BREAKING RULES TO TEACH THOUSANDS ONE STUDENT AT A TIME
Dear Sibley School Alumni and Friends:

Greetings from Ithaca! Your extended Sibley School family here in Ithaca has spent the past year settling into our new Upson home. While there are some small challenges – the fans in some rooms are loud and faculty say their offices are small – the overall feedback has been very positive. Upson is new and modern, with great new teaching lab spaces, classrooms and conference rooms with modern multi-media for connected meetings, larger student collaborative spaces, and a larger shared student project team wing in the lower level, next to a rapid prototype lab which can be viewed from the floor above. Research labs are closer to graduate students and faculty offices, creating synergies and collaborations critical to research these days. We welcome you to come visit any time – even outside Reunion or Homecoming!

In our newsletter this year, we highlight two of our exceptional Senior Lecturers in Dr. Rajesh Bhaskaran and Dr. Hadas Ritz. Both are award winning instructors, and I think you will find their contributions to our School as extensive and important as we all do.

Rajesh has been the Swanson Director of Engineering Simulation for nearly two decades, thanks to a generous endowment from one of our alum, John Swanson. Many alum will remember Rajesh because of his teaching of common simulation concepts across many courses (solid mechanics, fluids, etc.). As a part of that work, he developed an open source SimCafe for others to use his approaches and examples. More recently, he developed a MOOC based on his work in simulation, and it currently serves as the most popular Cornell MOOC with over 100K enrolled from more than 170 countries.

Hadas has been an extraordinary instructor for the Sibley School for over eight years, teaching a wide variety of courses within and outside her area of expertise. She has helped revamp curriculum, redesigned a key undergraduate course, mentored new faculty in teaching, developed mathematics teaching tools for engineering undergraduates, and advised undergraduates and a project team. As one of my colleagues indicated during her recent promotion review: “this is almost too good to be true!” This year, she became a fellow of the McCormick Engineering Teaching Excellence Institute (MTEI), which now enables her to help mentor others in their teaching. Currently, she is helping lead an effort to revamp the junior level required curriculum using modern active learning methods.

Our alumni spotlight this year is Jeff Bleustein. As with many of our alumni, Jeff’s background is wonderfully interesting and impactful. After graduating with a B.S. from Cornell and a M.S. and Ph.D. from Columbia, he spent some time as a faculty member at Yale before moving to industry. He spent three decades at Harley Davidson, including VP of Engineering and Chief Executive Officer, President, and Chairman of the Board. He also served on President Bush’s President’s Council on the 21st Century Workforce. I think you will find his story remarkable.

In faculty news, we hired three new faculty this year: Prof. Zhiting Tian, an expert in thermal science at the atomistic level for energy conversion and management, Prof. Elaine Petro who is an expert in propulsion for spacecraft, and Prof. Atieh Moridi, an expert in metal based additive manufacturing. This newsletter highlights Zhiting, and two faculty who started in January 2018 – Nikolaos Bouklas who works in the area of computational mechanics, and Mahdi Esmaily who works in the area of computational biofluids. We will highlight Elaine and Atieh in a future newsletter after they arrive on campus.

The newsletter includes updates from reunion, project teams, faculty and student awards, and a profile of one of our Ph.D. students, Sarah Morris. Please keep in touch with us about your news and successes through the Alumni link on our website, or simply a quick email to mae_alum_news@cornell.edu.

Finally, this newsletter marks the last year of my time as Director; I plan to step down as Sibley School Director June 30, 2019, and a new person will take the wheel. One of my goals was to produce a newsletter each year as Director – and we did it! A special thank you to Laura Black, and other Sibley School staff over the years who really made this happen. As with any changing of the guard moment, one becomes reflective. A piece of advice I received from one of my role models – Sid Leibovich – before I started as Director was to set a goal of making the School better than when I joined it. I think that is for others to evaluate, but I will say that this was always my goal. I think we have done a lot over the years – with strong and diverse hiring, modern facilities, growth of project teams and modernizing instruction, and an expansion of our research directions. And, the only reason we were able to accomplish so much was because of our collective teamwork – the faculty, staff and students working together. I thank all of you for your support, and I look forward to the directions our next Director will take us.

Warm regards,

Mark Campbell
Dr. Rajesh Bhaskaran is the Swanson Director of Engineering Simulation and a senior lecturer in the Sibley School of Mechanical and Aerospace Engineering. For the last several years, Bhaskaran has been developing and refining his MOOC—that is, a Massive Open Online Course. His course (https://www.edx.org/course/a-hands-on-introduction-to-engineering-simulations), which is free and open to anyone, teaches students how to solve engineering problems using software made by ANSYS, an engineering simulation software maker.

The inspiration for the MOOC came from a realization he had in the classroom while teaching engineering students at Cornell. Often, Bhaskaran says, he would put videos online as a guide, but in class, he would sometimes tell the students to do things differently than how he had done them in the videos—say, because he had made a mistake, or because he realized there was a better way. “Nobody would do it the way I would tell them in class,” he says with a laugh. Instead, they would almost invariably follow the online instructions. “Whatever was online, [the students] treated like gospel,” he said in a recent video interview (http://www.cornell.edu/video/rajesh-bhaskaran-online-learning-engineering-education).

Bhaskaran quickly realized this is how students learn best: watching videos they can pause, rewind, and skip through, unlike a live in-person lecture. So Bhaskaran has done what he calls “flipping the classroom.” Essentially, he assigns lectures in video format as homework. Then in class students work through problems, with Bhaskaran there to guide them, answer questions, and provide assistance as necessary. “It’s much more interesting for me and much more valuable for the student,” he said in the interview.

In his MOOC, Bhaskaran can’t provide the in-person guidance that he does for his students at Cornell. But he can include assessments that check to make sure students understand the material, and he has videos that guide enrollees through exercises.

