



Mechanical Engineering

Department Newsletter

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A Word from the Chair

The academic year is off to a fast start as is typically the case. We had a great turn out of alumni and friends at the Homecoming tailgate and football game on Saturday, Oct. 11th. We will look for other opportunities to invite you back to campus each year as we hope to stay engaged with all of you into the future.

I had mentioned in the first newsletter this academic year that we have our largest first year class in our history, and the word from admissions is that this trend will continue. To help accommodate all of these students while maintaining the high quality education that we aspire to, we will be offering half of our core ME courses both semesters. This will address overcrowding in our courses as well as provide flexibility to students when scheduling their courses and co-op opportunities. About 90% of our students currently participate in a summer internship during their time in our program and many students and companies are also interested in this extended opportunity.

Note on the last page of this newsletter the kick-off of our Nuts and Bolts fundraising campaign for senior design projects. For many of you, this was the most rewarding and memorable experience during your time with us. The goal of this campaign is to provide the resources necessary for students to effectively compete in their competitions and complete their projects without worrying about financial limitations. While managing a budget is a valuable skill for Mechanical Engineers, fundraising is not necessarily something that many will need to do in the future. While we have collaborated in some cases with the UNH business school to involve their marketing students in our project teams, having funds available to the teams will remove or at least lessen this burden. So we ask that you consider donating even a small amount to this fund for your old senior design team. Small amounts from lots of alumni will make this a light burden for all. The web link on the last page will hopefully make this a quick and painless process. As you can see, many things are changing in the ME department, so please stay engaged and let us know your thoughts for how to improve our program. Thank you!

Brad Kinsey

Professor and Chair, Mechanical Engineering Department



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Mechanical Engineering Facts & Awards

- ME Senior, Ian Gagnon was recently selected as the NH College Student of the Year Award.
- ME doctoral student, Ivo Nedyalkov received the 2014 ASME Fluids of Engineering Division Graduate Scholar Award. He was one out of 13 awarded for his paper titled: "Performance of Bi-Directional Blades for Tidal Turbines."
- A paper (listed below) that Prof. Chris White co-authored while at Sandia National Laboratories has been officially designated by the Thompson Reuters Essential Science Indicators as a Highly Cited Paper. Highly Cited Papers are those that rank among the top one percent most cited in their subject field over the last ten years. There are 22 subject fields in total, and this paper was ranked in the subject field of Engineering.

White, C.M., Steeper R.R. and Lutz A.E. "The hydrogen-fueled internal combustion engine: a technical review." *Int. J. Hydrogen Energy*, 2006. 31:1292-1305. DOI: 10.1016/j.ijhydene.2005.12.001.

- Professor Martin Wosnik and former graduate student, Nathaniel Dufresne, were awarded the Lewis F. Moody Award for their "outstanding original paper useful to the practice of mechanical engineering from the American Society of Mechanical Engineers (ASME), Fluids Engineering Division.

Check out full length stories, pictures, and awards on the Mechanical Engineering website:

<http://unh.edu/mechanical-engineering/>

Newsletter Coordinators:

Barbaros Celikkol
Tracey Harvey
Lauren Foxall



Designing the Future with Energy

I was born in Tanzania. I am a senior interested in energy and fluid mechanics. I have been actively involved with the National Society of Black Engineers (NSBE) chapter. We arranged field trips to numerous companies like Thermofisher and Volpe, attended the annual national conference in Nashville, TN and arranged an outreach activity to a Manchester middle school to provide students with STEM related exercises. I am also a proud member of Men of Strength, Diversity, Education, and Family (MOSDEF), a multicultural support group on campus where we discuss major issues affecting men of color around the world and on campus and also offer support to men of color on campus.

In the summer of 2013, I worked with Xemed LLC in Durham, NH. Xemed builds polarizer machines to polarize gases such as Xenon. Their machines help to make high-resolution imaging of lung functional characteristics and pre-symptomatic detection of respiratory pathology a reality. I worked on redesigning the polarization oven for their hydrogen polarizer machine. This gave me a great introduction to machine design and also fluid

dynamics as I helped design a system to regulate temperature in the oven to a specified range. I also worked on a redesign of the laser system whose specific wavelength is utilized for the polarization of the gas in the polarizer machine.

This summer I worked in Palo, Iowa at the Duane Arnold Nuclear Plant. The plant is owned by the NextEra Energy, a company with one of the largest energy fleets in the U.S. They are also the largest renewable energy fleet in the U.S. I had a great introduction to NonDestructive Testing (NDT) methodologies such as Magnetic Particle and Ultrasonic inspections. This was a great experience for me as I gained an introduction to the energy industry. I am working to accurately model offshore wind turbine arrays for my senior project.

