

Amy C. Courtney, PhD

curriculum vitae

Department of Physics, United States Military Academy
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Education

- Harvard University and the Massachusetts Institute of Technology** **1989-1994**
1994 Ph.D. in Medical Engineering & Medical Physics from the Division of Health Science and Technology (HST) (Included 2 years of Harvard Medical School courses).
- Harvard University** **1989-1992**
1992 M.S. Medical Engineering
- Michigan State University** **1985-1989**
1989 B.S. Engineering Mechanics, minor in biomedical engineering

Teaching Experience

- United States Military Academy, West Point** **2007 - present**
Assistant Professor of Physics – teaching calculus-based physics in core program.
- Southwestern Community College** **2006**
Adjunct Professor, Human Anatomy & Physiology – taught lecture/lab in undergraduate, transferable course.
- The Cleveland Clinic Foundation/Ohio State University** **1997-1998**
Adjunct Professor of Biomedical Engineering – supervised undergraduate and masters' degree students in research projects.
- Harvard University** **1993**
Teaching Assistant – Calculus I and II

Work Experience

- Department of Engineering, Western Carolina University** **2007**
Research Engineer. Developed program of study for new Biomechanical Engineering major; developed new courses in Biomechanics of Human Movement and Motor Control and Continuum Biomechanics. Wrote NSF grant with colleagues on developing an intelligent orthotic device for counteracting pathologic hand tremor. Revamped website to attract and inform prospective engineering students. Center for Rapid Product Realization: Coordinated events for the Innovation Collaborative, which gathered ideas from healthcare providers and senior citizens for new adaptive devices and technologies. Prepared annual report and descriptive brochures.
- The Cleveland Clinic Foundation, Cleveland, OH** **1995-1998**
Post-doctoral fellow, then Project Scientist. Studied effects of aging and disease processes (including diabetes) on bone. Designed experiments to measure *in vivo* deformation of human calcaneal bone under various exercise and gravitational conditions. Applications to identifying strain thresholds for bone mass maintenance and developing effective exercises. Successfully applied for grants from NASA, American Diabetes Association, and The Whitaker Foundation. Prepared written and oral presentations.
- Reebok International, MA** **1994**
Designed and performed experiments with human subjects measuring human performance and properties of athletic equipment. Designed experiments, statistical testing and reporting protocols to quantify material and biomedical performance in prototype athletic footwear and components. Guided frequent tours and other public relations events explaining the experiments and equipment.

Beth Israel Hospital, Boston, MA**1989-1994**

Designed and performed experiments to quantify the effects of age and bone density on the strength of the human hip. Included bone density measurement techniques, mechanical testing on human and bovine bone material and structure, and mathematical modeling. Part of a larger project studying the risk of hip fracture and interventional methods involving cadaveric testing, tests with human subjects, epidemiologic studies and mathematical (finite element) modeling. Led to the development of a clinical risk index used to quantify an individual's risk of hip fracture in the event of a fall. Designed and performed experiments and a mathematical model to show the nature of damage in bone material.

Department of Biomechanics, MSU**1985-1989**

Conducted veterinary clinical experiments investigating the efficacy of knee ligament reconstruction techniques in dogs. Conducted experiments with allografts measuring the effects of irradiation on the mechanical properties of patellar tendon grafts. Conducted experiments on the rate-dependency of mechanical properties of human patellar tendons. Conducted experiments with human subjects measuring human performance and properties of athletic footwear.

Brookhaven National Laboratory**1989**

Conducted experiments in laboratory rats investigating the efficacy of medications to preserve or enhance bone density.

University of Cincinnati**1987**

Conducted experiments on cadaveric specimens *in vitro* and *in situ* investigating the roles of individual structures in knee stability and the mechanical properties of ligaments and tendons.

Awards and Recognition

1997 International Society for Biomechanics Most Promising Young Scientist Award

1996 Whitaker Foundation grant

1989 National Science Foundation graduate fellowship

1985 MSU Alumni Distinguished Scholar (full scholarship)

Publications

The truth about ballistic coefficients, M Courtney, A Courtney, (2007).

<http://arxiv.org/ftp/arxiv/papers/0705/0705.0389.pdf>

An acoustic method for determining ballistic coefficients, M Courtney, A Courtney, (2007).

<http://arxiv.org/ftp/arxiv/papers/0705/0705.0391.pdf>

Using sound of target impact for acoustic reconstructions of shooting events, M Courtney, A Courtney, (2006). www.ballisticstestinggroup.org/impactsound.pdf

Links between traumatic brain injury and ballistic pressure waves originating in the thoracic cavity and extremities, A Courtney, M Courtney, in press (2006).

Review of criticisms of ballistic pressure wave experiments, the Strasbourg goat tests, and the Marshall and Sanow data, M Courtney, A Courtney, (2007).