With a cumulative enrollment exceeding 100,000 students, clearly his techniques are resonating with a broad audience. And the students are not just in the United States: in fact, a higher percentage of them are in India, followed by the U.S. and then Brazil. In total, students from 173 countries have enrolled in Bhaskaran’s MOOC.

Ultimately, Bhaskaran’s goal is to get students to move away from novice learning—in which they can follow a prescribed set of instructions, but don’t have a deeper understanding that would let them solve new problems—towards expert thinking. It’s the difference between practicing mindlessly and practicing deliberately, he says. The latter will set students up for success once they’re out in the world and no longer have him—or his videos—to guide them.
Meet Hadas Ritz, Sr. Lecturer in MAE and a Faculty Teaching Fellow in the James McCormick Family Teaching Excellence Institute (MTEI) at Cornell University. She teaches required and elective courses covering a wide range of topics in the undergraduate Mechanical Engineering curriculum, including courses in engineering mathematics, solid mechanics, and dynamics. Through MTEI, she works with colleagues in the College of Engineering to improve teaching, with a focus on advising new faculty members. Her main teaching interests include solid mechanics and finite element analysis. Ritz was recognized with a 2013 Cornell College of Engineering Excellence in Teaching Award. She received her Ph.D. in Mechanical Engineering from Cornell in 2008 with Professor Emeritus Paul Dawson as her Ph.D. Committee Chairman.

Tell me about why you decided to become an instructor, why you chose your current position.

“In graduate school, some semesters you have to be a TA, but your main goal is to get all your research done and write a dissertation and graduate. Yet, when I was TAing, I felt like I was putting all my time into the TAing, and not into the actual research. It was pretty clear early on that my skills and interests were more on the teaching of the classes rather than just the straight engineering research. It was really during graduate school that I realized that was going to be the path of success for me.”

Do you think that choice has been a good one? Have you enjoyed occupying the teaching end of the spectrum?

“Oh yeah, absolutely. Absolutely. My interactions with the students are, for me, the most valuable part of the job. For many faculty members, the most valuable part of the job is the research, and a lot of people also really enjoy the teaching; but for most people, it’s a secondary thing, and for me it’s the primary thing.”

How do you keep students engaged during class?

“I try to create an environment in the classroom where students can ask questions, and I try to create a lot of opportunity. I’m learning more and more techniques for making that more effective. I’ve always made it a habit to make frequent pauses and make sure that the students are getting the material, but there are always new techniques. Just this summer, I was at a conference where they said that actually, you can generate questions rather than silence by asking the students to talk with each other in smaller groups, and then bring these questions to the larger group for me to answer.”

Have you found that over time, those strategies have changed the way that your students engage with you in the class?

“Yes, I definitely feel like I’m getting better and better at creating a good classroom environment. There’s always room for improvement though. One aspect that I’ve been working on since last semester is to really make human connections with students. I do pretty well in the classroom, and in office hours, but I really want to make those human connections. I have over three hundred students this semester, but I have a few of them down! I don’t know all of their names, but I’m letting them know that I’m making an effort to learn, and the students knowing that I’m interested in making the effort is good.”

How would you identify your academic and other interests?

“Well, my wife and I like to take walks outdoors… I like to do arts and craft things, like knitting and crochet. Lately I’ve been doing batik on eggshells. [She shows me one batik goose egg, and I ask if she made it:] Yes, I made it! I mean, I didn’t make the egg; a goose made the egg.”

You’ve talked about group work and prioritizing human connections as teaching methods. Are these the main prongs of your approach? What kinds of methods do you focus on when you approach teaching?

“I like to spend a lot of my in-class time having students solve problems, having students work through examples. For MAE2020, Meredith Silberstein and I work together to incorporate some longer activities in the lectures; that could be the entirety of the class, or a large portion of it. I like
to use class time having students solving problems, rather than just sitting and listening; otherwise, even they don’t know if they understand the material or not. That way, I can address questions and misunderstandings in real time in the lecture.”

You teach very diverse courses. How do you teach these at such a high level without having studied them intensively before?

“I teach a lot of different classes. My background is in solid mechanics, and that’s where my main interests lie, but I’ve taught dynamics classes, I taught space

craft engineering a few years ago… When I’m teaching those other kinds of classes that I’m fresher to, that I don’t have the second-nature answers to everything, I’m in

an even better position to address student questions, because I’m like, “Oh yeah, I just figured that out, too!” The department assigns these diverse classes to me; I am the

hammer for which every problem is a nail. If there’s a hole in the teaching schedule, often I fill it. The department gives excellent support, whether it’s notes from a

previous instructor, or a lot of TAs for the class, and the lab support staff, like Matt Ulinski, Dave Hartino, Rick Schmidt, and Liran Gazit. I try to just put myself in the

students’ shoes to help make the connections between new material and the larger scheme of the class.”

Of the courses that you have taught, which has been your favorite?

“ENGR 2020 is my favorite. It’s a fast class, it covers a lot of material; a lot of other

universities would have 1.5 classes to cover that material. It’s hard for the students, but it’s great fun, too. Like I said, Silberstein and I worked together a few years ago to

give it an overhaul, so we have lots of example videos, homework problems based on problems from industry, hands-on labs in section… There’s a lot going on in that class, but it’s a fun one for me to teach.”

Which has been the most challenging?

“Let’s see. Well, the first time I teach any new class, that’s the most challenging. Actually, when I taught spacecraft engineering, I didn’t know about it before. So, I

mean, that was challenging, but it was fun, I learned a ton; if you teach a new topic you learn a ton! I think maybe the most challenging classes are the ones where there’s

just not very good energy in the room; maybe the class starts at 8:40, and the students are tired. I just do the best that I can, I try to let the students know that I want it to be

interactive, that I want to make it valuable for them.”

How valuable is this learning experience to you?

