Laissez les bons temps rouler! As I write this during our Mardi Gras break, I can’t help to think that these are very good times for Biomedical Engineering at Tulane, and I’m happy to share some of our excellent news with you. Our department has many new faculty members, whom you’ll meet on these pages. In the last year we have received new grants from federal, state and foundations. We are extremely proud that Professor Michael Moore was awarded a prestigious NSF CAREER Award to develop integrated models of neuronal axon guidance. Our undergraduate BME population is at a six-year high, and we continue to be one of the most popular majors in the School of Science and Engineering.

In this newsletter we are celebrating Professor David Rice’s contributions to our department on the occasion of his retirement. Dave has been a faculty member in Biomedical Engineering at Tulane for 31 years. In this time, our students and the New Orleans community have benefited enormously from the passion and intellect Dave has provided in his guidance of projects that aid individuals with disabilities. Going forward, we intend to honor and expand upon Dave’s groundbreaking work in service learning through the teaching of Team Design.

We are fortunate to have hired Professor Lars Gilbertson, who is extremely well prepared to lead this program. Lars earned his Ph.D. at the University of Iowa, and before coming to Tulane last year, he was Director of the Spine Research Laboratory at Cleveland Clinic. Lars wrote our lead story about Dave, and the respect and admiration we all have for Dave comes through so strongly in Lars’ tribute.

To celebrate Dave’s contributions, we are holding a Biomedical Engineering Design Symposium on April 13, 2012. Former faculty and students who specialize in design will present their views of modern BME design practices and pedagogy. We are looking forward to this as both a joyous and intellectually stimulating event, and we hope that you will be able to attend.

Tulane’s Board of Administrators has created the David A. Rice Design Endowed Fund in Biomedical Engineering, which will help to support our design program. This endowment was initiated by a major donation from the Almar Foundation. We would be delighted to accept additional donations to this important endowment, and have included an easy to use pledge form in this newsletter.

I want to thank the contributors to this year’s newsletter: Taby Ahsan, San Aung, Ben Cappiello, Lars Gilbertson and Annette Oertling. Cedric Walker was the editor, and our amazing Executive Secretary, Cindy Stewart, contributed countless good ideas and handled all of the logistics of putting it into your hands. We hope that you enjoy what they’ve done, and if you are in the New Orleans area, please come by to see for yourself!

With best wishes,

Donald Gaver
Chair, Department of Biomedical Engineering
Team Design Under the Aegis of Prof. David Rice

In New Orleans, the social and cultural highlight of the season - Mardi Gras - is neatly bookended by two dazzling Tulane BME student showcases: the Undergraduate Research and Design Conference in January and the Senior Team Design Show in March. These two forums represent the professional debuts of the graduating BME seniors in independent and team-based research and design. The individual senior project and thesis has been a BME requirement since the department’s founding in 1977, and the team design project has met the capstone design requirement since the early 1980s.

Prof. David Rice arrived at Tulane as a new faculty member in Fall 1981, the first academic year following the inaugural Senior Team Design Show. In his first semester, Prof. Rice experienced full immersion in the teaching of Team Design as co-instructor with Prof. Cedric Walker. In subsequent semesters, Prof. Rice moved on to the teaching of diverse other courses, ranging from Biomedical Acoustics, Biosystems, and Circuits, to Engineering Physics and Human Physiology.

In Fall 1987, Prof. Rice was again tapped to teach Team Design—this time on his own. As he taught, new ideas took shape that would change the direction of the course in the years to come. Team Design had been a semester-long course, with the Senior Team Design Show in early Spring bringing the students’ exciting efforts to what seemed to Prof. Rice to be a “premature close—and a waste of talent”. What type of project could sustain student interest over the entire senior year? What new pedagogical content should be added? What would be the deliverables? How to fund? Anticipating Tulane’s commitment to service learning by two decades, the revamped Team Design course of the 1988-89 academic year was launched, dedicated to the purpose of developing assistive technology for persons with disabilities. Bolstered by extramural support that Prof. Rice secured from the National Science Foundation, BME Team Design sought out and found clients in the New Orleans area with disabilities and technological needs that were not being addressed by available state and local resources or by any commercially available device. The disabilities were formidable—stroke, cerebral palsy, autism, paraplegia—but the students found inspiration in the clients and families and caregivers, compelling the design teams to greater imagination and effort.

