

Harold (Hal) Thomas Evensen, Ph. D.

Professor of Engineering Physics

Department of Engineering Physics

University of Wisconsin – Platteville

Activities at UW-Platteville: Assistant Professor since August 1999; Associate Professor since Fall 2004; Professor since Fall 2009.

Research Interests

Energy Nanomaterials; Industry 4.0/Internet of Things; Engineering Physics & Applied Physics.

Awards and Recognition

National Academic Advising Association Outstanding Faculty Advisor Award, 2010

Engineering, Mathematics and Science Exemplary Faculty Award for Teaching, 2001-2002.

Courses Taught

Engineering Physics Systems: *new "intro to EP" course for freshmen*

Instrumentation, Monitoring and Controls: *course for SRES majors; 1-month Sensors module;*

Applied Mechanics: *"Physics" Mechanics with engineering applications, design projects.*

Engineering Physics Laboratory: *Physics and engineering experiments oriented around metrology; developed technical communication component (written/oral).*

Sensors Laboratory: *Physical principles, applications and computer interfacing of sensors.*

Modern Physics and Laboratory: *Included adding/updating five experiments*

Electric & Magnetic Fields: *junior-level advanced course (lecture-based)*

Introductory Physics I & II, Introductory Physics Laboratory

Applied Optics and Applied Optics Laboratory

Engineering Physics Senior Design: *Industry-sponsored interdisciplinary projects.*

Introduction to Engineering Projects: *EP rotation for hands-on course for first-year students.*

Introduction to Microsystems & Nanotechnology: *hands-on intro course for MSNT freshmen & others*

Engineering Success Skills: *"intro to college" course for first-year students*

Special Topics: *Introduction to MEMS and Nanotechnology Responsible for laboratory portion*

Student Projects: *Several students have worked on projects including fluorescent detection of temperature in a solution, design of a macroscopic, tunable chaotic oscillator, design of a maglev model train using Halbach arrays; design of a model boat driven by magnetohydrodynamics; spin coating PDMS polymer onto hydrophobicized silicon wafers; spin coating nanowires in PDMS; initialization and operation of an educational scanning tunneling microscope; initialization of a robot arm experiment; testing several undergraduate experiments in nanotechnology; developing hands-on engineering outreach activities; construction and testing of nanocrystalline solar cells; wireless sensing; development of carbon nanotube-based transistors and sensors; implementation of I40/IoT technologies*

Service

Founder/organizer of UW-Platteville Holiday Toy Hack, 2018-present. *Students modify electronic toys for accessibility and donate these to the community.*

IoT Coordinator for the UW-Platteville College of Engineering, Mathematics and Science. *Led a multi-disciplinary faculty team to determine "Internet of Things / Industry 4.0"-related content and equipment. Led a student team to bring the new "Industry 4.0 Lab" up to speed. Fall 2018 to present.*

External (on-site) evaluator for the Austin Peay State University's proposed Engineering Physics degree program. *Reviewed faculty, curriculum, and facilities for Tennessee Board of Regents, Dec. 11-12 2016.*

Program Coordinator, Engineering Physics, Fall 2007 – Spring 2012. *Led our department's ABET accreditation effort in 2012.*

Program Coordinator, Microsystems & Nanotechnology Engineering, Fall 2011 – 2015. *Led planning and development process for new major in Microsystems and Nanotechnology.*

Chair, EMS Nanotechnology Education Committee, Fall 2005 – 2011.

- Wrote Request for Authorization for Academic Program in Microsystems and Nanotechnology (MSNT), submitted to UW System and approved, April 2011.
- Wrote Request for Permission to Plan an Academic Program in Microsystems and Nanotechnology (MSNT), submitted to UW System and approved, Fall 2005.
- Liaison to EMS Industrial Advisory Board in regards to MSNT

Advise and judge school projects from G. W. Carver Magnet High School, Aldine TX (UW-Platteville EMS outreach/collaboration), 2011-2012.

Founder/Organizer of the “EP Cannon Shoot,” “EP Altitude Challenge,” “EP Flight Time Challenge,” and “EP Zip Line Challenge,” Engineering Expo outreach contests, 2002-present.

