MESSAGE FROM THE CHAIR

Dear friends and colleagues of Tulane’s Department of Biomedical Engineering,

I’m delighted to introduce our Summer/Fall 2018 newsletter. Here we provide snippets of some of our successes, including an overview of our highly successful 40th anniversary celebration. As you will see, our department’s research and teaching missions continue to flourish. Several metrics provide evidence of this success, including approximately $500k/year of externally-supported research funding per research-faculty member, BME undergraduate numbers that are the largest we’ve had since the founding of the School of Science and Engineering, highly active graduate programs in Biomedical Engineering and Bioinnovation, and the successes of our recent graduates and alumni. I hope you will enjoy reading this newsletter, and please stay in touch! We would love to see you if you are traveling to New Orleans.

Sincerely,

Donald Gaver
Alden J. ‘Doc’ Laborde Professor and Chair
Department of Biomedical Engineering

Truss-Busting Competition

Students enrolled in Statics prepare to “bust their truss” in an annual competition on the effects of force. The students design and build their trusses utilizing CAD software and the Makerspace, and then load them to failure in a custom built testing apparatus. Winners are determined based on the amount of force the truss can withstand, the load-to-weight ratio and the best calculation accuracy for the amount of force needed to bust the truss.

New Orleans area professional engineers offer suggestions and choose a judges’ favorite. This year, judges included Rene Chopin and Jackie Sempel of Burk-Kleinpeter, Inc., and Tulane alums Jack Leary of Leary Engineering and Ryan Burks of RYCARs Construction, as well as guest judge Dr. Cedric Walker of the Makerspace. Statics is taken by first-year biomedical engineering students.
ALUMNI SPOTLIGHT: Sabrina Martucci Johnson

Sabrina Martucci Johnson is the Founder and Chief Executive Officer of DARÉ Bioscience, a company committed to the advancement of innovative products for women’s reproductive health.

She received her BS in biomedical engineering from Tulane University and a MS from the University of London. She is also a member of the Tulane School of Science and Engineering Advisory Board, the Tulane Biomedical Engineering Board of Advisors and the Bioinnovation External Advisory Committee.

Q: What are some of your memorable experiences at Tulane?
A: My most memorable experiences at Tulane were those quintessential Tulane and New Orleans experiences: Plum Street snowballs, crawfish boils, bands in the quad, Mardi Gras, outings in the French Quarter, movie night at McAlister Auditorium, and just hanging out with my friends.

Q: What is the first thing you think about when you think about BME at Tulane?
A: The first thing that comes to mind when I think about BME at Tulane is the senior design project. Our project was to build a mobility unit for someone in a full body cast - not a trivial task! I also remember how much I enjoyed the small class size and the close-knit group of friends we became. And, of course, I remember certain particularly memorable professors, like Dr. Cedric Walker.

Q: What research did you conduct at Tulane, and did it have any bearing on your career choice?
A: I participated in two research projects while at Tulane - one was the senior design project mentioned above, and in the second project I studied the rheological properties of the synovial fluid of the arthritic knee. Both were interesting in their own right, but one project was definitely more medical device centric, while the other was more applicable to development of a therapeutic product. I realized that I was more interested in therapeutic products as opposed to implants or devices, and that definitely guided the direction I took professionally.

Q: What has your career path been?
A: I started my professional career in research at Baxter Healthcare, where I worked on the development of recombinant proteins for therapeutic use, and optimization of the manufacturing process for such products. Specifically, I worked on their Factor VIII program for the treatment of hemophilia. While I loved the scientific aspects of the research, I realized that my personality was better suited to a more outwardly facing role than inwardly facing role, so I went back to school to get my MBA and transitioned to the business side of the pharmaceutical / biotechnology industry, in sales, marketing, and eventually finance and operations as Chief Financial Officer and Chief Operating Officer. I eventually became an entrepreneur and founded Daré Bioscience, Inc. in 2015, a company focused on advancing innovative products that address therapeutic gaps in women's reproductive health, where I am currently the CEO.

