Statistics

Undergraduate Certification

Certified MME Students

% of Pullman ME Applicants Certified

New Pullman ME Students Certified Each Year

New MSE Students Certified Each Year
MME Statistics

Certification Requirements

Students apply for certification after completing Math 171, Math 172, Chem 105, Chem 106 (for MSE only), Phys 201, and CE 211 (for ME only).

The School of MME establishes the total number of students certified into the ME and MSE programs.

Applicants are ranked based on the average GPA of math, science, and engineering courses taken at WSU.

Graduate Education

PhD Degrees Awarded

<table>
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<tr>
<th>Year</th>
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<th>PhD MSE (MME advised)</th>
<th>PhD EngS (MME advised)</th>
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PhD Enrollment

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MS Enrollment

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<td>2015</td>
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<td>41</td>
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</tbody>
</table>
MME Statistics

Domestic/International Graduate Enrollment

US News & World Report Graduate School Ranking

Female Graduate Enrollment

Graduate Student Support (Fall Semester)

Minority Graduate Enrollment

Graduate Teaching Assistants 36 MME
1 CEA
2 Chem

Graduate Research Assistants 46 Pullman
2 Tri-Cities

Graduate Fellowships 7

Self-Supported (includes students sponsored by foreign governments) 52 Pullman
26 Tri-Cities
Graduate Recruitment

Grad. Applications
(MS ME, MS MSE, PhD ME)

Conversion: Ratio of RA & TA Offers to Acceptances

Number of New Grad Students Enrolled

- Enrolled with own support (self paid, employer paid, timeslip)
- Enrolled with other support (fellowship, own government)
- Enrolled with RA or TA
**Departmental Operations**

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**Tenure & Tenure-Track Faculty (FTE)**

- 2006: 21.5
- 2007: 22.5
- 2008: 21.0
- 2009: 21.5
- 2010: 22.4
- 2011: 22.6
- 2012: 23.5
- 2013: 24.1
- 2014: 27.0
- 2015: 30.6

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**Research Expenditures per TTF**

- 2006: $125,779
- 2007: $186,968
- 2008: $400,000
- 2009: $526,794
- 2010: $516,206
- 2011: $5,815,206
- 2012: $5,162,006
- 2013: $5,162,506
- 2014: $5,162,506
- 2015: $5,162,506

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**Research Expenditures (including SSL)**

- 2007: $2.70 M
- 2008: $3.71 M
- 2009: $4.58 M
- 2010: $5.72 M
- 2011: $5.72 M
- 2012: $5.72 M
- 2013: $5.72 M
- 2014: $5.72 M
- 2015: $5.72 M

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**New Research Grants Awarded**

- 2006: $0.0 M
- 2007: $1.0 M
- 2008: $3.5 M
- 2009: $4.0 M
- 2010: $3.0 M
- 2011: $2.0 M
- 2012: $1.0 M
- 2013: $5.0 M
- 2014: $5.0 M
- 2015: $5.0 M

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**Personnel (Headcount)**

- Tenure and Tenure-Track Faculty (Pullman): 32
- Non-Tenure Teaching Faculty (Pullman, Bremerton, & Everett): 11
- Non-Tenure Research Faculty and Post-Docs: 6
- AP and Classified Staff: 9

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**Permanent Budget Line (by Fiscal Year)**

- 2007: $2.0 M
- 2008: $3.0 M
- 2009: $4.0 M
- 2010: $4.5 M
- 2011: $5.0 M
- 2012: $6.0 M
- 2013: $5.0 M
- 2014: $5.0 M
- 2015: $5.0 M
**MME Statistics**

**Total Gift Productions & Scholarships (by Fiscal Year)**

- Amount in MME expendable accounts
- Amount added to endowments

**MME Scholarship Awards (by Fiscal Year)**

**Research Sponsors**

- AETOS Systems Inc.
- Amateur Softball Association
- Battelle - INL
- Battelle - ORNL
- Battelle – PNNL
- The Boeing Company
- Brigham Young University
- ISU-Center for Bioplastics and Biocomposites
- Insitu, Inc.
- Int. Polyol Chemicals
- NASA
- NASA (NSTRF)
- National Renewable Energy Laboratory (DOE)
- National Science Foundation - (CBET)
- National Science Foundation - (CMMI)
- National Science Foundation – (DMR)
- National Science Foundation - (IIP)
- Odysseus Technologies
- Sandia National Laboratories
- Smithbucklin Corp – (United Soybean Board)
- SpaceEX
- Texas A&M - Qatar Foundation
- Ultramet
- University of Michigan
- University of Washington - JCATI
- US Dept. of Agriculture – NIFA (AFRI)
- US Dept. of Defense – Army (SMDC)
- US Dept. of Defense – Missile Defense Agency
- US Dept. of Energy – Office of Nuclear Energy
- US Dept. of Energy – Office of River Protection
- US Dept. of Transportation FAA
- US Environmental Protection Agency
- US HHS Center for Disease Control
- US HHS National Institutes of Health
- WSU Foundation - Murdock
- WA State Life Science Discovery Fund
MME Statistics