Founder/Organizer of “EP Week,” for EP recruitment/retention, 2002-2004.

Theta Tau Engineering Fraternity faculty advisor, 2002-2005.

College Review, Salary and Tenure Committee (CRST), 2002-2004.

University Undergraduate Curriculum Committee, 2004

New physics/EP faculty mentor, 2004-05 & 2013-2014

Ten Engineering Physics/Chemistry search committees, 2000-2013; chair in 2001, 2013.

Secretary, Division of Physics and Engineering Physics, ASEE 2002 – 2004, 2013

UW-Platteville Engineering Expo Committee, 2003-2010.

UW-Platteville Ethics Committee

UW-Platteville Library Committee

Presentation on graduate schools to UW-P EMS students, Fall 2002 – 2004, 2008 – 2010

Several presentations to middle/high school students on Engineering Physics at “Women in Engineering Career Days,” 2003-present

Engineering Physics Library representative, 1999 – 2003

Research and Grants

“Full implementation of automated rotational grazing and assessment of its impact on animals and on forage,” award from Dairy Industry – Impact and Innovation Faculty Fellowships (\$58,300) (July 2022 – June 2024, co-PI)

“Nanopatterning of graphene for nanoelectronics,” UW-Platteville Scholarly Activity Improvement Fund Grant, 2022 (Internal)

“IoT Module Development,” WiSys Launch Grant (\$5,000) (Nov. 2020 – Feb. 2021, co-PI). *Funding for student review of IoT Curriculum Modules developed with 2019-2020 WEDC grant, with an eye on commercialization.*

“Local virtual enclosures to enforce managed grazing,” award from Dairy Industry – Impact and Innovation Faculty Fellowships (\$64,500) (July 2020 – June 2022, co-PI)

“Proposal for UW-System/WEDC Funding of a Collaborative IoT Curricular Initiative,” awarded by the Wisconsin Economic Development Corporation (WEDC) (\$50,000) (January 2019 – July 2020). *Funded development of IoT Curriculum Modules, and a workshop to kick off this effort. Dean Molly Gribb was the PI on this project; I prepared the proposal (with Dean Gribb) and executed the work.*

“Nanoscale Vacuum-channel Field Effect Transistors from Aligned Carbon Nanotubes,” awarded by UW System-WiSYS Applied Research – WiTAG Grant Program (\$38,404) (June 2017 – June 2018)

* Supplemental funding of \$2,000 for Summer 2018 awarded June 2018

Collaborator with UW-Madison on funded NSF Scalable Nanomanufacturing grant (SNM); supports UW-Platteville students’ summer research at UW-Madison. (Jan. 2017; for Summers 2018-2019)

Supplemental funding to “Fabrication of Large-Area and Large-Bandgap Semiconducting Graphene Materials,” NSF Research Opportunity Award (ROA) supplement to NSF-CMMI #1129802 (\$36,299) (2015, co-PI)

“USE-NanoMEMS: Undergraduate Science and Engineering Workforce Education in Nanotechnology and Microsystems,” NSF-NUE grant # 0939384 (\$200,000) (2009, co-PI)

“Acquisition of an Advanced Atomic Force Microscope at the University of Wisconsin-Platteville,”

NSF-MRI Grant # 0960232 (\$454,282) (2009, co-PI)
"Introduction to Nanotechnology: Nanofabrication and Nanoimaging," funded by both a Curricular Improvement Fund Grant and a Scholarly Activity Improvement Fund Grant (2005, Internal)
"Wrinkle Patterning – A Novel Method to Achieve Controlled Nanoscale Topography of Polymer Surfaces," (co-PI) submitted to National Science Foundation's Nanoscale Exploratory Research Program; \$140,202 requested (Not Funded)
"Tailoring Polymer Surface Topography from the Nano- to the Micro-Scale via Wrinkling," Scholarly Activity Improvement Fund Grant, 2003 (Internal)
Petroleum Research Fund Summer Fellowship 2003 (Not Funded)
"Assessment of Natural Sciences Component of UW-Platteville's General Education Program," Assessment Activities Fund Grant, 2001-02 (Internal)
"Thermal Cycling of Submicroliter Volumes by Means of Laser/Dye Absorption," UW-Platteville Scholarly Activity Improvement Fund Grant, 2000 (Internal)
Collection Development Fund Grant, 2000 (Internal; augment EP collection in UW-P Library)

