

University of New Hampshire College of Engineering and Physical Sciences

Mechanical Engineering Department Newsletter

SPOTLIGHTS

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Nuts and Bolts Fundraising:

Please consider giving a tax deductible donation to the **ME** General Fund. To donate, visit the CEPS homepage at https://giving. unh.edu/cepsme and select the Donate tab located on the far right menu bar to select a ME fund. THANK YOU!

A Message From The Chair



We hope you are all doing well in your jobs and in your personal life. We want to hear what and how you are doing and enjoy seeing people's travels, their new families, and their new jobs via Facebook and LinkedIn. Please keep us up to date.

There are lots of changes in the department this year.

 Prof. Brad Kinsey has stepped down as chair one year before the end of his term due to the demands of running a \$20M NSF Biomade multi-university grant and being interim director of the John Olson Advanced Manufacturing Center as well as chair of the CEPS Graduate Research committee. As a result, I will be interim chair. After approximately one month back on the job, I greatly appreciate the freedom I had to learn new things when I

was not chair. But I also greatly enjoy the opportunity to work with and help the undergraduate and graduate students achieve their goals.

- Prof. Joe Klewicki has taken a position as Head of School of Electrical, Mechanical and Infrastructure • Engineering at The University of Melbourne, Australia. His positive contributions will be missed.
- Yannis Korkolis is leaving us to become an Associate Professor at Ohio State University. We will miss him.
- Prof. Barry Fussell has elected to be a half-time professor for the next three years and then he will • retire. We will miss him, too (but not yet).
- Nikhil Padhye will start as an Assistant Professor this coming January. He is currently completing • his post-doctoral study at Stanford developing next-generation software tools in the area of Natural Hazards Engineering. His area of interest are in applied and computational mechanics, optimization and mechanics of materials.
- Tracy Mandel will start as an Assistant Professor in January 2020 after completing a post-doctoral • study at the University of California-Merced. Dr. Mandel has a Ph.D. in Environmental Fluid Mechanics and Hydrology from Stanford University. She has research expertise in coastal ocean mixing and will bring welcome expertise to our Ocean Engineering activities.

We have a bumper crop of new students, too. This year the total number of enrollment is 564 students between B.S.M.E. and B.S.O.E. programs. We have lots of interesting collaborative senior design that are summarized on the next page. We would welcome future collaborations (as well as donations to help support some of the team projects).

Happy holidays to you and your families and best wishes for 2019! Todd Gross Professor and Interim Chair of Mechanical Engineering Department

SENIOR PROJECTS

FOR ACADEMIC YEAR 2018-2019:

Below is a list of the Mechanical Engineering (ME 755) and Ocean Engineering (TECH 797) senior design projects for this academic year. We are excited that these projects are building and/or futhering industrial partnerships.

Mark your calendar for the UNH Undergraduate Research Conference on April 24, 2019 where these projects will be displayed.

ME 755- Competition (C), Industry (I), and Other (O) Projects	ME 755- Research (R), and Industry/Research (I & R) Projects	TECH 797- Ocean Competition (C), Research (R), Industry (I), and Other (O) Projects
UNH AEROCats (C)	Development of an In-Situ, smart sampler and sensor package for PFAS at Pease International Tradeport (R)	Remotely Operated Vehicle (ROV) (C)
American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Challenge (C)	ET NavSwarm (R)	Autonomous Surface Vehicle (ASV) (R)
FIRST LEGO League	Ergonomic, Ajdustable Reclining	Acoustic Measurements of Ice
Game Design (C)	Wheelchair (R)	Thickness (R)
FSAE Precision Racing Team (C)	Magnetic Pulse Welding (R)	High Speed Water Tunnel (HiCat) (R)
NASA LunaBots (C)	Pressure Gradient Insert for Large Wind Tunnel (R)	Nearshore Beach Observations (R)
Students for the Exploration and Development of Space (SEDS) - Hybrid Rocket Engine (C)	QuadSat Swarm (R)	Sea Urchin Aquaculture (R)
3D Printed Concrete: Preparing for Real-World Construction (I)	Smart 3D Printing on Macro and Micro Scales (R)	Submersible Fish Cage (R)
GE Aviation: Blisk Defect Detection Automation (I)	The Living Bridge Turbine Deployment Platform Loading and Motion Study (R)	
Novel Hybrid Bicycle for paraplegic cyclists (1)	Automated Workflow using soley open source tools (I & R)	A A
Pratt and Whitney Compressor Case Automated Bearing Sleeve Assembly (I)	Cryogenic Tempature Sensor (I & R)	65-202
Bridge-Truck Collision Avoidance System (O)	Fiber Bragg Grating Annealer (I & R)	
Rotator Cuff Machine (O)	Integration of a Mobile Industrial Robot (I & R)	ARA
UNH ZeNETH (O)	Ultra-lightweight cooling system for sensor POD (I & R)	and the second second
0	Valve Flow Control with Baffle [CFD Simulation] (I & R)	7 1000

UNDERGRADUATE & GRADUATE SPOTLIGHT



Zachary Davonski is a senior in the very first class of the undergraduate Ocean Engineering program. He is also pursuing an M.S. in Ocean Engineering via the accelerated master's program, while minoring in marine biology as well.