Journal Publications with MME School Affiliation  
(from Scopus Database)

Faculty Research
Journal Papers Published 129  
Conference Papers Published 68  
Sections/Chapters in Books 9  
Books Authored or Edited 4  
Patents 7  
Doctoral Dissertations 18  
Master’s Theses 5

Named Faculty Positions
Berry Family Director  
Dr. Michael Kessler

Herman and Brita Lindholm Endowed Chair in Metallurgy  
Dr. Amit Bandyopadhyay

Herman and Brita Lindholm Endowed Chair in Metallurgy  
Dr. Susmita Bose

Westinghouse Distinguished Professorship in Materials Science and Engineering  
Dr. Wiehong (Katie) Zhong

Professional Society Fellows
American Association for the Advancement of Science  
Dr. Amit Bandyopadhyay  
Dr. Yuehe Lin  
Dr. Kelvin Lynn  
Dr. Hussein M. Zbib

American Ceramic Society  
Dr. Amit Bandyopadhyay  
Dr. Susmita Bose  
Dr. Yuehe Lin

American Institute for Medical and Biological Engineering (AIMBE)  
Dr. Amit Bandyopadhyay  
Dr. Susmita Bose  
Dr. Yuehe Lin

The American Physical Society  
Dr. Kelvin Lynn

American Society for Materials (ASM International)  
Dr. Amit Bandyopadhyay  
Dr. David P. Field

American Society of Mechanical Engineers  
Dr. Jow-Lian Ding  
Dr. Prashanta Dutta  
Dr. Sankar Jayaram  
Dr. Uma Jayaram  
Dr. Cill Richards  
Dr. Hussein M. Zbib

National Academy of Inventors  
Dr. Amit Bandyopadhyay

North American Thermal Analysis Society  
Dr. Michael Kessler

Royal Society of Chemistry  
Dr. Yuehe Lin
Spring 2015 – Pullman

**Truck in Process Locating System – PACCAR Corp.**
Michael Murphy, Anthony Dal Santo, Chris Ryan, Zachary Anderson, David Thuneman, Benjamin Whitaker

‘Sierra Leone Ankle’ Reliability Study and Design – Mobility International – Seattle
Geomar Acob, Megh Subedi, Shas Yassin, Damber Adhikari

**UAVs for Conservation Tracking – African Painted Dog Research Foundation**
Hengyi Xu, Ryan Woods, Ashley Vetter, Graham Smith, Brody Sabin, Previn Perera, Wenhao Lin, Motaz Shamsan, Matthew Moloney, Tina Lee, Samuel Brooks, Derek Bean

**Next Generation Attachment System – Lifeport/Sikorsky**
Garrett Smith, Muhammad Ashiran, Kyle Florek, Peter Johnson, Zachary Hein, Jason Becker

**Screw Analysis Constraint and Redesign – Intel Corp.**
Qiang Li, Zhekun Zhang, Jonathan Alex, Matthew Leslie, David Beam, Jacob Ellis

**Optimal Bonding Constraints Test Platform – Microsoft Corp.**
Ashley Almaguer, Camden Davenport, Garet Hupp, Michael Lacey, Joseph Kabel, Keshava Bhamidipaty,

**Automation of Insert Replacement on Large Milling Cutters – Boeing Co.**
Kisa Brostrom, Nicholas Wood, Connor Moloney, Connor McBride, Aaron Thonney, Scott Olivares, Trevor Douglas, Andrew Clements, Joseph McKenna, Josiah Wai

**Safeguards Design Project – Nuclear Reactor Core Simulation and Manipulation – Pacific Northwest National Lab**
Eric Rampp, Jacob Kiekenapp, Jordan Erdman, Jack Cerenzia

**Collaborative Robotics – Olympus Controls**
Derek Redline, Franco Spadoni, Mack Bailey, Thomas Williams, Lucas Verde, Zhi-yan Chen, David Estrada-Echegaray

