

FALL/WINTER  
2017/2018

# CLEMSON<sup>®</sup>

## CHEMICAL AND BIOMOLECULAR ENGINEERING

### Alumni, Faculty, Staff and Students Celebrate 100 Years of Chemical Engineering at Clemson University



In November, the 100th anniversary of chemical engineering at Clemson University was marked with a full day of events that began with a campus tour, included lively stories of years past and ended with an alumni dinner.

The days' events included a tour of campus and Earle Hall and a luncheon in the president's box at Memorial Stadium featuring a talk by Tony Elliott, co-offensive coordinator and running backs coach for the Clemson Tigers. Later, attendees went to a research seminar at the Watt Innovation Center with Dr. Tony McHugh, the Ruth H. and Sam Madrid Professor at Lehigh University. Dr. McHugh was the inaugural speaker of the Dan Edie Distinguished Lectureship series. This lectureship was established through an endowment that honors Dr. Dan Edie's career as a teacher and researcher in the Chemical and Biomolecular Engineering Department. The 100th anniversary event ended in the evening with an alumni dinner and a presentation in the Madren Center, which highlighted key milestones for the department.

(continued...)



Department Chair Dr. David Bruce with past chairs Doug Hirt, Charles Gooding, Dan Edie, and Charles Barron.



Clemson Tigers co-offensive coordinator and running backs coach Tony Elliott spoke at the luncheon.





Dr. Tony McHugh with Dr. Dan Edie.

Chemical engineering was first introduced at Clemson in the 1917-18 academic year. The course of study died out after the 1924-25 academic year and returned in 1933.

Much has changed since the program's early days. Chemical engineering has grown from four graduates receiving Bachelor of Science degrees in 1923 to 73 this year, a 1,725 percent increase. Their average starting salary has grown from about \$2,100 a year to \$70,000 a year, an increase of more than 3,233 percent. In the same period, the program has gone from zero graduate students to 55 Ph.D. students this year, and research expenditures have grown from zero to more than \$4 million per year.

When the program first began, Clemson was a male-only military college. This year, a third of the students in the Department of Chemical and Biomolecular Engineering are female. Susan Glen Herrington, Class of 1970, was the first female Clemson graduate to receive a B.S. in Chemical Engineering, and Beth Gainey Stoner in 1991 became the first female at Clemson to receive a Ph.D. in chemical engineering from the University. Dr. Rachel Getman was promoted to associate professor this year, making her the department's first female professor to receive tenure.



Pictured here are Bacil Dickert and Joe Alexander from the Class of 1955.



Victor Lopez Lindo (Class of 1966) and his wife Beatriz traveled from El Salvador to attend the event.

Clemson received \$1.175-million from the Olin Foundation in 1958 to construct Earle Hall, and the building remains the home of chemical engineering. The department acquired its current name in 2005 when biomolecular engineering was added to what was then the Department of Chemical Engineering. The department's largest grant came in 1998 when the National Science Foundation provided \$29 million to establish the Center for Advanced Engineering Fibers and Films. Prof. Dan Edie served as center director before handing the reins over to Prof. Douglas Hirt. Dr. Amod Ogale became director in 2009 and remains in that role today.

Dr. Hirt became chair of the Department of Chemical and Biomolecular Engineering in 2009 before stepping aside in 2016 to become associate dean for research and graduate studies in the College of Engineering, Computing and Applied Sciences.

Dr. David Bruce assumed the Chair position after Dr. Hirt. "With a century behind us, we are well positioned for future success," he said. "I thank all who joined us to celebrate this momentous occasion." (Written by Paul Alongi)



During the alumni dinner, the Class of 1963, Sofia and Silas Wong, and Dr. Stephen and Patricia Melsheimer were honored for the endowments they have recently created to benefit the Department of Chemical and Biomolecular Engineering.



# SCENES FROM THE 100<sup>th</sup> ANNIVERSARY





## MESSAGE FROM THE CHAIR



Greetings from the Chemical and Biomolecular Engineering Department at Clemson University. I am thrilled to share some of this past fall's highlights with you. Of particular note was the Department's celebration of 100 years of Chemical Engineering at Clemson. In early November, we invited alumni, faculty, staff and students to join us at several events on Clemson's campus, including a luncheon in the President's Box at Memorial Stadium with guest speaker Tony Elliott, co-offensive coordinator and running backs coach for the Clemson Tigers Football Team. There was also a banquet, where alumni danced and reminisced about their time at Clemson and I shared stories about the Department's history.