For the past few summers Zach has be interning for Manna Fish Farms, an aquaculture company that hopes to be the first offshore fish farm on the east coast of the United States. His senior design project is to build a scale model of the submersible cage that Manna is planning to use, and test it for open ocean use. Zach traveled to Lake Huron, Canada in mid-October to see the full size aquaculture cage in action. Zach will be working for Manna after he completes



his graduate degree, and hopes to design his own fish cage someday.

When not in the Chase Ocean Engineering lab, Zach loves to be in the outdoors fishing, surfing, boating, etc. He is also the captain of the shooting sports team here at UNH, and has competed throughout New England in different shooting sport events since his freshman year with great success. Last year he was even part of the squad that defeated West Point in the New England Clay Cup Collegiate Championship.



Drummond Biles is a Ph.D. candidate working with Professor Chris White. His dissertation work focuses on experimental measurements of wall bounded flow in two unique environments; high Reynolds number turbulent flows and non-equilibrium convective flow. The high Reynolds number experiments are conducted in the UNH Flow Physics Facility (FPF) utilizing a high resolution Particle-Image-Velocimetry (PIV) measurement system developed specifically for the FPF. The goal of the measurements are to detect and characterize structures in the flow at high Reynolds number and determine scaling laws which will be utilized by on-going modeling efforts at UNH. The convective flow studies are performed in the UNH Non-Equilibrium And Thermal (NEAT) boundary layer wind tunnel, in which both momentum and thermal boundary layers

are developed and studied. The NEAT tunnel provides the ability to induce both inner

(near-wall) and outer (free-stream) forcing in order to perturb the developing boundary layers. The goal of the study is to aid in the development of physics based models for determining heat loss in real world engineering environments (ie internal combustion engines). Outside of school Drummond enjoys taking advantage of the beautiful landscape of NH through skiing, hiking and biking throughout the White Mountains.

Pictured Right, a home built wind tunnel to teach young kids about wind energy and the force of fluids. This was used at Ocean Discovery Day, which was held on Saturday Sept. 29th.



FACULTY SPOTLIGHT



Ivaylo (Ivo) Nedyalkov came to UNH to work on his Ph.D. in Mechanical Engineering, after spending a year in Sweden, from where he obtained his M.S. in Applied Mechanics. His degrees provide a balance of experimental and computational applied fluid mechanics, something that Ivo has strived to incorporate in every project he has been working on. After graduating in 2015, Ivo became a Lecturer in the department and since then has been teaching classes in the Thermo-fluid sciences, including a Computational Fluid Dynamics class. He has been the adviser or co-advisor for 20 senior projects, and is currently advising 6 more.

One of the most interesting projects he has been working on is about measuring the drag and side forces on cyclists in formation in the presence of cross-wind. When cyclists ride in formation the riders can experience significant decrease of the aerodynamic forces. This phenomenon is extensively studied for riding in the absence of side wind, and at UNH we have studied the added complexity of the side wind. Most of the studies were performed in the student wind tunnel with 3D-printed model cyclists, and some initial full-scale studies were performed in the Flow Physics Facility. This research and the students working on the project were recently featured in a video series from the popular site FYFD, jointly produced



Pictured Above, Setting up a full-scale experiment at the Flow Physics Facility with Adam Lovell, B.S.M.E. '17 and Alec Cunningham, B.S.M.E. '17.

with the Journal of Fluid Dynamics. Other interesting projects that Ivo has advised include flow in fish tanks for aquaponic systems; wingtip devices for marine applications; sustainable surf board; and experimental study of compact heat exchangers. Many of the projects that Ivo advises are sponsored by local companies, including Brayton Energy llc., Applied Math Modelling, and DEKA research. Several of his current projects focuses on Computational Fluid Dynamics with the use of the open source software OpenFoam. One of Ivo's hobbies is rapping, so occasionally he discusses class topics in rhymes. He enjoys complex rhyme patterns (flows) and recently, he was featured in a video by Liblab, presenting a part of his Fluids RAP project. He will soon be featured in an FYFD video as well, and looks forward to completing the project.

In his free time, Ivo enjoys playing volleyball. After a few titles from local leagues in 2015 and 2016, he joined the Maine State Volleyball Association in 2017 where he is currently a C+ level player. His ambition is to reach the B- level and play in nationals. This year, Ivo also started volunteering as an assistant coach at Great Bay Community College.