**Rotary Kiln Ion Transfer Vessel Demonstrator – Kurion Corporation**
Mark Fong, Samuel Fazzari, Konnor Erdman, Boston Smith, Jeffrey Willie

**Barrel Waste Leveler – Columbia Energy and Environmental Services Corp.**
Angelo Ivory, Marshall Crenshaw, Mitchell Braun, Monica Olivas, Samantha Merry

**Portable Photogrammetry Scale – Origin Engineering**
Ryan Keehnel, Zeya Huang, Nick Soller, Benjamin Wilson

Fall 2015 – Pullman

**Cab Dolly Re-design – PACCAR Corp.**
Andrew Reid, Daniel Cha, Drew Rickerson, Jose Avila

**UAVs for Conservation Tracking – African Painted Dog Research Foundation**
Nick Peterson, Paul Menendez, Seth Whittington, Vitou Chea, Yuki Tanikawa, Sunghun Han

**Foul-proof Armor Attachment System – Lifeport/Sikorsky**
Alex Wheelon, Denton Donahou, Evan Tremblay, Scott Sexton

**Safeguards Design Project – Pacific Northwest National Lab**
Conner Huck, Dylan DeLay, Kent Evans, Sam Heyd, Tyas Young

**Safeguards Design Project – Pacific Northwest National Lab**
John Kriienen, John Feiler, Matt Will, Justin Stanton

**Entrance/Egress System for Rail Gondola Cars – Nucor Steel, Seattle**
Aaron Hasenoehrl, Andrew Doornink, Blake Rowe, Edward Park, Tanner Meier, Ross Rowinski
Senior Design Projects

Rail Dunnage Crane Attachment – Nucor Steel, Seattle
  Curtis Treiber, Hanna Raine, Jace Bailey, Kyle Johnson, Muad Saleh

Microfiltration Pre-Filter Cartridge System – Cascade Designs
  Ahmed Alhashemi, Caden Stockwell, Kyle Stevens, Mayra M Flores, Joshua Park, Yiu Ming Lai

OSB Pre-Form Spreader – WSU-Composite Materials and Engineering Center
  Alex Fabrick, Cole Pruitt, Daniel Lee, Greg Martin, Jay Weeks, Reuben Huddleston

Pin-on-disk Tribometer with Machine Vision – TriboTEX LLC
  Christian Castillo, Keith Johnson, Matt Fluster, Patrick Chow, Ryan Shuel

Veneer Dryer Equilibration Re-design – Weyerhaeuser
  Bryan Pettit, Craig Horne, Eric Lee, Kevin Flannigan, Michael Rupert

Quad Bikes for Disabled Access – Eric Lindsley and Jordan Griffin
  Andrew Graham, Chris Ryan, Curtis Zehnder, Spencer Sare

Forest Concepts’ Centerless Veneer Lathe – Forest Concepts
  Alexander Kulsa, Miles Appleton, James Slosson, Colin Laird

Building B-194 HVAC Design Report – Manchester Fuel Depot Navy Base
  Keenan Fontaine, Lucas Hill, Andrew Kamel, Josh Klatman, Josh Taylor

Spring 2015 – Everett

University Rover Challenge: Robotic Arm – WSUME-Everett
  Antonio Amort, Jaime Henle, Zach Lipana, Daniel Webster

Tag Kitting Fixture – Zonar
  Monika Duong, Jennifer Hernandez, Jon Scattaregia, Josh Steele

Hidden Hinge – Boeing Co.
  Christian Dinsmore, John Miller, Brad Mills, Gabriel Valea

Personal Service Unit (PSU) Attachment – Boeing Co.
  Brenden Beaver, Elijah LaCaze, Hussam Mustafa

Quick Attach/Install Floor Fitting System – Boeing Co.
  Andrea Dupras, Fatah Dalla, Anna Farlow, Josia Ravelonanahary

Spring 2015 – Bremerton

Multipurpose Modular Smart Tool – Eagle Harbor Holdings
  Andrew Berry, Blaine Vister, Thomas Kinzel, Colin McDaniel

PSNS Fluid Test Bench – Puget Sound Naval Shipyard
  Christine Abubo, Dan Oranski, Amber Catron, Bryce Cox

Wood Pellet Feeding System – BURN Manufacturing
  Eric Anderson, Eric Arnold, Christy Matson

Hydrophone Test Chamber – Leidos
  Abdullah Rauf, Cameron Dreyer, John Thomas, Samer Kamel, Travis Matthews
Spring 2015