Pedagogically, the design teams received new tools to help them to accomplish more for their clients: project management skills, ideation and brainstorming strategies, analytical problem solving techniques and more. Best of all, the year-long course went beyond design to the actual construction and delivery of innovative products to the client. The devices and systems passed a rigorous safety review by a faculty panel, and then were delivered to the clients together with user-friendly instruction manuals.

The success of these early projects was immediately and emphatically made apparent through the enthusiastic feedback from the clients, families, and caregivers. As word spread in the New Orleans community about the Tulane BME Team Design program, a new wave of persons with disabilities and their families began to inquire: Would the program be offered again next year, and could they be involved as clients?

A series of exciting and informative news items appeared in the media year after year, featuring the student design teams with their grateful clients, front and center. As a result of their involvement in the team design course, the students looked with fresh perspective (and enhanced credentials) towards potential careers in medical device design. The course has been reprised and enhanced every year, with new clients and new course content geared towards helping the students serve the clients with even greater excellence.

What is the future of Team Design at Tulane? Prof. Rice has been preparing for that in this academic year, even as he looks ahead to retirement. Under Prof. Rice’s mentorship, recent Tulane faculty recruit and co-instructor of this year’s Team Design course, Prof. Lars Gilbertson, is “learning the ropes” in preparation for teaching the course solo next year. “I’m continually amazed at what Prof. Rice and students have accomplished and continue to accomplish in the area of assistive devices for persons with disabilities—it has expanded my thinking as to what is possible.” Asked what he will do to put his own stamp on what has become a legendary course, Prof. Gilbertson responded, “With this strong program in place and very able student body, I believe we can do something to help our returning veterans with post-traumatic stress disorder (PTSD).” More broadly, our challenge will be to continue to innovate, as Prof. Rice and students have done for many years.”

To assure that there will be resources for this and other service-learning projects in future years under Prof. Gilbertson’s guidance, the Department has created the David A. Rice Design Endowed Fund. The Chair’s Letter explains how friends and alumni can help secure this endowment.

In the current 2011-12 academic year, Prof. Rice is guiding eight more design teams - 31 students - through the process.
LINDSEY SHEPARD ’11

Lindsey came to Tulane from Albuquerque, NM in 2007 on a full scholarship for volleyball and to study biomedical engineering. She was a four year member (and senior captain) of the Varsity Volleyball team, helping lead them to their first two national tournaments in school history while putting herself in the Tulane record books. She was Tulane’s female Scholar Athlete of the Year in both her junior and senior years.

Upon graduating, Lindsey was hired into a competitive program at NASA as a Biomedical Flight Controller. After rigorous training, taking many of the same training courses as the astronauts, she became a member of the Flight Control team. She provides engineering support to astronauts on the International Space Station and she must be just as familiar with the equipment on the ISS as the astronauts, if not more, so that she can monitor and fix the equipment from her post in Houston.

The primary function of her position as a Biomedical Flight Controller is to ensure astronaut health and safety by providing operational and engineering support to the biomedical and environmental systems. She is an integral part of a team that manages three important systems: the health maintenance system, the environmental health system, and the countermeasures system. She must have a strong understanding of all of the hardware and software within these systems so she can provide real-time support to the astronauts if they need assistance troubleshooting equipment or executing procedures on the ISS. She cites that she never would have been able to end up in such an exciting career straight out of college were it not for the top notch education she received from the biomedical engineering department at Tulane.

LINDSEY SHEPARD says, “she never would have been able to end up in such an exciting career straight out of college were it not for the top notch education she received from the biomedical engineering department at Tulane.”

RUSTY PICKERING ’91

Rusty came to Tulane in 1987 with a Dean’s Honor scholarship to study biomedical engineering. After graduation, Rusty went on to earn his JD from the University of Texas School of Law. He’s now a senior partner with the law firm of Nelson Mullins Riley & Scarborough LLP, based in their Atlanta office.