<http://arxiv.org/ftp/physics/papers/0701/0701268.pdf>

Ballistic pressure wave contributions to rapid incapacitation in the Strasbourg goat tests, M Courtney, A Courtney, (2007). <http://arxiv.org/ftp/physics/papers/0701/0701267.pdf>

Relative incapacitation contributions of pressure wave and wound channel in the Marshall and Sanow data set, M Courtney, A Courtney, (2007).

<http://arxiv.org/ftp/physics/papers/0701/0701266.pdf>

A method for testing handgun bullets in deer, M Courtney, A Courtney, (2007).
<http://arxiv.org/ftp/physics/papers/0702/0702107.pdf>

Acoustic Measurement of Potato Cannon Velocity, M Courtney, A Courtney, in press, The Physics Teacher (Scheduled Winter 2007). Pre-print: <http://arxiv.org/ftp/physics/papers/0612/0612118.pdf>

Five Frequently Fatal Freshman Physics Fantasies, M Courtney, N Althausen, A Courtney. Physics Education, (42) 116, (2007). Pre-print: <http://arxiv.org/ftp/physics/papers/0605/0605152.pdf>

Who is the Customer in Higher Education? M Courtney, A Courtney, (2006).
<http://arxiv.org/ftp/physics/papers/0612/0612117.pdf>

An extensometer for global measurement of bone strain suitable for use in vivo in humans. Gail P. Perusek, Brian L. Davis, James J. Sferra, Amy C. Courtney, Susan E. D'Andrea J. Biomechanics 34(2001)385-391

Effects of age, density and geometry on the bending strength of human metatarsals. Amy C. Courtney, Brian L. Davis, Timothy Manning and Helen Kambic. Foot & Ankle International 18(4): 216-221, 1997

Etiology and prevention of age-related hip fractures. WC Hayes, ER Myers, SN Robinovitch, A. Van Den Kroonenberg, AC Courtney, TA McMahon. Bone 18(1) Supplement, 1996

Age related differences in post-yield damage in human cortical bone – experiment and model. Amy C. Courtney, Wilson C. Hayes, and Lorna J. Gibson. J. Biomechanics 29(11):1463-1471, 1996

Age-related reductions in the strength of the femur tested in a fall-loading configuration. Amy C. Courtney, Edward F. Wachtel, Elizabeth R. Myers, Wilson C. Hayes. Journal of Bone and Joint Surgery 77-A(3):387-396, 1995

Effects of loading rate on strength of the proximal femur. A.C. Courtney, E.F. Wachtel, E.R. Myers, W.C. Hayes. Calcified Tissue International 55:53-58, 1994

The effects of test environment and cyclic stretching on the failure properties of human patellar tendons. Roger C. Haut, Amy C. Powlison (Courtney) J. Orthopaedic Research 8:532-540, 1990

Conference Proceedings and Other Publications

Distinguishing the effects of aging on bone density and biomechanics in macaca fascicularis. Chen M. C., Courtney A.C., Davis B.L. Proceedings 44th Annual Meeting, Orthopaedic Research Society, March 16-19, 1998

Posty-Yield testing of bone to assess susceptibility to damage. Courtney AC, Hayes WC, Gibson LJ. 23rd Annual Meeting of the Society for Biomaterials April 30-May 4, 1997

Biomechanical data – how should they be displayed? Brian L. Davis and Amy C. Courtney International Society for Biomechanics Newsletter 1995

Age-related reductions in the strength of the femur tested in a fall loading configuration. A.C. Courtney, E.F. Wachtel, E.R. Myers and W.C. Hayes. 40th Annual Meeting, Orthopaedic Research Society, 188:32, 1994

Strength of the femur increased at a high rate of loading simulating a fall on the hip. A.C. Courtney, E.F. Wachtel, E.R. Myers, N.M. Cummings, W.C. Hayes. 40th Annual Meeting, Orthopaedic Research Society, p. 527, 1994

Ultrasonic and densitometric properties of the calcaneus correlate with in vitro hip fracture loads. ML Bouxsein, AC Courtney, WC Hayes. 40th Annual Meeting, Orthopaedic Research Society, p. 525, 1994

Multiple angle and anteroposterior dual energy x-ray absorptiometry predict femoral strength in vitro. A.C. Courtney, E.R. Myers, E.F. Wachtel, W.C. Hayes. J. Bone Mineral Research 8(Suppl. 1):S350, 1993

Bone mineral density of the calcaneus predicts hip fracture strength in vitro. ML Bouxsein, ER Myers, AC Courtney, WC Hayes. J. Bone Mineral Research 8(Suppl. 1):S255, 1993

Order of irradiation and lyophilization on the strength of patellar tendon allografts. R.C. Haut, A.C. Powlison (Courtney). 35th Annual Meeting, Orthopaedic Research Society p. 514, 1989

Some effects of donor age and sex on the mechanical properties of patellar tendon graft tissues. R.C. Haut, A.C. Powlison (Courtney), G.W. Rutherford, and J.R. Kateley 1988 Winter Annual Meeting of the American Society of Mechanical Engineers Nov. 26-Dec. 2, 1988