David Beam  
*Faculty Advisor: Lloyd V. Smith*  
Senior Thesis: Delamination of Composite Softball Bats: Naturally Broken In Vs Artificially

Muad Saleh  
*Faculty Advisor: John McCloy*  
Senior Thesis: Effects of Heat Treatment of Nuclear Steel on Magnetic Barkhausen Noise

Fall 2015

Delaney Ferrel  
*Faculty Advisor: Michael Kessler*  
Senior Thesis: Poly-dicyclopentadiene with Halloysite Nanoparticle Reinforcement For Optically Transparent Composites

Vaughn Hack  
*Faculty Advisor: Susmita Bose*  
Senior Thesis: PVA-SPI Biocomposite Electrospun Nanofabrics for Air Filtration

Kyle Johnson  
*Faculty Advisor: Katie Zhong*  
Senior Thesis: Bone growth effects of phytoestrogen/curcuminoid-treated calcium phosphate coating on Ti implants

Jon Ward  
*Faculty Advisor: Michael Kessler*  
Senior Thesis: Shear Alignment of Multi Walled Carbon Nanotube (MWCNT) Buckypapers for Use in Dicyclopentadiene (DCPD) Composites

Hailey Warren  
*Faculty Advisor: Susmita Bose*  
Senior Thesis: Adhesive strength evaluation of induction plasma sprayed pure and doped hydroxyapatite coated CP-Ti implants for load bearing applications
Khaled Adam, PhD ME  
*Faculty Advisor: D. Field*  
Modeling microstructural evolution during recrystallization of hot rolled high strength aluminum alloy 7050

Olaniyi Adeayo Balogun, PhD ME  
*Faculty Advisor: C. Mo*  
Thermo-mechanical constitutive model of shape memory polymer-numerical modeling, experimental validation and its application to aero-morphing structures

Jacob Thomas Fisher, PhD ME  
*Faculty Advisor: J. Leachman*  
Diagnostic twin screw extruder for characterizing fusion fuel production

Erman Guleryuz, PhD ME  
*Faculty Advisor: S. Mesarovic*  
Atomistic modeling of slip on internal and external interfaces

Graden Bryant Hardy, PhD ME  
*Faculty Advisor: D. Field*  
Generating triple junction distributions

Qian He, PhD MSE  
*Faculty Advisor: G. Norton*  
Enhanced Redox stability of titanium doped molybdenum dioxide

Yuri Hovanski, PhD ME  
*Faculty Advisor: D. Field*  
Enabling high speed friction stir welding of aluminum tailor welded blanks

Bruce Hugo, PhD ME  
*Faculty Advisor: K. Matveev, R. Omberg*  
Modeling evaporation from spent nuclear fuel storage pools: a diffusion approach

Colin Merriman, PhD ME  
*Faculty Advisor: D. Field*  
Microstructure evolution of FCC metals during the explosive welding process

Alireza Narimmanezhad, PhD MSE  
*Faculty Advisor: K. Lynn*  
Simulation studies and fabrication of microtraps with long aspect ratio to store high density of positrons

Md Walid Rezanoor, PhD ME  
*Faculty Advisor: P. Dutta*  
Rotation of spherical microparticles in linearly polarized AC electric field

Pavlo Rudenko, PhD MSE  
*Faculty Advisor: A. Bandyopadhyay*  
Understanding superlubricity of in situ formed tribofilms by magnesium hydroxilicate nanoparticles

Tsun-Kay Jackie Sze, PhD ME  
*Faculty Advisor: P. Dutta*  
Modeling and simulation of osmotic phenomena: the application of plant phloem in microfluidics

Babak Talebanpour, PhD MSE  
*Faculty Advisor: I. Dutta*  
Microstructural Effects on Creep and Fracture of Sn-Ag-Cu Solders

Abulikemu Tueroxunjiang, PhD MSE  
*Faculty Advisor: K. Lynn*  
Electrical properties of CDTE single crystals, defects and their correlation to solar cell performance

Yu Wang, PhD MSE  
*Faculty Advisor: K. Zhong*  
Gummy nanocomposites as interfacial energy materials for energy storage devices

Kisoo Yoo, PhD ME  
*Faculty Advisor: P. Dutta*  
Study of ionic liquid as novel electrolyte for next generation Li batteries

John Paul Young, PhD MSE  
*Faculty Advisor: D. Field*  
The production of fine grained magnesium alloys through thermomechanical processing for the optimization of microstructural and mechanical properties
Thesis Masters