Rusty represents technology and other companies from early stage start-ups to mid-sized public companies. He serves as outside general counsel, and assists with raising seed and venture capital, mergers and acquisitions, and with intellectual property, licensing and contracting matters. Rusty attributes much of his success in working with high-tech companies to his biomedical engineering degree from Tulane. He regularly says that his BME degree has done more for him in his legal career than his law degree, as there are very few corporate lawyers with a deep working knowledge of technology.

Rusty is very active in the Tulane community, currently serving as the Vice President of the Tulane Alumni Association and Co-President of the Tulane Alumni Association of Atlanta. Earlier in his career, he was the in-house general counsel of a NASDAQ traded financial technology company. He also currently serves as outside general counsel to the Morale Entertainment Foundation. Rusty became involved with Morale though his service on the Tulane Alumni Board with Morale founder Tom Lee (E’76). Last year, Rusty helped the foundation organize the inaugural Carrier Classic, a college basketball game played on the deck of the USS Carl Vinson in San Diego in honor of Veterans Day.

RUSTY PICKERING (left) recently spent 10 days visiting US troops in the Middle East with Apollo astronauts Neil Armstrong, Jim Lovell, and Gene Cernan. He is pictured above with Jim Lovell, commander of Apollo 13.

START UPS

New ventures from two recent BMEN grads, Will Kethman and Ben Cappiello, are featured on the School of Science and Engineering’s web site, along with chocolate toothpaste and cellulose nanospheres.
FEATURED STUDENT

Krisen Lynch

Kristen enjoys the independent and creative aspects of research. So after completing her PhD, Kristen intends to do a postdoctoral fellowship to help her decide whether to pursue a future in academia or industry.

Faculty News

Mic Dancisak is working with local podiatrist Dr. Leon Shingledecker to develop a new dynamic orthotic device for “turf toe” (hallux rigidus).

Through two service learning courses offered by Annette Oertling in the fall of 2011, 28 Tulane students mentored 10 middle-school FIRST Lego League robotics teams and assisted in hosting a qualifying tournament for New Orleans and the Regional Championship attended by 58 Louisiana teams.

Ronald Anderson’s Biomedical Engineering Design Studio course introduced the practical implementation of state-of-the-art fluid-structure analysis, now opening the door for expansion of departmental research in areas such as microfluidics, whereby red blood cells, serum, and vessel walls may be analyzed as interacting components of a true anatomy.

Taby Ahsan’s Stem Cell Laboratory had four podium presentations at the annual meeting for the Tissue Engineering and Regenerative Medicine International Society meeting in Houston, TX.

Damir Khismatullin’s laboratory has been developing a novel, focused ultrasound-based method for minimally invasive treatment of large and aggressive tumors. The results of their recent collaborative work with the Food and Drug Administration have been recently published in “Physics in Medicine and Biology.”

San Aung celebrated his 75th birthday last Fall, while once again teaching Mechanics of Materials to BME and Engineering Physics students.

Lee Murfee’s laboratory discovered a new marker for cell types involved in blood vessel growth. Their discovery was featured as a cover article in Microvascular Research.

Donald Gaver and his students Will Glindmeyer and Bradford Smith published the paper “In Situ Enhancement of Pulmonary Surfactant Function Using Temporary Flow Reversal” in the Journal of Applied Physiology. This led to an editorial in JAP “Could dynamic ventilation waveforms bring about a paradigm shift in mechanical ventilation?”

Cedric Walker’s new Freshman course The Edge of Medicine brought over 30 students to Tulane Hospital to observe high-technology surgical procedures firsthand.

Yu-Ping Wang spent his summer as a visiting professor in Shanghai under the Eastern Scholar Professorship supported by Shanghai University for Science and Technology, where he delivered lectures and conducted joint research on genomics and bioinformatics.

An article “Integrated separation of blood plasma from whole blood for microfluidic paper-based analytical devices” published by Sergey Shevkoplyas’ laboratory in Lab on a Chip quickly became one of the most accessed articles from the online version of the journal.