“I feel like I learn something every time I teach a class. If it’s a class that I’ve taught many times, then maybe I learn a different way of explaining something. But if it’s a class that I haven’t taught in a long time, or I haven’t taken in a long time, that makes it interesting. I get to learn new material. I’m teaching a new class, differential equations, in the Spring, which I haven’t taught before; obviously I’ve used differential equations, but I haven’t thought about teaching them before. I am excited about it; I taught calculus before, and I just thought, Wow, this is fun!”

Because you’ve had such success in teaching, the College of Engineering now has you mentoring others on teaching. How does that experience compare with teaching students?

“We talked about how when I’m teaching, I’m also learning. That’s true in the engineering courses, but much more so when I’m interacting with other faculty members

about teaching. I went to a workshop this past summer, the National Effective Teaching Institute, so that I could learn how to be more helpful to other faculty members

here, but I learned so much, so many specific tips that I’m trying to incorporate this semester. And then when I was helping Kathy Dimiduk (Sr. Lecturer, College of

Engineering) lead the new teacher training this August, just during those two or so days of workshop, just talking about it with newer and more experienced teachers

reminds me of techniques. That’s been really great; it’s spurred me on to keep making continual improvement in my teaching.”

How do you relate all of your activities in your view of who you are, what you do, and your path in life?

“I’m moving more towards interacting with faculty about improving the undergraduate experience here. So instead of just improving my classes, I want to help

disseminate information about teaching. There are a lot of faculty who have really excellent teaching methods, but we don’t share those methods. So one of the things

that we are trying to do at MTEI with Kathy Dimiduk is to spread the word about things that other people are doing that are great that maybe other people could borrow.”

When you were studying, is this how you envisioned your path?

“I think I started grad school with no vision at all; I felt that everything I had learned in undergrad was super interesting, but that I’d barely scratched the surface, and I wanted to learn more. I really just stumbled into getting this position, which is absolutely ideal for me, it’s absolutely ideal. If I could have sat down five years ago and described the ideal career that I could have, it’s pretty much what I’m doing right now.”
Few brands are as synonymous with American engineering as Harley-Davidson. The motorcycle company has been manufacturing alluring road machines since 1903 and has built its brand around ideals of personal freedom and self-expression. That same sense of freedom and exploration is what guided Jeff Bleustein ’60, ’61 BME, from Cornell Engineering to Harley-Davidson, where he would help save the company from bankruptcy and become one of its most successful leaders.

As an undergraduate at Cornell, Bleustein was always chasing his academic interests. He enrolled in liberal arts courses, studied biological sciences, and eventually settled on earning a mechanical engineering degree.

“I got something out of every one of those courses,” said Bleustein of his broad range of studies at Cornell. “I was able to follow my own path and was able to search for what I really wanted to do.”

After earning his Ph.D. from Columbia University and then teaching engineering and applied sciences at Yale University, Bleustein decided he wanted a new challenge. He accepted a position as a technical consultant in mechanical engineering at American Machine and Foundry, better known as AMF, where he got to apply his engineering skills in a variety of ways.

“My job at AMF was really fascinating,” said Bleustein, noting that the corporation’s 56 companies had a diverse array of products, including sporting goods, yachts and even tobacco machinery. “I worked on the Arthur Ashe tennis racket with Arthur Ashe, I worked on Ben Hogan golf clubs with Ben Hogan doing mechanical analysis of the clubs, and I worked on Alyeska Pipeline equipment, helping to develop a machine to inspect the pipeline for cracks.”

But there was one particular company that AMF thought Bleustein could help the most. He was sent to the Harley-Davidson headquarters in Milwaukee and was asked to develop an extensive report recommending changes to the company, which had seen decreasing sales amid performance issues in their motorcycles.

In 1975, Bleustein was named vice president of engineering at Harley-Davidson, where he introduced a number of engineering upgrades and new features that brought the brand back to prominence. He introduced the rubber engine-mount, the Kevlar drive belt, and anti-dive suspension, among other features. But perhaps the most consequential change was the redesign of the company’s V-twin engine, which was transformed into the more reliable and durable Evolution V-twin engine, helping to regain consumer confidence in the quality of Harley-Davidson bikes.

Bleustein was promoted to various leadership positions before becoming the company’s president and chief operating officer in 1993. By 1997, he was named chief executive officer and a year later was named chairman of the board.

As the company’s leader, Bleustein reorganized staff, modernized engineering and testing practices, conceived and executed a plan to transform its dealer-owned stores into modern retail establishments, and instituted a new licensing program that significantly grew sales of merchandise. By 2001, the company was named Forbes Company of the Year, Industry Week named Bleustein Technology Leader of the Year, and shortly after he was named to the World Trade Hall of Fame.

Bleustein credits his business acumen and much of his success to his engineering education.

“It taught me how to learn on an ongoing basis and it provided me with the discipline, the tools and the confidence I needed to acquire areas of knowledge that were new to me at the time,” said Bleustein. “I found the science, if you will, in areas as diverse as sales and marketing, finance, manufacturing and even in interpersonal relations and leadership. This allowed me to experience a lifetime of learning and an extraordinarily satisfying career.”

Over the years, Bleustein has stayed engaged with Cornell Engineering. As president of Harley-Davidson, he returned to campus to participate in a lecture series on manufacturing engineering. He also established a scholar-in-residence program at the company and as its first resident selected Al George, Cornell’s longtime professor of mechanical and aerospace engineering who now directs graduate studies for systems engineering. Bleustein retired as board chair in 2009, but remains involved with the college today, helping various academic initiatives through his generously established Bleustein Fund for Excellence in Engineering.

His advice to students is much in the spirit of Harley-Davidson, which is to feel free to follow your interests, wherever they will take you.

“Seek out a career that will present you with new challenges on an ongoing basis,” said Bleustein. “Do something that will energize you, something you have some passion about.”
FACULTY

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the 2018 Young Investigator Award from the American Academy of Orthopaedic Surgeons.

Received the Dennis G. Shepherd Memorial Teaching Prize 2016-17 Excellence in Teaching Award.