Dishary Banerjee, MS MSE  
*Faculty Advisor: S. Bose*  
Effects of polymer chemistry, concentration and pH on doxorubicin release kinetics from hydroxyapatite-PCL-PLGA composite for bone tissue engineering

Lu Chen, MS MSE  
*Faculty Advisor: K. Zhong*  
Fabrication of sulfur nanoplates for advanced sulfur cathode

Kyle Saari, MS ME  
*Faculty Advisor: C. Richards*  
Effect of wood fuel size and form in biomass microgasifier cookstoves

Harrison Scarborough, MS ME  
*Faculty Advisor: L. Smith*  
The investigation of toughness and its role in fatigue performance of adhesively bonded joints

Peiyu Tan, MS MSE  
*Faculty Advisor: I. Dutta*  
Electric pulse induced cutting (epic): theoretical development and prototype construction

Non-Thesis Masters

Ali Al Mahfoodh, MS ME  
*Faculty Advisor: C. Mo*

Zainab Alshams, MS ME  
*Faculty Advisor: C. Mo*

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*Faculty Advisor: S. Banerjee, J. Hale*

Samia Fadil, MS ME  
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Alexandra James, MS ME  
*Faculty Advisor: C. Mo*

Carolyn Beaudry John, MS ME  
*Faculty Advisor: C. Mo*

Howard McDonald, MS ME  
*Faculty Advisor: R. Richards*
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Timeslip Clerical Assts.

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Information Systems Coordinator
Robert Lentz

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Amit Bandyopadhyay
Soumik Banerjee
Scott Beckman
Xiaopeng Bi
Nandita Biswas
Susmita Bose
Kuen-Ren Chen
Jow-Lian Ding
Indranath Dutta
Prashanta Dutta
David Field
B Arda Gozen
Yongqing Guo
Kurt Hutchinson
Kshitij Jerath
Peter Jung
Jacob Leachman
Lei Li
Qizhen Li (Katherine)
Yuehe Lin
Jin Liu

Adjunct Faculty

Post-Docs and Visiting Scholars

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Lab Technicians, Research Technologists

Student Employees, RA/TAs, timeslip

Technical Staff
Information Systems Manager
Michael Shook

Michael R. Kessler
Professor and Director
School Organization

MME Faculty

School Director

Michael R. Kessler – Berry Family Director and Professor
Joined MME in 2013
Ph.D. in Theoretical and Applied Mechanics from University of Illinois at Urbana-Champaign in 2002

Dr. Kessler’s research interests include processing and characterization of polymer composites, bio-based polymers, multifunctional- and nano-composites, materials with self-healing functionality, and thermal analysis of polymers.

Regents Professor

Kelvin G. Lynn - Regents Professor
Joined MME in 1996
Ph.D. in Materials Science and Engineering from University of Utah in 1974

Dr. Lynn’s research interests include solid state and surface physics, defects in semiconductors and metals, photovoltaic materials, room temperature radiation detectors, thermal stimulated spectroscopies, positron interactions in solids, micro-electrical and mechanical systems, growth of semiconductors and oxide crystals, and energy harvesting.

Pullman Campus: Professors

Amit Bandyopadhyay - Herman and Brita Lindholm Endowed Chair Professor
Joined MME in 1997
Ph.D. in Materials Science and Engineering from University of Texas at Arlington in 1995

Dr. Bandyopadhyay’s research interests include processing of ceramics, metals and composites using rapid prototyping; load bearing and non-load bearing implants; patient specific implants; laser processing of materials; microwave sintering of ceramics; and piezoelectric micromachined ultrasonic transducers (pMUTs) for medical imaging and therapeutics.

Susmita Bose - Herman and Brita Lindholm Endowed Chair Professor
Joined MME in 1998
Ph.D. in Physical-Organic Chemistry from Rutgers University in 1998

Dr. Bose’s research interests include nanoscale surface modification of medical devices, and nanoparticles in protein/drug delivery; resorbable ceramics and composites in bone tissue engineering using 3-D printing technology; microwave and plasma processing of materials; in vitro bone cell material interactions; and piezoelectric micromachined ultrasonic transducers.
School Organization

Jow-Lian Ding - Professor and Associate Director
Joined MME in 1983
Ph.D. in Engineering from Brown University in 1983

Dr. Ding’s research interests include dynamic response of materials and structures (experimental characterization, modeling, and simulation), shock dynamics, thermomechanics, electrodynamics, stress-induced phase transformation.

Indranath Dutta - Professor
Joined MME in 2008
Ph.D. in Materials Science and Engineering from the University of Texas at Austin, in 1988.