Currently, I am the Academic Excellence Chair for the NSBE -UNH chapter, and a community assistant at Babcock Hall. I enjoy astronomy, and watching and playing soccer. In the future, I hope to attend graduate school to pursue a MS and possibly a Ph.D. in Mechanical Engineering. I hope to contribute in the energy industry with high interests in renewable energy.



Thomas Kroll Class of '15

Thomas was recently awarded the Bertram Husch International Scholarship!

Senior Projects 2014-2015

Mechanical Engineering 755:

- Aerocats- 9 ME Students
- Baja- 8 ME Students
- FSAE- 12 ME Students
- Automated Flying Fishing Jigging- 4 ME Students
- Bio-Inspired Cellular Structure (3D Printing) - 3 ME Students
- Braille RealTime Conversion Using Image Mapping* - 2 ME, 1 CS, 2 ECE Students
- COOLSIM Data Center- 4 ME Students
- Northeast Passage bike- 2 ME Students
- Weapon Control- 2 ME Students

Mechanical Engineering 755 Cont. :

- Microtube Bending Machine for Biomedical Applications- 2 ME Students
- DPAL (Laser)- 2 ME Students
- Ski Board Press- 4 ME Students
- Lunacats- 3 ME Students
- QuadSat* - 1 CS, 1 Math, 6 ME Students
- ET-NavSwarm- 6 ME Students
- Automated Brewery- 3 ME Students
- Fire Fighting Robot- 3 ME Students

TECH 797 (O.E.):

- Integrated Aquaculture* - 1 ME, 1 Physics, 2 Biology Students
- Harbor Security System- 2 ME Students
- Wind Turbine/Demonstration Channel- 6 ME Students
- Remotely Operated Vehicle (ROV)* - 1 ECE, 8 ME Students
- Drop Camera- 3 ME Students
- Buoyless Lobster Trap- 2 ME Students
- Wave Energy Buoy- 10 ME Students
- Autonomous Surface Vehicle- 5 ME Students

* Interdisciplinary Projects

It's all 3D with Professor Li



Professor Yaning Li

Prof. Li joined the faculty of Mechanical Engineering Department in the of Fall 2012. Before joining the department, Prof. Li worked as a post-doc research fellow at MIT. Prof. Li's research area is in mechanics of materials, including solid and structure mechanics, fracture mechanics, structural and material instability, and composite materials across all length scales. In particular, she is currently interested in using 3D printing as a tool to unveil mechanical principles in nature and therefore developing new bio-inspired materials. She has published numerous peer reviewed journal papers and one patent in these areas. Her recent work on hierarchical fractal suture interfaces and the instability of 3D printed stratified composites was highlighted in American Physical Society Sites and MIT news, respectively.

Prof. Li recently received a NSF award titled 'A Bio-Inspired Strategy for In-Plane Energy Dissipation through Suture Interfaces'. This research was inspired by a remarkable material in nature, shown as the background image, which is the SEM image of the seed coat of the *Portulaca oleracea* plant. The

star-shaped epidermis cells interlocked like a jigsaw puzzle, forming a compact coat to protect the seed inside. The knowledge gained from this research will provide guidelines for designing new lightweight and damage-tolerant materials with broad engineering applications in aerospace, naval, architectural structures, ground vehicles, and armor. The interdisciplinary nature of the research will expose students to the areas of mechanics, materials, and additive manufacturing. This research will also open a new avenue of using 3D printing as a tool to explore fundamental engineering and scientific questions and new concepts in biomimetic design.

Her philosophy is based on two famous quotes: "It is the supreme art of the teacher to awaken joy in creative expression and knowledge." (Albert Einstein); and "Tell me and I forget. Teach me and I remember. Involve me and I learn." (Benjamin Franklin). She emphasizes that promoting students' creativity, improving their abilities, building their confidence, and cultivating their interests are as important as conveying knowledge. She believes that each student is unique. She strives to bring out the best in each student.

Listening to the Wind

Rachel has always been fascinated with aerodynamics, and began working for Prof. Joe Klewicki as an undergraduate on the design of the Flow Physics Facility (FPF) at UNH. The FPF is the largest boundary layer wind tunnel in the world, and was completed in 2010. The tunnel serves as a revolutionary facility for unraveling the complex behavior of turbulent fluid flows, such as those over aircraft wings and ship hulls. In 2009, Rachel graduated from UNH with a BS degree in mechanical engineering and subsequently received the CEPS Graduate Fellowship. The strong fluid dynamics influence in UNH's Mechanical Engineering Department lead her to stay for

graduate school as a Ph.D. student under Prof. Klewicki. During the first three years of her studies, she developed advanced hot-wire sensors for measuring flow statistics in wind tunnels. Her multi-wire sensors are the smallest of their kind to-date, and provided her with the opportunity to perform experiments in the High Reynolds Number Boundary Layer Wind Tunnel (HRNBLWT) at the University of Melbourne during a two month visit in the winter of 2012.