U.S. Fulbright Scholar selected for Denmark in academic year 2017-18.

Reappointed as Director of MAE for one-year term effective July 1, 2018. Campbell also was named IEEE Fellow for contributions to control and estimation theory for autonomous systems.

Receives inaugural Mosaic Medal of Distinction for his impact and leadership on creating opportunities for diverse communities.

Accepted the position of associate dean for research and graduate studies for the College of Engineering.

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected in the inaugural class of Fellows of The Combustion Institute.

Promoted to Senior Lecturer for the Sibley School of Mechanical and Aerospace Engineering.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.” Savransky is also a recipient of the James and Mary Tien 2016-17 Excellence in Teaching Award.

Promoted to Associate Professor with indefinite tenure effective July 1, 2018.

2018 3M non-tenured faculty award for outstanding research, experience, teaching and academic leadership. Singh is also the first Cornell Engineering faculty to serve on the board of interdisciplinary medical journal as associate scientific advisor for Science Translational Medicine. Additionally he was honored with the Dorothy G. Swanson Award, which is sponsored by John Swanson ’61 ME, in honor of his mother.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.”

Fluid Dynamics Lab named the Charles H.K. Williamson Lab in his honor, by the Merrill family and former students, in recognition of his Merrill Scholars award record.

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected in the inaugural class of Fellows of The Combustion Institute.

Fluid Dynamics Lab named the Charles H.K. Williamson Lab in his honor, by the Merrill family and former students, in recognition of his Merrill Scholars award record.

HONORS AND AWARDS

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the 2018 Young Investigator Award from the American Academy of Orthopaedic Surgeons.

Received the Dennis G. Shepherd Memorial Teaching Prize 2016-17 Excellence in Teaching Award.

U.S. Fulbright Scholar selected for Denmark in academic year 2017-18.

Reappointed as Director of MAE for one-year term effective July 1, 2018. Campbell also was named IEEE Fellow for contributions to control and estimation theory for autonomous systems.

Receives inaugural Mosaic Medal of Distinction for his impact and leadership on creating opportunities for diverse communities.

Accepted the position of associate dean for research and graduate studies for the College of Engineering.

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected in the inaugural class of Fellows of The Combustion Institute.

Promoted to Senior Lecturer for the Sibley School of Mechanical and Aerospace Engineering.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.” Savransky is also a recipient of the James and Mary Tien 2016-17 Excellence in Teaching Award.

Promoted to Associate Professor with indefinite tenure effective July 1, 2018.

2018 3M non-tenured faculty award for outstanding research, experience, teaching and academic leadership. Singh is also the first Cornell Engineering faculty to serve on the board of interdisciplinary medical journal as associate scientific advisor for Science Translational Medicine. Additionally he was honored with the Dorothy G. Swanson Award, which is sponsored by John Swanson ’61 ME, in honor of his mother.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.”

Fluid Dynamics Lab named the Charles H.K. Williamson Lab in his honor, by the Merrill family and former students, in recognition of his Merrill Scholars award record.

HONORS AND AWARDS

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the 2018 Young Investigator Award from the American Academy of Orthopaedic Surgeons.

Received the Dennis G. Shepherd Memorial Teaching Prize 2016-17 Excellence in Teaching Award.

U.S. Fulbright Scholar selected for Denmark in academic year 2017-18.

Reappointed as Director of MAE for one-year term effective July 1, 2018. Campbell also was named IEEE Fellow for contributions to control and estimation theory for autonomous systems.

Receives inaugural Mosaic Medal of Distinction for his impact and leadership on creating opportunities for diverse communities.

Accepted the position of associate dean for research and graduate studies for the College of Engineering.

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected to Fellow by the American Society of Mechanical Engineers (ASME).

Elected in the inaugural class of Fellows of The Combustion Institute.

Promoted to Senior Lecturer for the Sibley School of Mechanical and Aerospace Engineering.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.” Savransky is also a recipient of the James and Mary Tien 2016-17 Excellence in Teaching Award.

Promoted to Associate Professor with indefinite tenure effective July 1, 2018.

2018 3M non-tenured faculty award for outstanding research, experience, teaching and academic leadership. Singh is also the first Cornell Engineering faculty to serve on the board of interdisciplinary medical journal as associate scientific advisor for Science Translational Medicine. Additionally he was honored with the Dorothy G. Swanson Award, which is sponsored by John Swanson ’61 ME, in honor of his mother.

Promoted to Associate Professor: Effective Nov. 1, 2018. She also received the Department of Energy Office of Science’s Early Career Research Program funding to study polymer membranes and awarded a grant from an Office of Naval Research (ONR) entitled “Mechanoresponsive Antifouling Polymers Based on Unveiling Functional Cross-links.”

Fluid Dynamics Lab named the Charles H.K. Williamson Lab in his honor, by the Merrill family and former students, in recognition of his Merrill Scholars award record.
The Sibley School community congratulates the graduated students who achieved the highest scholastic averages in mechanical and aerospace engineering for 2018.

2018 Senior Class Speaker: On behalf of the B.S., ME Class of 2018, one student is selected by peer nomination for the honor of presenting a speech at the Sibley School graduation ceremony.

Award Recipient: Katrina Lastra: B.S. ME ’17

Outstanding Achievement Award: Awarded to the graduating student who has achieved the highest academic standing in the Master of Engineering Program.

Award Recipient: Alexander Bernard: M.Eng. ME ’18

Recipient of the 2018 Sibley Prize: The Sibley prizes were established in 1884 for the two seniors with the highest scholastic averages.

Award Recipients: Shoshaunah Jacob: B.S. ME ’18; Timnah Zimet: B.S. ME ’18

Thomas J. and Joan T. Kelly Prize: Awarded to Seniors and M.Eng. students in MAE displaying excellence in aerospace engineering, as demonstrated through coursework or an innovative design project. The awardee must show tangible evidence of being a well-rounded person with an outstanding non-engineering contribution to Cornell and/or the greater community.


