



ENGINEERING PHYSICS

At A Glance

Nuclear Engineering & Engr. Physics – Engineering Mechanics

<http://www.engr.wisc.edu/ep>

Degrees Offered

B.S., M.S., Ph.D. in

- Engineering Mechanics (EM)
- Nuclear Engineering (NE)
- B.S. Engr. Physics in Honors

Indicators of Quality

- EM & NE rank in Top 5 program
- National Academy of Engr (3)
- Wisconsin Dist. Professors (3)
- Named professorships (5)

Enrollment (Fall 2008)

EM: B.S. – 125; MS/PhD – 19

NE: B.S. – 82; MS/PhD – 82

Non-EP grad students advised or supported by EP faculty – 28

Graduates (2007-08)

EM: B.S. – 32; MS – 11; PhD – 2

NE: B.S. – 18; MS – 23; PhD – 12

Financial Aid

50 UG scholars 12 Grad fellows
MS/PhD – 8 TA's, 70 RA's

Faculty

18 Professors

5 Associate Professors

2 Assistant Professors

6 Affiliate Professors

Academic Staff

5 Lecturers and Researchers

10 Postdoctoral Fellows

8 Assistant Scientists

4 Associate Scientists

6 Senior Scientists

Research Funding

Over \$20,000,000 in 2008-09

Areas of Emphasis in the Graduate Program

Mechanics of Materials

(Professors M. Allen, Blanchard, Bonazza, Carpick, Crone, Drugan, Kammer, Lakes, Malkus, Plesha, Smith, Waleffe, Witt) Engineering Mechanics concerns the fundamental study of force, stress, deformation, and motion as applied to engineering materials and structures. Research is conducted with a wide range of experimental, computational, and theoretical techniques. Materials and structures under study include shape memory alloys, nanostructured films, biomaterials, bone and soft tissue, geomaterials, space structures, viscoelastic liquids, and fiber-reinforced composites. Close collaboration with the departments of Materials Science & Engineering and Biomedical Engineering are emphasized.

Nuclear Systems Engineering

(Professors T. Allen, Bier, Blanchard, Bonazza, Corradini, Henderson, Kulcinski, Moses, Pfothner, Wilson, Witt) Nuclear Systems Engineering emphasizes research in radiation transport and neutronics, materials science and engineering, and thermal-hydraulics, as well as risk analysis and systems integration studies for fission reactors, fusion systems, and medical applications of nuclear technology. These efforts are conducted in bench-top labs as well as large-scale experimental facilities in combination with theoretical and computational modeling. Close collaboration with the departments of Mechanical Engineering and Medical Physics are emphasized in student, research scientist and faculty teams.

Plasma Science and Engineering

(Professors Callen, Fonck, Hegna, Hershkowitz, Moses, Sovinec, Volpe) Plasma Science and Engineering emphasizes high temperature plasmas for fusion energy applications (both magnetic and inertial), low temperature plasmas for industrial applications, such as plasma processing and plasma aided manufacturing, and basic plasma physics. The research carried out is both experimental and theoretical/computational. Close collaboration with the depts. of Physics and Electrical & Computer Engineering are emphasized. The UW has one of the largest and most highly regarded plasma physics program in the U.S.

University of Wisconsin, Madison

Research Centers & Facilities

Centers, research groups in the department, and interdepartmental research centers and facilities in which the department faculty have a significant involvement include:

- Applied Superconductivity Center
- Center for Human Performance and Risk Analysis
- Center for Mathematical Sciences
- Center for Plasma Aided Manufacturing
- Center for Plasma Theory and Computation
- Fusion Technology Institute
- Materials Research Science and Engineering Center
- Materials Science Center
- Materials Science Program
- Mechanics and Materials Research Group
- Pegasus Plasma Experiment
- Rheology Research Center
- Synchrotron Radiation Center
- UW Nuclear Reactor Lab
- Wisconsin Institute of Nuclear Systems
- Wisconsin Plasma Processing and Technology Research Consortium
- Wisconsin Shock Tube
- Wisconsin Structures and Materials Testing Laboratory

Further information on these centers can be found on the department WWW site.

Emeriti Faculty:

Drs. Carbon, Callen, Emmert, Malkus, Vogelsang

Affiliate Faculty: P. DeLuca, T.Mackie, B. Thomadsen, R.Vanderby (Medical Physics) D.Morgan, I.Szlufarska (Matl's)

OUR FACULTY and THEIR RESEARCH AREAS

Matt S. Allen: Assistant Professor. Experimental Dynamics and vibrations, system identification, nonlinear dynamics.

Todd J. Allen, Associate Professor, Nuclear Materials, Radiation damage of materials

Vicki M. Bier, Professor. Probabilistic risk analysis, reliability, decision-making theory, game theory and uncertainty analysis.

Joseph Bisognano, Professor, and Director of the Synchrotron Radiation Center. Accelerator physics, theoretical analyses of stochastic cooling phenomena.

James P. Blanchard, Professor. Plant life extension and properties of materials, fission/fusion radiation damage, MEMS micro-nuclear technologies.

Riccardo Bonazza, Professor. Shock interface interactions, vapor explosion phenomena, experimental fluid mechanics.

Michael L. Corradini, Wisconsin Distinguished Professor. Thermal hydraulics and multiphase flow in reactor operation and safety, waste disposal, risk analysis.

Wendy C. Crone, Associate Professor. Experimental mechanics of materials, plasticity, mechanics in shape memory alloys, metallic single crystals, biomaterials.

Walter J. Drugan, Professor. Nonlinear fracture mechanics, plasticity theory, advanced materials, shock waves in solids, continuum mechanics, applied math.

Raymond J. Fonck, Professor. Experimental research in plasma physics, atomic processes in high temperature plasmas, applied optics.

Chris Hegna, Professor. Plasma theory for magnetic confinement and instabilities of high temperature plasmas, experimental scaling and analysis.

Douglass L. Henderson, Professor, Radiation transport, transmutation of nuclear waste, fusion reactor neutronics and activation; Director of Graduate Engr. Research Scholars

Noah Hershkowitz, Langmuir Professor. Experimental studies of ICRF effects of fusion plasmas, basic plasma physics, plasma processing.

Daniel C. Kammer, Professor. Dynamics, stability and control of large structures, system identification, nonlinear dynamics.

Gerald L. Kulcinski, Grainger Professor and Associate Dean of Research. Nuclear materials, radiation damage, fusion reactor design studies.

Roderic S. Lakes, Wisconsin Distinguished Professor. Experimental mechanics, composite materials, biomechanics, nanomechanics.

Gregory A. Moses, Professor. Modeling of dense plasmas for inertial confinement fusion, parallel computation of particle transport.

John M. Pfotenhauer, Professor. Applied superconductivity, cryogenics.

Michael E. Plesha, Professor. Finite element and numerical methods, structural dynamics, contact-friction problems.

Leslie Smith, Professor. Applied mathematics, computational fluids, turbulence.

Carl Sovinec, Associate Professor, Computational plasma physics and 3D-MHD.

Francesco Volpe, Assistant Professor, Experimental plasma physics, microwave physics

Fabian Waleffe, Professor. Applied mathematics, fundamentals of fluids, turbulence.

Paul Wilson, Associate Professor. Neutron diffusion and neutron transport, fuel cycle analysis and inventory analysis, Generation IV reactor design and analysis.

Robert J. Witt, Associate Professor. Finite element methods in solid/fluid mechanics.