Dr. Dutta’s research interests include multi-physics phenomena in materials science; near-interface effects in multi-component materials, with emphasis on materials for microelectronics; materials reliability in micro-systems and composites; and electrically-activated manufacturing at nano to meso scales.

Prashanta Dutta - Professor
Joined MME in 2001
Ph.D. in Mechanical Engineering from Texas A&M University in 2001

Dr. Dutta’s research interests include microfluidics; ion mobility spectrometry; multiscale modeling and simulation of biological flow; electrophoretic flow, mixing, separation and concentration; and micro fuel cell and battery for energy conversion.

David P. Field - Professor
Joined MME in 2000
Ph.D. in Mechanical Engineering from Yale University in 1991

Dr. Field’s research interests include physical and mechanical metallurgy, metal deformation and recrystallization, crystallographic texture, grain boundary structure, thin film and IC interconnect structure/properties relationships, and advanced experimental techniques.

Yuehe Lin - Professor
Joined MME in 2013
Ph.D. in Environmental Chemistry from University of Idaho, Moscow, ID in 1997

Dr. Lin’s research interests include synthesis and characterization of functional nanomaterials; materials and devices for sensing, bioimaging, and drug delivery; materials and systems for water monitoring and treatment; nanomaterials for fuel cells, batteries, and supercapacitors; electrochemistry, electrolysis and photoelectrocatalysis; and immunosensors, paper and microfluidic biosensors for biomarker detection.

Sinisa Mesarovic - Professor
Joined MME in 2001
Ph.D. in Engineering Sciences from Harvard University in 1996

Dr. Mesarovic’s research interests include plasticity of crystals and interfaces; micromechanics of granular materials; computational methods for coupled moving boundaries problems (phase transformations, wetting); collective behavior of carbon nanotubes; multiscale/multiphysics modeling; contact and adhesion mechanics.
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School Organization

M. Grant Norton - Professor and Dean
Honors College

Joined MME in 1991
Ph.D. in Materials from Imperial College, London in 1989.

Dr. Norton’s research interests include ceramic materials, nanotechnology; and clean technology.

Lloyd V. Smith - Professor

Joined MME in 1996
Ph.D. in Mechanical Engineering from University of Utah in 1994

Dr. Smith’s research interests include composite materials (multi-axial characterization, damage and failure modeling, environmental degradation) and sports science (experimental bat and ball performance, numeric modeling of sport ball impacts, protective equipment and head injury).

Charles Pezeshki - Professor

Joined MME in 1988
Ph.D. in Mechanical Engineering from Duke University in 1987

Dr. Pezeshki’s research interests include global engineering and design of high-performance work environments; development strategies for transcultural understanding for innovation communities; and understanding the relationships between design structure, knowledge structure, and organizational social structure in innovation communities.

Cecilia D. Richards - Professor

Joined MME in 1992
Ph.D. in Mechanical Engineering from University of California at Irvine in 1990

Dr. Richard's research interests include MEMS power, advanced energy systems, spray combustion, two-phase flows, and air breathing engines.

Robert F. Richards - Professor

Joined MME in 1992
Ph.D. in Mechanical Engineering from University of California at Irvine in 1990

Dr. Richard’s research interests include heat transfer, thermodynamics, and micro-electro-mechanical systems (MEMS).

Hussein M. Zbib - Professor

Joined MME in 1988
Ph.D. in Mechanical Engineering and Engineering Mechanics from Michigan Technical University in 1987

Dr. Zbib’s research interests include mechanics (multiscale modeling, numerical analysis, plasticity, composites, materials instabilities, damage and fracture) and materials (dislocation theory, dislocation dynamics, crystal plasticity, defects, radiation effects, nanomaterials).

Weihong (Katie) Zhong - Professor

Joined MME in 2007
Ph.D. in Materials Science from Beijing University of Aeronautics and Astronautics in 1994

Dr. Zhong’s research interests include polymers and composite manufacturing technology; battery materials and renewable energy materials; nanocomposites and multifunctional materials; and biomaterials and environmental polymeric materials.
School Organization

Pullman Campus: Associate Professors

Scott P. Beckman - Associate Professor
Joined MME in 2015
Ph.D. in Materials Science and Engineering from University of California at Berkley in 2005

Dr. Beckman’s research interests include theoretical and computational methods; thermal properties of materials; multi-functional materials; and materials for energy applications.