Outstanding Senior: Awarded to at least one M.E. student who has exemplified leadership and made significant contributions to the Mechanical Engineering undergraduate community. This award is made possible by Matthew O’Connor, B.S. ME ’81, M.Eng. ’82, ASME Chapter President, 1980-81.

Award Recipient: Nathalie DeNey: B.S. ME ’18

Walter Werring Prize: Recognizes talented and dedicated graduating seniors who have enhanced the Cornell community, excelling in a manner befitting the reputation of the Sibley School.

Award Recipient: Laura Lee: B.S. ME ’18

Frank O. Ellenwood Prize: Awarded to graduating seniors with the highest GPA in heat and power courses.

Award Recipients: James Greenbaum: B.S. ME ’17, M.Eng. AE degree candidate; Cristian Alonso: B.S. ME ’18, M.Eng. AE degree candidate.

H.D. Block Graduate Teaching Prize: Awarded to a Ph.D. and M.S. Candidates in the TAM Field, recognizing their dedication and excellence as a teaching assistant in Engineering Mathematics and Engineering Mechanics.

Award Recipient: Shrinidhi Shrikant Pandurangi: Ph.D. TAM degree candidate.

Bart Conta Prize in Energy and Environment: Awarded for best work on a research or design project dealing with energy and the environment.


Sibley Prize for Excellence in Graduate Teaching Assistance: Awarded to Ph.D. students and M.S. Candidates, recognizing their dedication and excellence as teaching assistants for Sibley School courses.

Award Recipients: Dasha Gloutak: M.S. ME ’18; Pushan Sharma: Ph.D. ME degree candidate; Gabriel Soto: Ph.D. AE degree candidate; Matthew Kasemer: Ph.D. ME ’18; Thais de Almeida: Ph.D. ME degree candidate.

McManus Design Award: Awarded for best technical paper of single or joint authorship presenting an original solution to a design problem or project.

**SIGGRAPHA 2017: This Controller Changes Shape To Match Virtual Objects:** The project is a collaboration between NVIDIA and Cornell, with Ph.D. candidates Ben Mac Murray and Bryan Peele from Cornell’s Organic Robotics Lab. (https://uploadvr.com/siggraph-controller-changes-shape/)


**Xiangkun (Elvis) Cao, a Ph.D. student in Professor Erickson’s lab, wins Best Poster Award** for FeverPhone Research at the ACLS International Summer School 2017 in Singapore. (https://www.mae.cornell.edu/spotlights/xiangkun-elvis-cao-phd-student-professor-ericksons-lab-wins-best-poster-award-0)

**Xiangkun (Elvis) Cao presents research at New York Academy of Sciences:** “Application of Smartphone Technology in Food Safety” at the Journey Through Science Day in New York City on September 18th. (https://www.mae.cornell.edu/news/cornell-projects-cultivate-digital-agriculture-landscape)


**InSitu@CHESS offers material-testing help to industry, academia:** InSitu@CHESS, a program begun in 2014 by engineering professor Matthew Miller, offers a way for industry and other labs to test materials using the high-energy X-rays of Cornell’s synchrotron source. (http://news.cornell.edu/stories/2017/07/insitu-chess-offers-material-testing-help-industry-academia)

**Breakthrough Starshot ‘Sprites’ in Orbit:** Centauri Dreams.org - Imagining and Planning Interstellar Exploration. ‘Sprites’ are four-gram spacecraft that was just launched on the Venta-1 satellite. (https://www.mae.cornell.edu/news/breakthrough-starshot-sprites-orbit)

**Singh Invited to the NAE 2017 EU-US Frontiers of Engineering Symposium:** Asst. Prof. Ankur Singh has been selected to attend the National Academy of Engineering (NAE) 2017 EU-US Frontiers of Engineering Symposium (EU-US FOE), which will be hosted by the University of California. (https://www.mae.cornell.edu/news/singh-invited-nae-2017-eu-us-frontiers-engineering-symposium)


**E-Synch: A Tool to Automate and Optimize Cattle Reproductive Management:** Principal investigators Prof. David Erickson and Prof. Julio Giordano are being funded by research investment from the Cornell University Agricultural Experiment Station (CUAES). They will fund six proposals over three years. (https://cals.cornell.edu/news/cornell-projects-cultivate-digital-agriculture-landscape)

**Five New York companies awarded JumpStart funding** through the Cornell Center for Materials Research JumpStart program, which is supported by Empire State Development’s Division of Science, Technology and Innovation. (http://news.cornell.edu/stories/2017/09/five-new-york-companies-awarded-jumstart-funding)

**Group uses organoid to explain immune cells’ rapid response:** Cornell BME/MAE and Weill Cornell Medicine teams report a method for uncovering immune response mechanism (http://news.cornell.edu/stories/2017/10/group-uses-organoid-explain-immune-cells-rapid-response)
World’s Smallest Spacecraft Is Prelude to Enormous Voyage:
Sprites, which were built by researchers at Cornell University, were launched June 23 aboard an Indian rocket. (https://www.nbcnews.com/mach/science/world-s-smallest-spacecraft-prelude-enormous-voyage-ncna797866)

Geoengineering might address climate change, MacMartin tells Congress:


Cornell team devises rapid test for vitamin A, iron deficits: “We must address the micronutrient problem at the individual level – which is a much easier task. The key to solving these micronutrient deficiency problems is early detection and early… http://news.cornell.edu/stories/2017/12/cornell-team-devises-rapid-test-vitamin-iron-deficits)


New Mechatronics final project has students, robots going cube crazy: Assoc. Prof. Hadas Kress-Gazit thought it was time that her junior-level Mechatronics class switched things up a bit. http://news.cornell.edu/stories/2017/12/new-mechatronics-final-project-has-students-robots-going-cube-crazy)

Engineers program tiny robots to move, think like insects: Cornell engineers are experimenting with new programming that mimics the way an insect’s brain works in order to power tiny robots. (http://news.cornell.edu/stories/2017/12/engineers-program-tiny-robots-move-think-insects)