Q: When did you know you wanted to be an entrepreneur?
A: I am not one of those people who always wanted to be an entrepreneur, nor was I someone who woke up one morning and realized I wanted to be an entrepreneur for the sake of being one. Rather, I was (and am) passionate about ensuring that products that have the potential to advance healthcare for women actually make it to market so that women can benefit from the innovation. It occurred to me that I could personally play a role in ensuring that happened by starting a biopharmaceutical company focused squarely on women’s health. So that is what I did nearly 3 years ago, and, while it is definitely hard work and stressful being a public company CEO, it is worth every grey hair when I think of the impact the work we are doing can have on women.

Q: What advice do you have for undergrads?
A: Balance and diversity. A variety of interests and activities make for a better overall learning experience. Take advantage of all that a leading research institution like Tulane and a unique city like New Orleans have to offer. Work hard, but make sure you take time to really appreciate the one-of-a-kind opportunities available to you.

Q: What is your advice for those who want to follow your path?
A: If someone opens a door for you, walk through it. Be patient yet tenacious. There were several pivotal turning points in my career where I was asked to take on a role or project that was outside of the normal scope of work for...
CURRENT STUDENTS

ERIN BLAKE

In 2018, campaigning for president of the undergraduate student body is a digital process. While buttons are still handed out along McAlister Drive, profile picture filters are now available on social media platforms to show support, and a video campaign message is required. As a dual major in biomedical engineering and computer science, with considerable business and multimedia skills, senior Erin Blake was well prepared for the challenge.

Erin arrived at Tulane from Mobile, appreciating the similarities between the cities but also the unique offerings of New Orleans. She immediately embraced opportunities to be involved both inside and outside of the classroom. She has worked in Dr. Kristin Miller’s Biomechanics of Growth and Remodeling lab, as well as Dr. Donald Gaver’s Biofluid and Biotransport lab, through which she is currently working on a thesis project. She appreciates the experimental design experience of Dr. Miller’s lab, as well as the computational modeling of Dr. Gaver’s that currently allows interdisciplinary work for Erin, incorporating her computer science experience.

Her involvement on campus began with the Freshman Leadership Program, which launched Erin’s interest in student government. She has since served as a Senator for the School of Science and Engineering, Executive Vice President for the Undergraduate Student Government (USG), as well as leadership roles in Chi Omega and a global health-focused initiative. As President of USG, Erin’s goals reflect her understanding of her peers, including sexual violence prevention and diversity and inclusion. “Erin works hard to reach across various student groups and has worked collaboratively to advocate for students and work on key issues that impact the student experience,” explains Smita Ruzicka, Ph.D., Assistant Vice President for Campus Life.

After spending her senior year leading the approximately 8450 undergraduate students at Tulane, Erin hopes to continue in the 5th year master’s program in biomedical engineering.

ANTONIUS PRADER

When Antonius Prader came to Tulane University to study biomedical engineering he didn’t have to run far. A native New Orleanian, Antonius was dual-enrolled in Tulane as a high school student. He chose biomedical engineering because it allowed him to combine his love of mechanical engineering and sport. Antonius ran track and field for Tulane and he used this interest to fuel his research into commercially available orthotic inserts. He studied the relationship between fluid filled orthotics and plantar pressure in the physiology lab at the Center for Anatomical and Movement Sciences where he was mentored by Dr. Michael Dancisak. Antonius graduated in May 2018 with a BSE and MS in Biomedical Engineering and plans to take his skills into product development.

Antonius’s accomplishments include the American Athletic Conference All-Academic Team, Tulane Athletics Club Scholar Athlete, and Tulane Dean’s List. He served as a Maker Ninja in Tulane’s Makerspace, and as a teaching assistant for the capstone Team Design course, sharing his prototyping experience and contributing to numerous student projects’ success.