Michael Moore was awarded a Faculty Early Career Development Award by the National Science Foundation to support his research and educational activities. The CAREER Award included funds totaling $450,000 for his research on “Integreted Models of Neural Axon Guidance.” Prof. Moore was also selected as “Teacher of the Year” by the Class of 2011.
**Tulane research on how blood vessels grow is highlighted on the cover of an upcoming issue of the scholarly journal Microvascular Research. Peter Stapor, a graduate student in Dr. Lee Murfee’s Microvascular Dynamics Laboratory, was first author of “Identification of class III β-tubulin as a marker of angiogenic perivascular cells.”**

Angiogenesis, the process of how blood vessels grow, is a common denominator for many disease states. Understanding this complex process requires knowing when and where specific cells are present. Two cell types that are involved are endothelial cells and vascular pericytes, but our knowledge about the interaction between these cells is limited by the inability to identify them. Stapor’s study highlights the discovery of a new cell marker that can potentially be used to identify vascular pericytes during the critical stages of vessel growth. The cover image shows vascular pericytes positively expressing this marker along growing vessels.
BME Staff And Students Inspire Next Generation Of Engineers

Every year, Lorraine McGinley and Megan Ohar, staff members in the Biomedical Engineering Department, assist in running the 3-day FIRST™ Robotics Competition (FRC) Bayou Regional. FIRST (For Inspiration and Recognition of Science and Technology) strives to inspire young people to be science and technology leaders, by engaging them in exciting mentor-based programs that build science, engineering, technology, and math (STEM) skills that inspire innovation and that foster well-rounded life capabilities including self-confidence, communication, and leadership. At the 2012 Bayou Regional on March 15-17, 48 teams from 7 states will come to New Orleans, one of 70 FRC competitions being held worldwide that involve almost 60,000 high school students. Since the kick-off on January 7, students have been working with a common kit of parts to engineer sophisticated robots that perform prescribed tasks against a field of competitors.

At the Bayou Regional, McGinley’s accountant skills come in handy as the tournament scorekeeper and Ohar’s experience as a lab supervisor serves her well as the lead team queuer, directing the movement of teams on and off the field. “Just seeing the kids and watching them learn thrills me,” McGinley says. “They are having so much fun, they don’t even realize how much they are learning.” Ohar feels that the earlier students become interested in science and engineering, the better. “I’m happy to volunteer my time when it exposes kids to these subjects at a time when they can still make the (academic) choices needed,” she says.

McGinley also volunteers as the tournament scorekeeper at the annual FIRST™ LEGO™ League (FLL) state competition for middle school students. Held every fall, the 2011 event hosted 58 middle school teams that were introduced to real-world engineering challenges by building LEGO-based robots to complete tasks on a thematic playing field. Ohar assists with mentoring a team of Girl Scouts that participate in the FLL competition each year. This team is sponsored by the Society of Women Engineers professional chapter, of which Ohar is a member.

McGinley has volunteered at the FIRST™ Robotics Competition (FRC) Bayou Regional since 2007 and is looking forward to next year. “I do it for the sheer pleasure of watching these kids have fun while learning,” she said. “You would think it was a sporting event by their spirit.”

Interested in learning more? Contact Annette Oertling (annette@tulane.edu), Professor of the Practice affiliated with the BME department and Assistant Dean for K-12 Outreach in the School of Science and Engineering.

Tulane and Engineering World Health

Four Tulane BMEs have volunteered with Engineering World Health (ewh.org), a non-profit organization that mobilizes the biomedical engineering community to improve the quality of health care in hospitals of the developing world.

Justin Cooper (BSE/MSE ’09) now works for EWH where he manages the day-to-day operations of the Biomedical Equipment Technician (BMET) Training Program in Honduras. He joined EWH in April 2009 as a Student Programs Coordinator, and is excited to now be involved in training BMETs abroad. He has worked with EWH in Haiti, Ethiopia, Honduras, Ghana, and Rwanda. Justin taught electronics and embedded controllers as a Teaching Assistant for Cedric Walker, and he now teaches through the EWH BMET training program in Rwanda and Honduras.

Bob Lathrop (BSE ’11) spent the Summer of 2010 at Mt. Meru Hospital in Arusha, Tanzania. The hospital has 500 beds and up to 30 doctors, but no technicians to look after equipment. “We were able to repair a total of 57 pieces of equipment—anything from small fixes like sphygmomanometers and emergency lights for use in case of power outage, a common problem, to a few larger items such as autoclaves, oxygen concentrators, phototherapy lights and even an electroscopy unit,” Lathrop says.