Education

1990 - 1996 University of Wisconsin - Madison
Department: Nuclear Engineering & Engineering Physics
Subspecialty: Spectroscopic plasma diagnostics
Degrees: Master of Science, December 1991; Doctor of Philosophy, March 1996

1986 - 1990 Michigan Technological University
Major: Applied Physics
Minor: Electrical Engineering / Controls
Degree: Bachelor of Science, May 1990, Summa Cum Laude

Related Work Experience

Research Associate, University of Washington, July 1996 - July 1999
Research Assistant, University of Wisconsin, 1994 - 1996

Professional Activities

Research Collaborations

Visiting Professor with Prof. Mike Arnold's group, University of Wisconsin-Madison; 2021-2022 sabbatical. Research into boundary-directed self-assembly of block copolymers.
Visiting Professor with Prof. Mike Arnold's group, University of Wisconsin-Madison; 2014-2015 sabbatical. Research into self-assembly of carbon nanotubes.
Research Associate at the Centre for Organic Electronics, University of Newcastle (Australia); (Sabbatical, 2008). Research into the physics of polymer photovoltaics.
Visiting Professor with Prof. Rob Carpick's group, University of Wisconsin-Madison, 2004-2009. Nanoscale patterning in plasma-treated polymer films; led to Nano Letters publication.

Teaching and Workshops

2022 ASEE Annual Conference & Exposition, Minneapolis, MN (presenting author)
2019 ASEE Annual Conference & Exposition, Tampa, FL (presenting author)
Regional Materials and Manufacturing Network 2017 Fall Symposium; conducted workshop: "Introduction to Instrument Control Using LabVIEW," Oct. 15, 2017, Platteville, WI.
2017 ASEE Annual Conference & Exposition, Columbus, OH (presenting author)
2014 ASEE Annual Conference & Exposition, Indianapolis, IN (presenting author)
2013 ASEE Annual Conference & Exposition, Atlanta GA (presenting author, two papers)
2013 NCSLI-Chicago Section meeting, May 23, invited presenter, "Incorporating metrology concepts into an engineering physics laboratory."
2012 ASEE Annual Conference & Exposition, San Antonio, TX (presenting author)
"Scanning Probe Microscopy for Energy Applications Center for Nanophase Materials Sciences," International Workshop Sept. 15-17, 2010, Oak Ridge National Laboratory, TN.
Asylum Atomic Force Microscope training, University of Illinois at Urbana-Champaign Center for

Microanalysis of Materials, July 21-23, 2010.
2008 ASEE North Midwest Section Conference, Platteville, WI (presenting author).
Visiting researcher (sabbatical) at the University of Newcastle Centre for Organic Electronics,
January – May 2008.
“ASME Nano Training Boot Camp,” July 2006, University of Minnesota
2006 ASEE Annual Conference & Exposition, Chicago, IL (presenting author).
“Hands-On Nanofabrication Workshop for Educators,” May 2005, Penn State University
“Promoting Active Learning in Introductory Physics Courses II,” June 2004, Carlisle PA (NSF
Chautauqua course)
Grant writing workshop, 2004, University of Wisconsin-Platteville
2003 ASEE Annual Conference & Exposition, Nashville, TN. *Session moderator.*
2002 ASEE Annual Conference & Exposition, Montreal, Quebec, Canada (presenting author).
“Share the Future II: A Working Conference,” hosted by the SUCCEED, GATEWAY, and
FOUNDATION NSF Engineering Education Coalitions, March 2001, Clemson, SC
Wisconsin Association of Physics Teachers, October 2001, Stevens Point, WI
Wisconsin Association of Physics Teachers, October 2000, River Falls, WI
UW-Platteville Faculty Development Workshops: every semester since Fall 1999
University of Wisconsin System Women and Science Program's "Opening Workshop" on teaching
techniques, October 21-22, 1999, at the University of Wisconsin-Madison

