

Julian Ly Davis, Ph.D.

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Mechanical and Industrial Engineering
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- 2008 - PRESENT **Post Doctoral Research Associate**, University of Massachusetts, Amherst, MA
- 2008 **Post Doctoral Research Associate**, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA
- 2007 **Ph.D. Engineering Mechanics**, Virginia Tech, Dissertation: [A Computational Study into the Effect of Geometry and Orientation of the Utricle of a Red Ear Slider Turtle on Hair Bundle Stimulus](#), Advisor: J. Wally Grant
- 2000-2007 **Graduate Research Assistant**, Virginia Tech, Blacksburg, VA
- 1999 **B.S. Engineering Science and Mechanics**, Minor: Mathematics, Virginia Tech, Thesis: [Design of a Smart Fluid Rankine Cycle](#), Advisor: Mark S. Cramer

TEACHING

- 2008 - PRESENT INSTRUCTOR (Enrollment ~70)
System Dynamics – University of Massachusetts, Amherst, MA
This course assembles knowledge from several different courses from the mechanical engineering curriculum. The students learn to write and solve differential equations for mechanical, electrical and electro-mechanical systems using time and complex frequency domain methods. They also receive a brief introduction to vibrations and control theory.
In addition to lecturing, grading and holding office hours, I hold weekly review sessions allowing students to interact with me and the material in a more relaxed atmosphere. This provides students an opportunity to ask questions and receive one-on-one mentoring in a less intimidating setting and after they've had a chance to work through the homework problems.
- 2008 INSTRUCTOR (Enrollment ~40)
Dynamics – New River Valley Community College, Christiansburg, VA
This course introduction to Newton's laws, Work, Energy, Impacts, Impulse and Momentum, and was divided into four sections: 1) Kinematics of Particles, 2) Kinetics of Particles, 3) Kinematics of Rigid Bodies and 4) Kinetics of Rigid Bodies. The most innovative aspect of my teaching in this course was demonstrating key ideas with in-class demonstrations (e.g. Projectile motion and Energy – "The Teaspoon Catapult"). I also fulfilled the more traditional tasks of lecturing, grading and holding office hours.
- 2006 TEACHING ASSISTANT
Fluid Mechanics and Vibrations, Virginia Tech, Blacksburg, VA - As a teaching assistant for these two classes I graded homework and held regular office hours. I also gave a guest lecture on dimensional analysis in Fluid Mechanics.

- 2002 LAB INSTRUCTOR (Enrollment ~25)
Foundations of Physics I Lab, Virginia Tech, Blacksburg, VA
 Foundations of Physics I Lab is an introductory lab for students outside of Engineering and Physics. In this lab, students learn the basics of mechanics (e.g. Newton's Laws, Conservation of Momentum & Conservation of Energy) and see these theories at work through experiments. My responsibility included developing and delivering a 5-10 minute lecture at the very beginning of each lab. I also mentored students through their laboratory experiments, placing special emphasis on careful data collection, organizational skill and conceptual approaches to data analysis.
- 2000 TEACHING ASSISTANT
System Dynamics, Virginia Tech, Blacksburg, VA - As a teaching assistant, I graded homework, assisted students during office hours. I also held well-attended review sessions before the in-class and final exams.
- 1999 TEACHING ASSISTANT
Fluids Mechanics, Virginia Tech, Blacksburg, VA - As a teaching assistant, I graded homework and assisted students during office hours.
- 1999 TEACHING ASSISTANT
Thermodynamics, Virginia Tech, Blacksburg, VA - As a teaching assistant, I graded homework and assisted students during office hours.

MENTORSHIP

- 2009 Mat Weissinger – Undergraduate Honors Thesis, committee member
 2006 Amelia Davis – Research Assistant, mentor

AWARDS & HONORS

- 2004 **Pratt Fellowship** (\$ 2000) – Engineering Science and Mechanics Academic Fellowship
 1999 **James H. Sword Award** – Best Computational ESM Senior Design Project
 1998-1999 **Undergraduate Dean's List**

RESEARCHPEER-REVIEWED PUBLICATIONS

- 2007 **J.L. Davis**, J. Xue, E.H. Peterson & J.W. Grant. *Layer Thickness and Curvature Effects on Utricle Deflection in the Red Ear Slider Turtle: Static and Dynamic Analysis*. Journal of Vestibular Research.

MANUSCRIPTS IN PREPARATION

- J.L. Davis** & E.H. Peterson & J.W. Grant. *In-Vivo Location and Orientation of the Turtle Utricle and its Effect on Dynamic Hair Bundle Stimulus*.
J.L. Davis & E.H. Peterson & J.W. Grant. *Shear Stiffness Contribution of Turtle Utricle Hair Bundles to the Stiffness of the Column Filament Layer & Hair Bundle Complex*.