Most of Antonius’s time as a student was spent either in the lab or with track and field, but with his free time he likes to explore the latest computer tech or game on the Xbox. Antonius also collects shoes. He currently has 30 pairs and his favorite are a pair of Nike White Independence Day AirMax 90’s Hyperfuse. He loves New Orleans’s seafood, crawfish and snowballs and that New Orleans winters are summer weather.
Ashwin Sivakumar took a circuitous path to a PhD, but it was always focused. He was born in Chennai, India and moved to Singapore when he was 10. It was during high school in Singapore that a teacher mentioned biomedical engineering to combine Ash’s passions for human biology and problem solving. Biomedical engineering was a new field in Asia at the time, but it was exactly what Ash was looking for. Ash earned his undergraduate degree from the Milwaukee School of Engineering and a professor there suggested Tulane for graduate work because of its established BME department. Escaping Milwaukee’s snow was a major plus, though evacuating for Hurricane Issac his first weekend in town may have been too tropical.

Ash completed his graduate work in Dr. Michael Moore’s lab, researching a peripheral nerve-on-a-chip that could be used as a drug testing platform analogous to clinical trials. Along with another graduate student, Jason Ryans, he also developed a low-cost, rapid paper diagnostic device to detect for viruses from a biological sample. With departmental support and an NSF I-CORPS grant, they were able to convert the idea into a start-up and travel internationally to test their business hypothesis. While at Tulane Ash was the BME representative for the Graduate Student Association and an oral presenter at the World Biomaterials Congress.

Ash enjoys spending time at the gym and playing sports. He loves watching and analyzing movies, especially those by Christopher Nolan and Steven Spielberg. His friends claim he is a decent cook and he enjoys watching cooking shows for inspiration and new spices. Ash is also a photographer and hopes to one day take his photo-editing hobby to a new level.
The Tulane Department of Biomedical Engineering celebrated its 40th anniversary with a 3-day event. The celebration started with a panel discussion including past and present faculty, alumni and current students followed by a tour of the downtown laboratories at the John Bennett Johnston Building.

In the evening everyone gathered at the Audubon Zoo Tea Room for a gala dinner. Steve Gleason, former New Orleans Saint and ALS battler, was the Surhen lecturer.

On Friday the department hosted lab tours on the Uptown Campus and on Saturday the event was capped with tailgating before the Tulane homecoming game.

Department Gala
Thursday, November 2, 2017

A fun evening at the Audubon Tea Room offered an opportunity to reconnect with old friends and make new ones.

The department recognized former department chairs, department supporter Dr. James Korndoffer and outstanding alumnus Dr. Monroe Laborde. Tulane president Michael Fitts and Stephen M. Gleason were the guest speakers.

Read Steve Gleason’s full speech on our website: http://www2.tulane.edu/sse/bme/newsandevents/seminars/steve-gleason-speech-2018.cfm

1852
The first workable system for a binocular microscope developed at Tulane University.

1952
Tulane offers first biomedical engineering course.

1977
William Van Buskirk becomes first Department Head. First undergraduate class graduates.

1981
ABET Accreditation (seventh in nation – currently over 130 departments accredited).

1944
Engineering Professor James Cronvich begins biomedical collaboration with George Burch, MD, including electrocardiology and radiation’s effect on humans.

1960s
Engineering Professor John Martinez studies the causes and effects of whiplash in rear-end collisions with Dr. Jack Wickstrom in Orthopedics.

1980
First Senior Team Design Show.

1988
Move to Lindy Boggs Center. Team Design began developing assistive technology for clients with disabilities.
Department Conference and JBJ Lab Tours
Thursday, November 2, 2017
Former faculty and alumni gathered to share memories and advice with current faculty and students. Afterwards everyone gathered for refreshments and to tour the department’s downtown facilities at the JBJ.