Living Tissue Systems for Fighting Disease: Asst. Prof. Ankur Singh is advancing technologies to reveal how the immune system succeeds or fails in fighting infection; he’s creating immune system organoids. (https://research.cornell.edu/news-features/living-tissue-systems-fighting-disease)

Removable implant may control type 1 diabetes: In an example of cross-campus collaboration, a group led by Minglin Ma has developed a unique implant for controlling type 1 diabetes, which affects more than 1 million Americans. (http://news.cornell.edu/stories/2018/01/removable-implant-may-control-type-1-diabetes)


New grad housing is living lab for heat pump study: At the Maplewood Apartments project, now under construction, Cornell engineering students will deploy heat-pump monitors to study the system viability in a severe winter climate. (http://news.cornell.edu/stories/2018/02/new-grad-housing-living-lab-heat-pump-study)

Three Cornell spacecraft now in NASA’s launch queue: Assoc. Prof. Mason Peck and his team had three new spacecraft selected by the NASA CubeSat Launch Initiative to be launched into space. (http://www.mae.cornell.edu/news/index.cfm?news_id=96409&news_back=news%5Farchive)

MAE News and Spotlights

MAE’s Max Zhang quoted in Newsweek story about toxic smog in China: Assoc. Prof. Max Zhang was quoted in a recent Newsweek story about toxic smog in China. (http://www.newsweek.com/china-smog-air-pollution-sandstorm-864451)


Graduate students, Khaled Hashad and Bo Yang, from Assoc. Prof. Zhang’s research group participate in project in Louisville KY. Do Trees Make you Healthier? (http://www.courier-journal.com/story/tech/science/environment/2017/10/26/tree-plantings-test-health-benefits-louisville/769628001/)

Science Question - From a Toddler: Online Science & Health asks Assoc. Prof. Peck, “How much sugar would it take to get a rocket to the moon?” that was asked by 4 and a half year old Jacob P. (https://fivethirtyeight.com/features/how-much-sugar-would-it-take-to-get-a-rocket-to-the-moon/)

Autonomous vehicles for air, land, and sea: Prof. Ferrari and the LISC are working on a multitude of projects, many of them focusing on autonomous sensor technologies installed on ground, air, or water vehicles. (https://research.cornell.edu/news-features/autonomous-vehicles-air-land-and-sea)

MAE Grad students win awards at ASEE St. Lawrence Section: Three Sibley school grad students won awards for their posters at to 2018 ASEE St. Lawrence Section annual conference. (https://www.mae.cornell.edu/spotlights/mae-grad-students-win-awards-asee-st-lawrence-section)

SpaceX’s Falcon Heavy Rocket poised to change space exploration forever: “In a few years we’ll have an unprecedented set of choices for heavy lift. That will change the world — for science, exploration, and commercial use of space...” (https://www.mae.cornell.edu/spotlights/spacexs-falcon-heavy-rocket-poised-change-space-exploration-forever)

The Robotics Revolution Will Be Soft: “It would be great if our robots behaved more like us,” says Assoc. Prof. Rob Shepherd. Shepherd runs the Organic Robotics Lab at Cornell University, which describes itself as “using synthetic adaptation of...” (https://www.mae.cornell.edu/spotlights/robotics-revolution-will-be-soft)


Insect flight—still a mystery: The flight capabilities of insects are nature’s solution to locomotion in air, according to Prof. Z. Jane Wang, and there are general principles of locomotion and evolution we can learn from them. (https://research.cornell.edu/news-features/insect-flight-still-mystery)

NASA greenlights revolutionary Asst. Prof. Savransky satellite project: NASA has just greenlighted a project from Cornell University that is truly mind-blowing. (https://www.siliconrepublic.com/machines/nasa-satellite-star-wars)

Watch a robot improvise: A robot’s got to know its limitations. But that doesn’t mean it has to accept them. This one in particular uses tools to expand its capabilities, commandeering nearby items to construct ramps and bridges. (https://techcrunch.com/2018/05/31/watch-a-hard-working-robot-improvise-to-climb-drawers-and-cross-gaps/)

MAE’s Assoc. Prof. Max Zhang aims for impact in Ithaca and beyond: In an one-hour conversation with Zhang, the word “impact” came up no fewer than 10 times. It is clear that it is important to Max Zhang that his work matters—that it has a positive effect in the real world as soon as possible. (https://www.engineering.cornell.edu/magazine/features/max-zhang-aims-impact-ithaca-and-beyond)
The study of fluid dynamics is deeply complex. But it can also be beautiful, as Sarah Morris, a fifth-year Ph.D. candidate in Charles H. K. Williamson’s Fluid Dynamics Research Laboratories, has found. She studies the way counter-rotating vortex pairs interact with each other and with surfaces.

Her early research at Cornell involved using a vortex-generator facility, shining an argon ion laser in a sheet across a tank of water to characterize the vortices using both particle image velocimetry and laser induced fluorescence. The laser activated fluorescein dye that had been applied to two flaps which generated pairs of vortices in a tank of water, letting Morris visualize the way the vortices moved and interacted with a wavy, solid surface. The vortices, elegant in their symmetry, look like nautilus shells when they first interact with the surface; as they rebound away from the wavy wall, shapes like cross-sections of mushrooms emerge. Images from this experiment won Morris the Milton van Dyke Award (https://gfm.aps.org/meetings/dfd-2016/57d70d7f-b8ac3117910006e5) at the 2016 Annual Meeting of the American Physical Society Division of Fluid Dynamics.