Angela Czesak ’13 (at left in the photo) and Aubrey Kraft ’13 both spent their summer vacations at EWH partner hospitals in Tanzania fixing autoclaves, incubator doors, suction pumps, blood pressure cuffs, three-phase wiring and even tea kettles. Angela will return to Tanzania this coming summer, with a Gordon Summer Fellowship, to work with Global Cycle Solutions developing local technologies with a focus on agricultural products. “I have loved my experiences in Africa so far,” Czesak says. “It’s a place I know I can really help out in. Why not do it where it’s needed most?”

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LinkedIn UPDATE

There are now more than 430 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/
Appendix  
2011 Annual Report  
Department of Biomedical Engineering

Faculty  
Nicholas J. Altiiero, Professor and Dean of the School of Science and Engineering  
Taby Ahsan, Assistant Professor  
Ronald C. Anderson, Associate Professor  
Michael Dancisak, Senior Professor of the Practice and Director of the Center for Anatomical and Movement Science  
Donald P. Gaver, Alden J. ‘Doc’ Laborde Professor and Department Chair  
Lars G. Gilbertson, Professor of the Practice  
Damir Khismatullin, Associate Professor  
Michael J. Moore, Professor of the Practice  
Walter Lee Murfee III, Assistant Professor  
David A. Rice P.E., Associate Professor and Director of Undergraduate Studies  
Sergey S. Shevkoplyas, Assistant Professor  
Yu-Ping Wang, Associate Professor  

Emeritus Faculty  
Paul L. Nunez, Professor Emeritus  
William C. Van Buskirk P.E., Professor and Chair Emeritus of Biomedical Engineering, Dean Emeritus of Engineering  

Affiliated Faculty  
San Aung, Professor of the Practice  
Annette Oertling P.E., Professor of the Practice and Assistant Dean

Archival Publications in 2011

Ronald C. Anderson, Associate Professor  

Donald P. Gaver, Alden J. ‘Doc’ Laborde Professor and Department Chair  


Damir Khismatullin, Associate Professor  
Archival Publications in 2011

*Michael J. Moore, Paul H. and Donna D. Flower Early Career Professor, Assistant Professor*


*Walter Lee Murfee, Assistant Professor*


*Sergey S. Shevkoplyas, Assistant Professor and The Ken and Ruth Arnold Early Career Professor in Biomedical Engineering*


*Yu-Ping Wang, Associate Professor*


Active Funding in 2011

Agency: National Institutes of Health
Type: Individual Investigator Award (R01-HL81266)
Title: Engineering Ventilation Waveforms to Reduce Atelectrauma
P.I.s: Donald P. Gaver
Duration: 6/1/06-5/30/12

Agency: Louisiana Board of Regents
Type: Post-Katrina Support Fund Initiative
Title: LONI Institute
P.I.s: Seidel, E. (LSU), Co-I: D. Gaver, R. Cortez
Duration: 10/07-10/12

Agency: NSF
Title: A Two-Color mu-PIV/LIF System to Measure Unsteady Two-Phase Flow and Surfactant Transport Relevant to the Lung
P.I.s: D. P. Gaver
Duration: 1/11-12/14

Agency: NSF-RTG (DMS-1043626)
EMSW21: RTG: Mathematical and Computational Biofluids
P.I.s: L. Fauci, Co-I’s: R. Cortez, D. P. Gaver
Duration: 6/11-5/16

Agency: Louisiana Board of Regents, Research Competitiveness Subprogram (BoR-RCS).
Title: Parallel algorithms for the simulation of cellular deformation and adhesion.
P.I.s: Damir Khismatullin
Duration: 06/01/2011 – 06/30/2014.