Boggs Lab Tours and Reception
Friday, November 3, 2017
Tours of the Boggs Center for Energy and Biotechnology were offered to learn about current research projects.

Tailgating before the Homecoming Football Game
Saturday, November 4, 2017
Current and former members of the Tulane Biomedical Engineering community gathered in the Newcomb Quad before the homecoming game.

1991
Cedric Walker becomes Department Chair.

1996
All students had Macintosh laptop computers as part of curriculum.

1997
Richard Hart becomes Department Chair.

2001
Boggs 241 Teaching Laboratory created to allow active learning.

2006
Donald Gaver becomes Department Chair. Center for Anatomical Movement Studies developed and gross anatomy lab required for all BMEN students.

2007
BME develops Design Studio.

2012
Interdisciplinary Bioinnovation PhD Program started.

2013
BME leads the development of the Tulane Institute for Integrative Engineering for Health and Medicine on the Health Sciences campus.

2016
MakerSpace opens in former centralized machine shop.
40 Years of Tulane Biomedical Engineering

At our 40th Anniversary celebration, we enjoyed discussions of several eras of our existence with founding Department Head William C. Van Buskirk, former Chairs Cedric Walker, Richard T. Hart, and current Chair Donald Gaver, and students from each of those eras.

The BME faculty have changed over the years.

BME staff members are huge collaborators and make our ambitions a reality.

From left to right: Cindy Stewart, Michelle Smith, Lorrie McGinley, Rebecca Derbes, John Sullivan and Rosanna Chavez.
We’ve developed the Center for Anatomical and Movement Sciences (CAMS) and expanded our design programs.

The Center for Anatomical and Movement Sciences (CAMS)

Professor Mic Dancisak
Director

Monroe Laborde, MD
Collaborator

Biomedical Engineering Design

Lars Gilbertson
NewDay Professorship
Carnegie Fellow

Ronald Anderson

Mic Dancisak

Katherine Raymond

James Korndorffer, MD in The Tulane Center for Advanced Medical Simulation and Team Training.

Innovation and Entrepreneurship

We have expanded our focus on technology development, leading to a new Interdisciplinary PhD program in Bioinnovation with collaboration between the NSF and the FDA which builds on our strengths in innovation and entrepreneurship.

Tulane Institute for Integrative Engineering for Medicine

A Center Focused on Interdisciplinary Collaboration

The Tulane Institute for Integrative Engineering for Health and Medicine on Tulane’s Health Sciences campus puts us in direct contact with clinical faculty.

In the last five years research funding has tripled. In addition, our vibrant environment has induced a 35% increase in student demand over the last three years.
GRAND CHALLENGES

All Tulane biomedical engineering students participate in a year-long research project starting the spring semester of their junior year. Some students participate in an individual research project while other students join Grand Challenges and work as design groups. The 2017 Grand Challenges class was tasked with finding a way to consolidate the amount of equipment involved in a Total Knee Arthroplasty (TKA) procedure with the potential for improving surgical outcomes. This was chosen because the operating room equipment for a TKA has not been significantly changed in 50 years.

The 2017 Grand Challenges class was subdivided into three teams who explored the challenge from multiple perspectives. One team chose to work on a hands-free retraction system, which would redirect the labor in the operating room and reduce procedure time. Another team focused on consolidating the roughly 10 different size cutting blocks into one. This would reduce the number of trays that were required in the operating room, lowering sterilization costs. It would also decrease the amount of time required to size and resect the femur. The third team focused on enhancing the uniformity of the tibial alignment procedure by developing a laser light system to align the cutting block. The three projects can be used to reduce the number of instruments and free operating staff, potentially reducing costs and improving outcomes.

The 2017 Grand Challenges class presented their work in February 2018 at the 16th Annual Biomedical Engineering Undergraduate Research and Design Conference.