Morris’ work yields more than beautiful images, of course. Her current work has shifted since the project that yielded the winning images. Before, she says, she was dealing with temporally-evolving vortices—that is, those that are created by a single event, and then change over time. Now she works with spatially-evolving vortex pairs, created by towing a triangular delta-wing through water. Those vortices are continually generated as the wing is towed. The difference, she says, is that “you also get an axial velocity profile through the core of the vortex.” The way that axial velocity profile changes when the vortex interacts with a wall is the current focus of her work. The goal is to understand the dynamics seen behind aircraft. “A lot of the instabilities that we can see in the lab you do actually see up in the air” behind aircraft, says Morris.

When airplanes are in close proximity to each other—say, at an airport, when they’re taking off—the pair of vortices that an airplane creates can pose a problem for an aircraft behind it. “If you have another aircraft flying through the vortex wake of the preceding aircraft, it can experience dangerous rolling moments,” Morris says, something that has caused crashes in the past. So one ultimate application for her work is learning how to break up those vortices more quickly. That could involve the creation of structures on the ground, which would “trigger the breakup of these vortex pairs,” she says.

Earlier this year, Morris was awarded an Amelia Earhart Fellowship, given to women pursuing doctoral degrees in aerospace-related fields. After she graduates, she hopes to continue her research, eventually running her own fluid dynamics lab.
WELCOME NEW FACULTY

Nikolaos Bouklas joined the faculty of the Sibley School of Mechanical and Aerospace Engineering in January. Bouklas most recently held a postdoctoral research position at the Institute of Mechanical Engineering of École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland.

Bouklas is interested in the fundamental study of soft materials, active materials and biomaterials, fracture and instabilities, as well as multiscale modeling in coupled multi-physical systems. “My work is at the intersection of engineering, materials science, mathematics, and physics,” says Bouklas. “All of these are necessary to finding the best way to predict what a material is going to do.”

Bouklas grew up in Thessaloniki, Greece, where he says he was always drawn to mathematics. At the age of eighteen Bouklas decided to study engineering. “I really liked math, but engineering was more alluring due to the applications,” says Bouklas. He earned a B.S. and an M.Eng. in Mechanical Engineering from the Aristotle University of Thessaloniki. It was during his years at Aristotle that Bouklas was introduced to finite element analysis and mathematical simulation.

“The group I worked with had a lot of programming, simulation, and design,” says Bouklas. “I got to see the level of mathematical sophistication needed to follow up with engineering tasks.” Bouklas knew he wanted to learn more “I have always wanted to learn more. Always,” says Bouklas during a recent conversation in his Upson Hall office.

“I considered graduate schools in Europe, but then I thought ‘if I’m going to go far for school, why not go really far?’” Bouklas answered his own question by moving to Austin, Texas and started a Ph.D. program in Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin. Academically and professionally, Austin was perfect for Bouklas. “UT is so strong in computational and solid mechanics,” he says. “I was very lucky to work with both Rui Huang and Chad Landis.”

While living in Austin, Bouklas also had the chance to indulge in his second love—jazz saxophone—but he never seriously thought about ditching engineering for music. “The best decision I ever made professionally was choosing between a path in music and a path in engineering. In science and in music there is always the excitement of looking for something new—but the career path in engineering is much safer,” says Bouklas with a small laugh.

During his doctoral studies at Austin, Bouklas created predictive computational techniques for understanding new soft materials. After earning his Ph.D., Bouklas stayed at UT-Austin for a two-year postdoc with Mark Mear at the Institute for Computational Engineering and Sciences (ICES). During this postdoctoral appointment he delved into fatigue failure for aerospace structures and generally learned more about how materials fail. From Austin, Bouklas moved to EPFL where he worked with William Curtin on cell and tissue modeling, and was also introduced to multi-scale predictive modeling of materials.

In 2018 Bouklas joined Cornell as an assistant professor in the Sibley School. “In coming to Cornell, I have the chance to work with people whose research I have followed for years,” says Bouklas. “There is such a modern approach to engineering here. I can see many applications of the predictive modeling tools I am working on. It is great to be in a place where the fundamentals are so strong and at the same time the focus is on the future.”

At Cornell, Bouklas will continue to focus on the fields of theoretical and computational solid mechanics. He aims to improve the fundamental understanding of materials and structures, and to enhance the predictive capabilities in relevant engineering applications.

He is currently co-teaching a class in Experimental and Applied Mechanics with Professor Matt Miller, also of the Sibley School. “Creating and co-teaching this class with Matt is great for me,” says Bouklas. “It is mostly juniors and they are starting to specialize, so this is the first class where they see all of the aspects brought together—theoretical, experimental, and computational. It is really interesting to talk with Matt as we plan the class and decide what will be most helpful to the students.”
There were signs early in Mahdi Esmaily’s life that he might end up a mechanical engineer. Growing up in Tehran, Iran, Esmaily’s neighborhood often had buildings under construction. “It was always fun for me to go and watch the heavy equipment,” says Esmaily. “Also, my father was always going to the library to learn things and he encouraged me to do the same. My older brother would bring math problems home from school and challenge me to solve them.”

Add to this mix a soldering iron that Esmaily used to fabricate things out of scrap metal, and you have a budding mechanical engineer.

Today Mahdi Esmaily is an assistant professor in the Sibley School. His research is focused on the study of emerging applications in cardiovascular mechanics and biological flows as well as on development of computational techniques for such problems. Cardiovascular disease is the biggest killer in the United States today. In addition to the human cost, there is also an enormous financial cost associated with the prevalence of heart disease. Some experts estimate the cost of cardiovascular disease in the United States will reach $1 trillion by 2030. Mahdi is working to build high-fidelity predictive tools that can be applied to the study of cardiovascular diseases and contribute toward improving current treatment methods and surgical techniques.

After earning his undergraduate and Master’s degrees in mechanical engineering at Tehran’s Sharif University of Technology, Esmaily moved to San Diego, where he earned his Ph.D. in mechanical engineering from the University of California San Diego. In 2014 he won the Outstanding Graduate Student Award from the MAE department.

At UCSD Esmaily began to focus on computational modeling. “In any physical system, the same sets of equations govern,” says Esmaily. “I used that fact to model blood flow through the cardiovascular system and then take what we learned and improve cardiac surgical design.”