Qizhen (Katherine) Li - Associate Professor
Joined MME in 2014
Ph.D. in Materials Science and Engineering from The Ohio State University in 2004

Dr. Li’s research interests include advanced materials (e.g., light-weight materials and structures, nanoporous materials, nanocomposites, nanostructured multilayered thin films, lattice block structures) for structural, energy, and bio-applications; nano and micro fabrication/manufacturing, and materials synthesis/processing; mechanical behavior of materials, nano/micro-mechanics, fatigue and fracture; relationship among processing, structure and property of advanced materials; biomaterials and biomechanics, bone/dental implant materials, biomedical applications of shape memory alloys, magnesium alloys, and titanium alloys.

Konstantin Matveev - Associate Professor
Joined MME in 2006
PhD in Mechanical Engineering from the California Institute of Technology, in 2003

Dr. Matveev’s research interests include high-performance marine craft, ground-effect aerodynamics, free-surface hydrodynamics, unmanned aerial and marine vehicles, and thermoacoustics.

John McCloy - Associate Professor
Joined MME in 2013
Ph.D. in Material Science and Engineering from the University of Arizona in 2008

Dr. McCloy’s research interests include nuclear waste forms, radiation effects on materials, magnetic materials and properties, optical ceramics and glasses, electronic transport, sensors.

Rahul Panat - Associate Professor
Joined MME in 2014
Ph.D. in Theoretical and Applied Mechanics from the University of Illinois at Urbana-Champaign, 2004

Dr. Panat’s research interests include manufacturing, microelectronics/flexible electronics, Li-ion batteries, thermal barrier coatings, and thermodynamics.

Jinwen Zhang - Associate Professor
Joined MME in 2012, with WSU from 2004
Ph.D. in Polymer Science from the University of Massachusetts, 1997

Dr. Zhang’s research interests include synthesis, processing and application development of biobased polymer materials; structure and properties of polymer blends and composites; polymer foaming and fiber spinning technologies; polymer stabilization and flame retardancy; and polymer hydrogels and controlled release.
School Organization

Pullman Campus: Assistant Professors

Soumik Banerjee - Assistant Professor
Joined MME in 2011

Dr. Banerjee’s research interests include nanoscale transport phenomena, molecular modeling of materials, organic photovoltaic solar cells, modeling electrolytes in Li batteries, and synthesis and properties of carbon nanostructures.

Kuen-Ren (Roland) Chen - Assistant Professor
Joined MME in 2016
Ph.D. in Mechanical Engineering from University of Michigan, 2013

Dr. Chen’s research interests include biomedical manufacturing, additive manufacturing, surgical thermal management, design of medical assistive devices, and tissue engineering.

Arda Gozen - Assistant Professor
Joined MME in 2014
Ph.D. in Mechanical Engineering from Carnegie Mellon University, 2012

Dr. Gozen’s research interests include manufacturing processes and equipment, micro-nano manufacturing, manufacturing with soft-matter (e.g. elastomers, functional liquids etc.), and flexible-stretchable electronic devices.

Kshitij Jerath - Assistant Professor
Joined MME in 2015
Ph.D. in Mechanical Engineering from Pennsylvania State University, 2012

Dr. Jerath’s research interests include self-organized dynamics in complex systems, multi-agent systems, connected and autonomous vehicles, system reliability and prognostics, and robotic ensembles.

Jacob Leachman - Assistant Professor
Joined MME in 2010
Ph.D. in Mechanical Engineering from the University of Wisconsin-Madison, in 2010

Dr. Leachman’s research interests include hydrogen, deuterium, tritium and mixtures; small, modular hydrogen liquefier design; thermophysical property modelling and measurement; rocket and space stage vehicle design; cryogenics; liquid hydrogen fueling of unmanned aerial systems/vehicles (UAS/UAV).

Lei Li - Assistant Professor
Joined MME in 2013
Ph.D. in Industrial and Systems Engineering from The Ohio State University in 2009

Dr. Li’s research interests include precision engineering optical manufacturing, micro/nano manufacturing, micro-electro-mechanical systems (MEMS).

Jin Liu - Assistant Professor
Joined MME in 2012
Ph.D. in Mechanical Engineering from Johns Hopkins University, 2008

Dr. Liu’s research interests include multiscale modeling and simulation; fluid mechanics, turbulent flow and computational fluid dynamics; micro/nano-fluidic and bio-fluidics; electrokinetic transport and electrowetting; modeling of mesoscale molecule adhesion and targeted drug delivery.