Agency: National Institutes of Health – NINDS
Type: R21 NS065374
Title: Localized immobilization of ephrin-B2 for neurite guidance in 3D culture
Status: In one-year no-cost extension
P.I.s: Michael Moore
Duration: 6/1/2009 – 05/31/2012

Agency: Louisiana Board of Regents Support Fund
Type: LEQSF(2009-10)-RD-A-18
Title: Engineered Tissue Culture Micro-Environments for Studies in Axon Regeneration
P.I.s: Michael Moore

Agency: National Science Foundation
Type: CBET-1055990
Title: CAREER: Integrated models of neural axon guidance
P.I.s: Michael Moore

Agency: NIH Centers of Biomedical Research Excellence COBRE (Role: Junior Investigator)
Title: Tulane COBRE in Hypertension and Renal Biology
PI: L. Gabriel Navar, Walter Lee Murfee
Duration: 07/10 - 06/12 (for subproject)
Active Funding in 2011

**Agency:** Louisiana Board of Regents  
**Title:** Identification of Lymphatic Vessel Structure and Function in Adult Microvascular Networks  
**PI:** Murfee WL  
**Duration:** 06/09 - 06/12

**Agency:** Subcontract from Beth Israel Deaconess Medical Center  
**Type:** under NIH 1 R01 HL096795-01A2  
**Title:** Modulation of erythrocyte function by complement  
**P.I.s:** Ionita C. Ghiran, Sergey Shevkoplyas  
**Duration:** 05/01/2011 – 02/28/2015

**Agency:** Subcontract from Antek Inc., Phase I STTR, U.S. Army  
**Type:** USAMRAA  
**Title:** Automated blood component separator  
**P.I.s:** Sergey Shevkoplyas  
**Duration:** 11/01/2010 – 04/30/2011

**Agency:** National Blood Foundation  
**Title:** The relationship between the ability of stored red blood cells to perfuse microvascular networks and their 24-hr post-transfusion recovery *in vivo*  
**P.I.s:** Sergey Shevkoplyas  
**Duration:** 07/01/2010 – 06/30/2012  
**Project Title:**

**Agency:** Subcontract from the President and Fellows of Harvard College  
**Title:** Zero-cost Diagnostics  
**P.I.s:** George Whitesides, Sergey Shevkoplyas

**Agency:** NIH 1R15GM088802-01  
**Title:** Accurate detection of chromosomal abnormalities with multi-color image processing,  
**P.I.s:** Yu-Ping Wang  
**Duration:** 09/21/2009-8/20/2012.

**Agency:** NIH 1R21LM010042-01  
**Title:** A New Paradigm for Integrated Analysis of Multiscale Genomic Imaging Datasets  
**P.I.s:** Yu-Ping Wang  
**Duration:** 07/01/2009-06/30/2012

**Agency:** NSF, DBI 0849932  
**Title:** Multiscale Genomic Imaging Informatics  
**P.I.s:** Yu-Ping Wang  
**Duration:** 12/01/2009-11/30/2012.

**Agency:** Ladies Leukemia League  
**Title:** Bioinformatics technique for accurate subtype classification of myelodysplastic syndrome (MDS)  
**P.I.s:** Yu-Ping Wang  
**Duration:** 06/01/2011-05/30/2012
### Theses and Dissertations completed in 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Degree</th>
<th>Chair</th>
<th>Title</th>
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<tr>
<td>2011</td>
<td>Jacob, Anne Marie</td>
<td>PhD</td>
<td>Donald Gaver, Chair</td>
<td>Pulmonary epithelial plasma membrane rupture and barrier function disruption during airway reopening</td>
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<td></td>
<td>Liu, Xun</td>
<td>MS</td>
<td>Michael Moore, Chair</td>
<td>An automated method of detecting ocular manifestations of cerebral malaria</td>
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<td>Martin, David</td>
<td>MS</td>
<td>Donald Gaver, Chair</td>
<td>Evaluating pulmonary epithelial cell damage near a bifurcation in a model of airway reopening</td>
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<td>Rodell, Christopher</td>
<td>MS</td>
<td>Michael Moore, Chair</td>
<td>On the characterization and utility of photolabile chemistries in biomaterial applications</td>
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<tr>
<td></td>
<td>Smith, Brad</td>
<td>PhD</td>
<td>Donald Gaver, Chair</td>
<td>Lagrangian analysis of surfactant transport processes in experimental and computational models of pulsatile airway reopening</td>
</tr>
</tbody>
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