ABSTRACTS AND PRESENTATIONS

- 2009 A. Rivera, **J.L. Davis**, J.W. Grant, R. Blob, E.H. Peterson, A. Neimann, M. Rowe. *Characterizing utricular stimulation during natural behaviors of the turtle, Trachemys Scripta*. Association for the Research in Otolaryngology, Baltimore, MD
 2007 **J.L. Davis**. *A Computational Study into the Effect of Structure and Orientation of the Red Ear Slider Turtle Utricle on Hair Bundle Stimulus*. Doctoral Defense, Virginia Tech, Blacksburg, VA

- 2007 **J.L. Davis** & J.W. Grant. *Contribution of Hair Bundles to Shear Stiffness of the Column Filament Layer in the Turtle Utricle*. Association of Research in Otolaryngology, Denver, CO
- 2006 **J.L. Davis** & J.W. Grant. *Computational Modeling of the Turtle Utricle*. Virginia Academy of Science, Virginia Tech, Blacksburg, VA
- 2004 **J.L. Davis** & J.W. Grant. *Effects of Otoconia Thickness and Overall Curvature on Utricular Otolith Dynamics*. Association of Research in Otolaryngology, Daytona, FL; Virginia Tech–Wake Forest Student Symposium, Wake Forest, NC

INVITED SEMINARS

- 2008 **J.L. Davis**. *A Computational Study into the Effect of Structure and Orientation of the Red Ear Slider Turtle Utricle on Hair Bundle Stimulus*. New Mexico State University, Las Cruces, NM
- 2008 **J.L. Davis**. *A Computational Study into the Effect of Structure and Orientation of the Red Ear Slider Turtle Utricle on Hair Bundle Stimulus*. Washington State University – Institute for Shock Physics, Pullman, WA

RESEARCH PROJECTS

- 2008- PRESENT **Post Doctoral Research Associate**, University of Massachusetts, Amherst, MA
Project Goal: Use finite element modeling & geometric morphometrics to study the ontogeny and mechanics of the skull.
 - Static and Dynamic Structural Analysis
 - Computed Tomography
 - Finite element packages and software used: **Strand7, Hypermesh & Matlab**.Sponsor: National Science Foundation, Division of Biological Infrastructure
(PIs: E.R. Dumont & I.R. Grosse)
- 2008 **Post Doctoral Research Associate**, Virginia Tech, Blacksburg, VA
Project Goal: Model accelerations experienced by turtle utricle during live feeding strikes.
 - Rigid Body Dynamics
 - Computed Tomography
 - High Speed Video Data Analysis
 - Software used: **Matlab**.Sponsor: National Institutes of Health , NIDCD
(PIs: E.H. Peterson, J.W. Grant & R.A. Eatock)
- 2003 – 2007 **Graduate Research Assistant**, Virginia Tech, Blacksburg, VA
Project Goal: Model interaction between hair bundles and the otoconial membrane & investigate the effects of orientation of the utricle organ using finite elements.
 - Static, Dynamic & Modal Analyses
 - Rigid Body Dynamics
 - Confocal and Computed Tomography Micrograph Processing
 - Finite element packages and software used: **ANSYS, ABAQUS & Matlab**.Sponsor: National Institutes of Health, NIDCD
(PIs: E.H. Peterson, J.W. Grant & R.A. Eatock)

2000 – 2003 **Graduate Research Assistant**, Virginia Tech, Blacksburg, VA
Project Goal: Model the detonation of an explosive in a cylinder with finite elements to determine relation between internal dynamic pressure and mode shape excitation

- Dynamic & Modal Analyses
- Experimental Modal and Strain Analyses
- Signal Processing
- Finite element packages and software used: **I-Deas & Matlab.**

Sponsor: Naval Surface Warfare Center
 (PI: A.L. Wicks)

PROFESSIONAL MEMBERSHIPS

2009 Society for Comparative and Integrative Biology
 2006 Virginia Academy of Sciences
 2005-2007 Virginia Tech Biomechanics Journal Club (*Founding Member*)
 2004,2007 Association for the Research in Otolaryngology
 1997-1999 Society of Engineering Sciences (Student Member)

UNIVERSITY SERVICE

1996-2002 **Marching Virginians** (Virginia Tech marching band)
 1994 Leadership roles:
 2002, Executive Officer
 2000-2001, Operations Officer
 1998-1999, Rank Captain

OUTREACH

2006 **The Big Event** is a university sponsored event in which student, faculty and staff volunteer groups are assigned community service projects ranging from painting to yard work to trash pickup for residents in the surrounding communities.

2004-2005 **FIRST LEGO League** (Judge) is a national program designed to excite middle- to high-school students about science and engineering through the use of Robotic LEGOs to solve themed challenges.

2002 **James R. Sochinski Spirit of Tech Award** (\$ 1000, Inaugural Recipient) is given to band member who exemplifies the true “Spirit of Tech” by demonstrating outstanding citizenship and dedication during their career as a member of The Marching Virginians.

2002 **Director’s Award** is given to a member of the Marching Virginians in recognition of extraordinary service to the marching band.

2001 **Outstanding Service Award** is given to a band member who has selflessly served the Marching Virginians throughout the season.

1996-2002 **Hokies for the Hungry** is an annual canned food drive sponsored by the Marching Virginians.