Dustin McLarty - Assistant Professor
Joined MME in 2015
Ph.D. in Mechanical Engineering from University of California at Irvine in 2013

Dr. McLarty’s research interests include high temperature fuel cells, distributed generation systems, and energy storage dynamics and integration with renewable sources.
Dr. Song’s research interests include rational design of materials/interfaces and manufacturing technologies; energy technologies (batteries, fuel cells, supercapacitors and smart windows); environmental technologies (electrochemical synthesis of fuels and electrochemical desalination/deionization of water); bio-inspired materials and processes for energy and the environment; and structure-property relations in materials and solid-state electrochemistry.

Dr. Swensen’s research interests include medical robotics (steerable needles, compliant devices); tunably compliant mechanisms; and modular robotics (compliant ensembles, smart materials in robotics).

Dr. Ameli’s research interests include multifunctional polymer composites; nano/micro-structured materials for fuel cells, batteries, and supercapacitors; smart materials and devices for sensors and actuators; green composites; advanced cellular composites; and modeling and simulation of manufacturing processes.
School Organization

Pui Ching (Amy) Wo - Assistant Research Professor
Joined MME in 2012
Ph.D. in Mechanical Engineering (Materials Science), University of Hong Kong, 2006.

Zhiquan (Andy) Shu - Clinical Assistant Professor
Joined MME in 2015
Ph.D., in Mechanical Engineering from the University of Washington in 2013

Bremerton Campus Faculty

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Joined MME in 2013
PhD in Mechanical Engineering from Washington State University in 2013

Marvin J Pitts - Clinical Professor and Program Coordinator
Joined MME in 2010
Ph.D., Agricultural Engineering

Pullman Research Faculty

Annie D. Du - Research Professor
Joined MME in 2013
PhD in Chemistry from Nanjing University, China in 2005

Thomas F. Garrison - Clinical Assistant Professor
Joined MME in 2013
PhD in Chemistry, Iowa State University, 2013

Vijay Kumar - Staff Scientist
Joined MME in 2013
Ph.D. in Polymer Chemistry from National Institute of Technology, India in 2009

Everett Campus Faculty

Xiaopeng Bi - Clinical Associate Professor and Program Coordinator
Joined MME in 2012
Ph. D. in Aerospace Engineering from University of Illinois at Urbana-Champaign in 2003

Peter Jung - Instructor
Joined MME in 2014
MS in Mechanical Engineering from San Diego State University

Yuzhan Li - Staff Scientist
Joined MME in 2014
PhD in Materials Science and Engineering from Iowa State University, 2014

Alireza Narimannezhad - Adjunct Faculty
Joined MME in 2015
PhD in Materials Science and Engineering from Washington State University, 2015
Yu (Will) Wang – Assistant Research Professor
Joined MME in 2015
PhD in Materials Science and Engineering from Washington State University, 2015

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PhD in Materials Science and Engineering from the University of California Davis, 2015

Emeritus Faculty

Stephen D. Antolovich - Emeritus Professor
Joined MME in 1992; Ph.D. in Materials Science from University of California, 1966

Walter J. Grantham - Emeritus Professor
Joined MME in 1978; Ph.D. in Aerospace Engineering from University of Arizona in 1973

John P. Hirth - Emeritus Professor
Joined MME in 1988; Ph.D. in Metallurgical Engineering from Carnegie-Mellon University in 1958

Richard G. Hoagland - Emeritus Professor
Joined MME in 1987; Ph.D. in Metallurgical Engineering from The Ohio State University in 1973

David V. Hutton - Emeritus Professor
Joined MME in 1981; Ph.D. in Engineering Science and Mechanics from Virginia Polytechnic Institute and State University in 1974

William E. Johns - Emeritus Associate Professor
Joined MME in 1978; Ph.D. in Wood Science from University of Minnesota in 1972

D. Bruce Masson - Emeritus Professor
Joined MME in 1960; Ph.D. in Chemistry from The University of Chicago in 1958

Larry C. Olsen - Emeritus Professor
Joined MME in 1981; Ph.D. in Physics from University of Kansas in 1965

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Joined MME in 1985; Ph.D. in Mechanical Engineering from University of Waterloo, Ontario, Canada in 1969

David E. Stock - Emeritus Professor
Joined MME in 1972; Ph.D. in Mechanical Engineering from Oregon State University in 1972

Timothy R. Troutt - Emeritus Professor
Joined MME in 1980; PhD, in Mechanical Engineering from Oklahoma State University, 1978

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Publications


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1 From ISI Web of Science for authors with School of Mechanical and Materials Eng. affiliation


Publications