Esmaily managed to improve what had been a trial-and-error process for surgeons involving shunt size, insertion points and angles. “If we can replace trial and error with data and engineering, why wouldn’t we?” asks Esmaily. This is the question that underlies Esmaily’s research.

As an undergraduate student Esmaily gained some experience working to fabricate new devices. The experience helped convince him that he should pursue an academic career. “As an academic,” says Esmaily, “you get to follow your own interests and work on your own ideas. This is not often true in industry.” After earning his Ph.D. in 2014, Esmaily moved on to a postdoctoral fellowship at the Center for Turbulence Research at Stanford. He held the fellowship for three years and then started at Cornell in January, 2018.

For Esmaily, deciding to come to Cornell was an easy choice. “The fluid mechanics program at Cornell is historically one of the strongest in the nation,” says Esmaily. “The people in the department have been very friendly and helpful. And I have some existing collaborations with researchers at Cornell Weill Medical.” Esmaily plans to use computer models to simulate and optimize an artificial heart. He will also create multi-scale models of red blood cells. With this work he hopes to reduce the risk of cardiac failure, arterial fibrillation, coronary occlusion, and stroke.

Esmaily began teaching a class in computational fluid dynamics in the Spring 2018 semester.
Zhitong Tian has joined the faculty of Cornell’s Sibley School of Mechanical and Aerospace Engineering as the Eugene A. Leinroth Sesquicentennial Faculty Fellow. Tian specializes in nanoscale thermal transport and energy conversion. She comes to Cornell after four years as an assistant professor at Virginia Tech.

“I am excited to be at Cornell,” says Tian. “Student quality is the key to implementing research ideas and students at Cornell are excellent. Also, being here gives me the chance to collaborate with world-class researchers from across the University.”

Tian grew up in southwestern China, where her parents were middle school teachers. “My parents believed that girls can do what boys can and they encouraged me to pursue higher education. They even brought me to visit top universities at the end of middle school and helped me set educational goals.”

Tian ended up attending a top university—Tsinghua University in Beijing—and earning her B.E. in engineering physics. While in Beijing, Tian received an offer for two years of support if she would come to Binghamton University and earn a masters in mechanical engineering. “It was such a good opportunity; I could not say no,” says Tian.

It was at Binghamton that Tian first studied molecular dynamics and heat transfer in condensed matter and started to look at nanoscale heat transfer. From Binghamton, Tian moved on to MIT, where she earned her Ph.D. in mechanical engineering working with Professor Gang Chen. “At MIT I started with modeling and moved into experimentation. Now my group conducts both modeling and experiments.” While earning her Ph.D., Tian also received the Graduate Women of Excellence Award and the Wunsch Foundation Silent Hoist and Crane Award for Academic Excellence.

After receiving her Ph.D. in 2014, Tian became an assistant professor of mechanical engineering at Virginia Tech. Tian was part of the Macromolecule Innovation Institute at Virginia Tech, where she worked with many chemists. “These interactions with chemists opened a new direction in my work,” says Tian. The “new direction” was soft materials. Her work would have significant application in organic solar cells, flexible electronics, and biomedical engineering.

“Studying nanoscale heat transfer in soft materials is incredibly challenging,” says Tian. “Despite the progress made in nanoscale thermal transport in hard matter, in soft matter it remains largely unexplored. The structural complexity and conformational variations pose some significant challenges on atomic modeling and experimental characterization.” Tian says the overarching goal of her research is to “advance the fundamental understanding of nanoscale heat transfer and energy conversion in hard, soft, and hybrid materials.”

Tian is teaching Introduction to Mechanical Engineering (ENGRI 1170) in the fall of 2018. “I like teaching—maybe because both of my parents were teachers,” says Tian. “Teaching is a way to impact the future. I also like having undergraduates in the lab—they sometimes come up with surprising and great ideas.”
Giving: Private gifts are essential and help to ensure the continued excellence, relevance, and impact of initiatives for MAE. To make a gift using the secure online gift form, please visit: www.giving.cornell.edu or a check made payable to Cornell University, may be mailed to: Cornell University, PO Box 25842, Lehigh Valley, PA 18003-9692. Please be sure to indicate your intention to designate your gift to MAE. Corporate matching gifts count as a gift from you and are a powerful way to double your giving. If your company has a matching gift program, please contact your HR director. Cornell’s financial advisors can assist you with a number of gift-giving tools designed to meet your family’s financial and philanthropic goals, including securities, trusts, bequests, and real estate. Please visit the Office of Trusts, Estates, and Gift Planning website: https://giving.cornell.edu/ways-to-give/.

Graduate Fellowships: Our goal is to provide funding to each first-year Ph.D. student and to provide fellowships as part of the startup for new faculty.

Digital Manufacturing Initiative: Purchase and maintain new, modern equipment (e.g. 3D printing, laser cutters, etc.) for the design and fabrication of engineered systems, particularly for undergraduate research and project teams.

Teaching Laboratory Specialist: Additional technical specialist in support of experiential learning, including instructional labs, shops, wind tunnels, and digital manufacturing.

Teaching Laboratory Fund: Add new and renew laboratory equipment used in student labs, which serve as a cornerstone of the Sibley School courses.

Design Lecturer: Professor of Practice to lead MAE design program, teach design courses, lead the M.Eng. program and provide liaison with industry.

Online Learning Initiatives: Develop a new series of online materials (lectures, problems, interactive sessions, simulations).

Research Seed Grants: Provide support for faculty to undertake new initiatives, new directions and interdisciplinary collaborations.

Distinguished Speakers Fund: To enable highly distinguished speakers to visit the Sibley School for the Colloquium and courses.

Student Projects: Provide support for undergraduate and M.Eng. student projects in design, project teams, or research.

Student Organizations such as ASME and AIAA: Provide support for outreach activities as well as travel to student conferences.