Lusher Students Visit CAMS

Students from the Lusher Charter High School PLTW - Biomedical Sciences- Medical Interventions Program visit the Center for Anatomical and Movement Sciences (CAMS). In addition to anatomy classes for Tulane students, the Center, led by Michael Dancisak, hosts lab visits from multiple schools in the surrounding area.
Dr. Kristin S. Miller Receives an NSF CAREER Award

Dr. Kristin S. Miller received an NSF CAREER Award titled “CAREER: Determining the dynamic role of elastic fibers in cervovaginal adaptations” for $500,000 over five years. The project will support an integrated research and education program to determine the role of elastic fibers in the soft tissues of the female reproductive system. The CAREER is the National Science Foundation’s most prestigious award in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

Elastopathic mice will be used to assess how elastic fibers influence adaptations in response to changes in tissue mechanical pressure of the reproductive organs. Vaginal and cervical tissue will be cultured up to a week with being exposed to various intraluminal mechanical pressures, with biaxial mechanical testing, and histochemical and biochemical analysis at several time points.

Experimental data will provide insight into the microstructural changes that occur and how that affects the strength/integrity of the tissue, along with elastic fibers role. This will aid in developing a mathematical model that can predict changes in the tissue assisting in developing preventative and treatment strategies for pelvic organ prolapse and preterm birth.

Dr. Michael Moore Appointed to NIH Panel

Dr. Michael Moore was appointed to the National Institutes of Health (NIH) Bioengineering of Neuroscience, Vision and Low Vision Technologies (BNVT) study section for a four-year term.

The panel reviews grants related to the nervous system and eye that have a significant technological or engineering component and determines funding. Being on an NIH panel is a sign that one is considered an expert in the field and part of one’s service to the profession.

Research Updates • Honors & Awards • Innovative Projects

Damir Khismatullin’s laboratory demonstrated in recent in vitro and in vivo studies that mechanical disruption of cancer cells induced by high-frequency vibration breaks cancer chemoresistance and, when combined with drugs that interfere with pro-survival signaling, decreases their metastatic potential.

J. Quincy Brown, the former Paul H. and Donna D. Flower Early Career Professor in Engineering, received tenure and a promotion to Associate Professor!

Kristin Miller and Akinjide Akintunde published a paper in the journal Biomechanics and Modeling in Mechanobiology titled “Evaluation of microstructurally motivated constitutive models to describe age-dependent tendon healing.”

Carolyn Bayer was awarded a $160,000 Research Competitiveness Subprogram Grant from the Louisiana Board of Regents.

Donald Gaver received an NSF grant titled “Multi-scale modeling of multiphase flows and fluid-structure interactions in the lung” which will assess the micro-mechanical state of the lung during forced mechanical ventilation.

Yu-Ping Wang co-chaired the student award committee and organized a special session, Integration of Multiscale Heterogenous Biomedical Imaging and Genomic Data, at the 2018 International Symposium on Biomedical Imaging in Washington, D.C.

Michael Moore’s startup company, AxoSim, was awarded a $1.7M Small Business Technology Transfer (STTR) grant from the NIH.

Joseph Bull published a paper in the journal Computer Methods in Biomechanics and Biomedical Engineering titled “Small-bubble transport and splitting dynamics in a symmetric bifurcation.”

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LinkedIn UPDATE

There are now more than 650 Tulane BME alumni, students, and faculty members in the “Tulane Biomedical Engineering Students and Alumni” group on LinkedIn.com.

If you’re already a member of LinkedIn, it’s easy to join. Just type “Tulane Biomedical” in the “Groups” search box at the top of the LinkedIn home page.

Keep Up With The Latest News

The BMEN web site is frequently updated with news about our students and research.

Get the latest updates at http://tulane.edu/sse/bme/newsandevents/.

One of the ranking metrics used by Google and other search engines is “popularity” as measured by the number of referring web sites. If you control a personal or business web page, please consider adding a link to your alma mater: http://tulane.edu/sse/bme/.