Mechanical Engineering

ALMUNI SPOTLIGHT



Jon Wood B.S.M.E 1984. MSc 1991

Jon graduated with a B.S.M.E. degree in 1984 and an M.S.c - Ocean Engineering degree in 1991. He is the president/owner of Ocean Data Technologies, Inc., an oceanographic consulting company founded in 2003 (www.oceandatatech.com). They



provide worldwide environmental monitoring services for the offshore marine industry, completing numerous projects in places such as Indonesia, Philippines, Australia, Nigeria, and Angola, among others.

Jon and his wife and business partner, Margaret (Digan), met freshman year while playing Frisbee in front of Christensen Hall. They have four children.

Jon said, "As a senior, facing graduation and looming job search, the only thing I knew with certainty was I had zero interest in an 'office job'. That final semester I noticed a flyer for 'ME797 Ocean Measurements Lab,' newly-introduced by Dr. James Irish, collecting oceanographic data aboard the R/V Jere Chase. I signed up. One day Jim described his research studying ocean currents flowing through the Strait of Gibraltar. "Wow, always wanted to see Spain....", so afterward I approached Jim and colleague Dr. Neal Pettigrew – like myself a huge Red Sox fan – who offered part-time work for \$5/hour. I did see Spain, and was later hired full-time at the Ocean Process Analysis Laboratory, working on a wide variety of different projects. As University staff, I took advantage of free

post-graduate classes, leading eventually to another degree, and also moonlighted as a technician in Greenland for the glacial chemistry research group. The opportunities UNH provided kick-started an unorthodox career working around the world, pursuing interests without regard for the ultimate destination."

Pictured Right is offshore West Papua, Indonesia, March 2014, following recovery of 1500m deep oceanographic moorings. I'm in the yellow hardhat, third from the right, smiling (because the job was completed safely and successfully).



Mechanical Engineering

STUDENT SCHOLARSHIPS CEREMONY

The College of Engineering and Physical Sciences held their annual scholarship ceremony on Friday, October 5th. M.E. Dept. had 78 scholarship recipients. 12 out of the 78 M.E. students were photographed with the donors.







Pictured Left: Richard Dane '77 and Susan Dane Scholarship

Dick Dane (Donor) Thor Bartlett (ECE) Kurt Jackman(Civil) Susan Dane (Donor) Jason Landolt (Mechanical) Jacob Nunnelley (Chemical) Sungjoon Shinnishi (Mechanical)

Diamond Casting & Machine Andrew Clark (Mechanical) Oliver Fetter (Mechanical) James Kelley (Mechanical) Jonathan Lamphier (Mechanical) Charlie Nitschelm (Mechanical) Gerald Letendre (Donor)

John B. and

Martha M.W. Zocchi Scholarship

Christopher Foster (Electrical) Silas Johnson (Mechanical) Griffin Leclerc (Computer Science) David Luneau (Donor)

John H. Smith Scholarship

Benjamin Froburg (Mechanical) Jintong Han (Computer Science) Jennifer Hargenrader (Electrical) Aaron Kearnan (Environmental) Samuel Lanternier (Civil) Sarah Zecha (Mechanical) Sherry Smith (Donor) David Smith (Donor)

Douglas R. Woodward Scholarship

Scott Woodward (Donor) Nathaniel Green (Environmental) Alessandro Caruccio (Civil) Olivia LeRay (Mechanical) Srigana Padamati (Bioengineering) Tom Woodward (Donor)

Albert Kingsbury Award Joseph Hill (Donor) Audrey Balaska (Mechanical) Evelyn Clulow (Donor)







Mechanical Engineering

DONOR SUPPORT

The Mechanical Engineering Faculty, Staff, Graduate Students, and Undergraduate Students deeply appreciate the support that we have received from our generous donors.

Meaghan Beal Raymond Burghard Scott Campbell Jack Carpenter '69 Diamond Casting & Machine Gweneth Frost Golen Engine Services Prof. Todd Gross Lukas Huebener Margaretta Jolly Robin Krueger North East Precision CNC Pratt & Whitney QA Technology Co., Inc Schwab Charitable Fund Prof. May-Win Thein Jon Wood '84 & '91 Anonymous Donors All of our scholarship donors

Thank you for your generosity!

Nuts & Bolts Fundraising

Please consider giving a tax deductible donation to the M.E. 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, and select the Give 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.).

Please help support our students and the Mechanical Engineering program for the future and beyond. Please contact Mike McCarthy for more information.

Professor Todd Gross Interim Chair

Lauren Foxall Graphic Designer Editor-in-chief

Rachael Stansfield Contributor Associate Director of Development, CEPS

Barbaros Celikkol Contributor Professor of Emeritus We would like to stay connected with our alumni and friends and would welcome newsletter contributions and suggestions.

t.nu

Please send your news items, e.g, awards, promotions, personal updates, memories of UNH, and suggestions to Lauren Foxall at lauren.foxall@unh.edu.

If you would like to make a financial contribution to the ME Department, please visit: https://giving.unh.edu/cepsme

Check out full length stories and pictures on the Mechanical Engineering website: http://ceps.unh.edu/mechanical-engineering/

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