Now she is completing her dissertation on the dynamics of turbulent flow over rough surfaces, and plans to graduate in December of 2014.



Grad Student Rachel Ebner



On Duty

Dale Delisle, PhD Class of '02



Dr. Delisle is very familiar with the halls and grounds of UNH, having spent almost 15 years as an undergraduate/graduate student in the Mechanical Engineering Department. He completed his BSME in 2002, his MS in Materials Science in 2006 and finally his Ph.D. in Materials Science and Engineering in 2012. After receiving his bachelor degree, Dr. Delisle entered the work force and was employed by the U.S. Government in the Deep Submergence Systems Program Office, whose charter is Research, Rescue and Special Projects for the Department of the Navy. In this position he traveled the world (Turkey, Taiwan, India, South Korea, etc.) performing structural surveys and analyses of foreign submarines, which certified these platforms for possible rescue by U.S. Navy assets and personnel in the case of tragic maritime accidents/incidents. Some of the memorable events he experienced in this time was a birthday celebration in the ward room of a Turkish 209 class submarine, a deep dive to 2,000 ft. under water on the DSRV Mystic (one of the last dives the vehicle made before being retired) and a one year sabbatical where Dr. Delisle taught in the Mechanical Engineering Department at UNH. Dr. Delisle currently works for a Federally Funded Research and Development Center, the MITRE Corporation, where as a lead engineer, he is responsible for testing and analyzing various prototype acquisitions

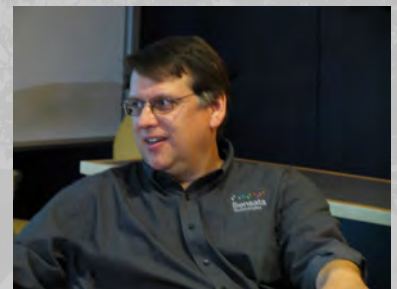
for the Department of Defense. In this role Dr. Delisle was personally selected to be an advisory member of the international community's Joint Airfield Frangibility Study Group, whose goal is to identify and influence the frangibility of structures placed on airports throughout the world to ensure the safety of pilot/crew and personnel in the event of aircraft accidents. Dr. Delisle served in the U.S. Army in both the Infantry and the Signal Corps, and is a decorated combat veteran of Desert Shield/Storm.

Alumni Shorts: Looking Back at Kingsbury



John Laymon, Class of '73 (on the right) recently visited UNH. When asked what he remembers most about UNH, John stated: "Getting my education." (Also pictured is Prof. Barbaros Celikkol).

John Wezowicz, Class of '86, spoke with engineering students about his experience at Sensata. When asked what he remembers most about UNH, John stated: "Meeting my wife and the hockey games. I am still a fan!"



William Porter, Class of '05, recently visited UNH. When asked what he remembers most about UNH, Will stated: "The connections I developed with fellow students and faculty." Will currently works at BAE, as a Mechanical Engineer and is married to Jodi and has a daughter named Abby who is pictured on the left.

NUTS AND BOLTS FUNDRAISING



Please consider giving a tax deductible donation to the ME General Fund, which will support all senior design projects, or to one of two identified funds, Precision Racing and Lunabotics Teams. This will provide the teams the resources necessary to be successful without having to focus extensively on fundraising.

To donate, visit the CEPS homepage, <http://ceps.unh.edu/> and select the Donate tab located on the far right menu bar. From there you can select one of the three Mechanical Engineering funds (or others of interest, e.g., Engineers Without Borders, Society of Women Engineers, etc.), enter your information, and help support our students and the ME program for the future and beyond. Please contact [Mike McCarthy](#) for more information on donating.

Stay Connected to ME!

We would like to stay connected with our alumni and friends and would welcome your newsletter contributions and suggestions.

Please send your news items, e.g. awards, promotions, personal updates, memories of UNH, and suggestions by email to:

lauren.foxall@unh.edu

If you would like to make a financial contribution to the ME Department, please go to:

<https://giving.unh.edu/cepsme>

Check out full length stories and pictures on the Mechanical Engineering website:

<http://unh.edu/mechanical-engineering/>