Scientific Meetings and Conferences

Spring Meeting of the Materials Research Society, April 2009, San Francisco, CA.
Spring Meeting of the Materials Research Society, April 2007, San Francisco, CA.
Society of Plastics Engineers ANTEC 2004, May 2004, Chicago, IL.
Fall meeting of the Materials Research Society, December 2003, Boston MA.
Tenth Annual Genome Sequencing and Analysis Conference, 1998, Miami, FL.

Professional Memberships

American Physical Society (1989 - present)
American Society for Engineering Education (2000 - present)
Materials Research Society (2003 – 2019)
Society of Plastics Engineers (2004 – 2005)
Wisconsin Association of Physics Teachers (2000 - 2004)
Society of Physics Students (1988 - 1990; 1999 - present)

Patents

C. D. Nelson and H. T. Evensen, U. S. Patent #10,903,034, “*Planar Field Emission Transistor*,” January 26,
2021. (Co-inventor with UW-Platteville student/alumnus.)
M. S. Arnold, P. Gopalan, G. J. Brady, Y. Joo, H. T. Evensen, U. S. Patent # 10,074,819, “*Floating evaporative
assembly of aligned carbon nanotubes*,” September 11, 2018.
M. S. Arnold, P. Gopalan, G. J. Brady, Y. Joo, H. T. Evensen, U. S. Patent # 9,786,853, “*Floating evaporative
assembly of aligned carbon nanotubes*,” October 10, 2017.
M. S. Arnold, H. T. Evensen, G. J. Brady, P. Gopalan, Y. Joo, U. S. Patent #9,673,399, “*Floating evaporative
assembly of aligned carbon nanotubes*,” June 6, 2017.
M. S. Arnold, H. T. Evensen, G. J. Brady, P. Gopalan, Y. Joo, U. S. Patent #9,425,405, “*Continuous, Floating
Evaporative Assembly of Aligned Carbon Nanotubes*,” August 23 2016.
H. T. Evensen and D. L. Cunningham, U. S. Patent #5,890,802, “*Piezo Ceramic Actuator-Driven Mixing Device*,”
April 6 1999.

Recent Publications

“Nanotube Alignment Mechanism in Floating Evaporative Self-Assembly,” K. Jenkins, Chan, J.; Brady, G.;
Gronski, K.; Gopalan, P.; Evensen, H. T.; Berson, A.; Arnold, M. *Langmuir*, **33**(46), 13407–13414 (2017).
“Quasi-ballistic carbon nanotube array transistors with current density exceeding Si and GaAs.” G. J. Brady, A.
J. Way, N. S. Safron, H. T. Evensen, P. Gopalan, M. S. Arnold, *Science Advances* **2**, e1601240 (2016).
“Transformations in wrinkle patterns: cooperation between nanoscale cross-linked surface layers and the
submicrometer bulk in wafer-spun, plasma-treated polydimethylsiloxane.” H. T. Evensen, H. Jiang, K. W. Gotrik, F.

Denes, R. W. Carpick, Nano Letters **9**(8):2884-90 (2009).

"ACAPELLA-1K: A Biomechatronic Fluid Handling System for Genome Analysis that Processes 1000 Samples in 8 Hours," D. R. Meldrum, H. T. Evensen et al., IEEE Trans. Mechatronics **5**, 212 (2000).

"Acapella, a Capillary-Based Submicroliter Automated Sample Preparation System for Genome Analysis," D. R. Meldrum, H. T. Evensen et al., Genome Research **10**, 95 (2000).

"High-Density Small-Volume Gel Loading Directly from Capillary Tubes," H. T. Evensen, D. R. Meldrum, C. Saenphimmachak and E. Dixon, BioTechniques **27**, 974 (1999).

"Automated Fluid Mixing in Glass Capillaries," H. T. Evensen, D. R. Meldrum, and D. L. Cunningham, Review of Scientific Instruments **69**, 519 (1998).

"Measurements of Ion Temperature Fluctuations in the Tokamak Fusion Test Reactor," H. T. Evensen et al., Nuclear Fusion **38**, 237 (1998).

Recent Presentations and Seminars

Evensen, H. T., & Gribb, M. M., & Nasiri, A. (2019, June), Internet of Things Curriculum Workshop: An Interdisciplinary, Cross-Institutional Effort for Education in an Expanding Field Paper presented at 2019 ASEE Annual Conference & Exposition, Tampa, Florida. <https://peer.asee.org/33009>

"Adventures in Collaboration at the Nanoscale at UW-Platteville," H. T. Evensen, keynote address to the Regional Materials and Manufacturing Network (RM²N) 2017 Fall Symposium, Platteville, WI, October 2017.

"Incorporating Metrology Concepts into an Engineering Physics Measurements Laboratory," H. T. Evensen, presented at the 2017 American Society for Engineering Education Annual Conference, Columbus, OH, June 2017.

"Carbon nanotube electronics: transistors & sensors," presented at the 2016 Zone 9 Meeting of the Society of Physics Students, Platteville, WI, November 12, 2016.

"Aligned carbon nanotube array field effect transistors with current density that exceeds silicon and gallium arsenide," presented by Mike Arnold at the 2016 Fall Meeting of the Materials Research Society.

"Large Area Assembly and Alignment of Full-Surface Coverage Carbon Nanotube Arrays for High-Performance Field-Effect Transistors," presented by Gerald Brady (1st author) at the XXIV International Materials Research Congress, Cancun, Mexico, August 16 - 20, 2015.

"A Versatile Platform for Programming and Data Acquisition: Excel and Visual Basic for Applications," presented at the 2014 American Society for Engineering Education Annual Conference, Indianapolis, IN, June 2014.

"A Hands-on, Introductory Course for First-year Engineering Students in Microsystems and Nanomaterials," presented at the 2013 American Society for Engineering Education Annual Conference, Atlanta, GA, June 2013.

"Adapting an Engineering Physics Measurements Laboratory to Incorporate Metrology Concepts," presented at the 2013 American Society for Engineering Education Annual Conference, Atlanta, GA, June 2013.

"A New Undergraduate Major in Microsystems and Nanotechnology Engineering," presented at the 2012 American Society for Engineering Education Annual Conference, San Antonio, TX, June 2012.

"Effect of Monochromatic Wavelength and Intensity on P3HT/PCBM Device Characteristics," presented at the 2009 Spring Meeting of the Materials Research Society.

"The Minor in Microsystems and Nanotechnology at UW-Platteville," presented at the 2008 ASEE North Midwest Section Conference, Platteville, WI.

"Combining Mechanics and Chemistry to Generate Controlled Nano-Scale Topography in Polymer Thin Films," presented at Society of Plastics Engineers Annual Technical Conference (ANTEC), May 2004, Chicago.

"Wrinkle Patterns: Combining Mechanics and Chemistry to Generate Controlled Nano-Scale Topography in Polymer Thin Films," presented at the 2003 Fall Meeting of the Materials Research Society

"*Wrinkle Patterns*," presented to the UW-Madison Materials Research Group, November 2003.

"*EP Week: Raising Student Awareness of the Engineering Physics Program at UW-Platteville*," presented at the 2003 American Society for Engineering Education Annual Conference, Nashville, TN, June 2003.

"*Investigating Chaos: A Macroscopic, Controllable Chaotic Oscillator*," presented at the 2003 Society of Physics Students Zone 9 Meeting

"*Metamorphysics: Changing to EP at UW-Platteville*," presented at the 2002 American Society for Engineering Education Annual Conference, Montreal, June 2002.

"*A Physicist and the Human Genome Project (Before & After 'Completion')*," presented to the University of Wisconsin-Platteville Society of Physics Students, April 2001.

"*Development of Acapella, a System for Capillary-Based Reaction Automation*," presented to the University of Washington Applied Physics Laboratory, April 1, 1999.