By all accounts, the events were an overwhelming success, and it was wonderful to see so many alumni back in Earle Hall. I want to also thank our office staff, Terri McAllister, Joy Rodatz and Diana Stamey, for helping organize these memorable events!

Earlier in the fall, we welcomed two new faculty members to our department, Dr. Marc Birtwistle and Dr. Jessica Kelly. Their research on the development of enhanced therapies for treating brain cancer significantly increases our research portfolio in the area of biomolecular engineering. Meanwhile, many of our other faculty were recognized for their outstanding achievements and discoveries. For example, Dr. Mark Blenner was nominated for the Presidential Early Career Award in Science and Engineering (PECASE) by NASA for his research on biologically repurposing waste materials and Dr. Joseph Scott's paper on process fault detection won the Automatica Paper Prize Award, a prestigious title granted by the IFAC Journal Automatica to the top research article that year. It was also a very busy time for our technical staff, with several renovation projects occurring in Earle Hall to accommodate new researchers and the ever-growing number of doctoral graduate students, now totaling 55.

The success within our department did not stop at faculty. Many undergraduate students showcased their work at the Undergraduate Research Symposium on campus and several participated in a study abroad program in Copenhagen, Denmark. We also congratulate our graduate students on their hard work as well, including our newest PhD graduate Murri Shabbir-Hussain.

As we work on our next 100 years, our department is pleased to share that The Centennial Associate Professorship Endowment is being established in honor of the Department's 100 year anniversary!

This new endowed fund will help the ChBE department recruit and retain talented Associate Professors. The Dean and I plan to award this new endowed faculty position to an up and coming professor in the ChBE department, and we are confident that this professorship will help us retain and recognize the achievements of one of our outstanding young faculty members. Make your gift in support of our 100 year anniversary through the coupon and envelope enclosed or online at <https://cualumni.clemson.edu/give/chembioengineering>.

I want to thank everyone who has supported our department over the last 100 years! Your generous donations and service push us to succeed each and every year.

Best Wishes,  
David



## NEW FACULTY MEMBERS

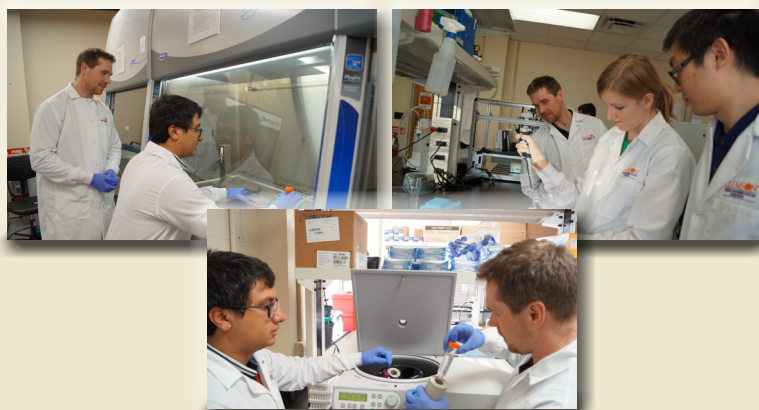
### Marc R. Birtwistle



We are pleased to announce that Dr. Marc Birtwistle has joined the Department of Chemical and Biomolecular Engineering this Fall as an Associate Professor.

Dr. Birtwistle received his B.S. in Chemical Engineering from the Georgia Institute of Technology, and his Ph.D. from the University of Delaware. Prior to accepting his position at Clemson, Dr. Birtwistle was a professor at the Icahn School of Medicine at Mount Sinai. Throughout his research and teaching at the Icahn School of Medicine at Mount Sinai, Dr. Birtwistle developed strong expertise in cancer systems biology and pharmacology.

His research interest is in exploring how variability between individual cells influences both signaling in cancer cells and the response of cancers to therapies. He addresses these issues by combining experiments with mathematical modeling. In the Spring, Dr. Birtwistle will be teaching a new Biomolecular course called Bioprocess Engineering.



### Jessica M. Kelly



The ChBE Department welcomes Assistant Professor Dr. Jessica Kelly. Dr. Kelly's research interests include Drug Materials, Biomaterials, and Nanotechnology.

She received her PhD in Chemical Engineering from Auburn University, after receiving her BS from the University of Virginia.

Professor Kelly's research is centered on biomimetic and polymeric materials for drug delivery applications in neurodegenerative disease and other brain disorders. Her research focuses on the development of advanced material amphiphiles to enhance enzyme delivery in neurodegenerative disease. Professor Kelly utilizes a variety of nanoparticle characterization techniques, as well as in vitro and in vivo therapeutic analysis, working at the interface of biology and engineering. Through careful development of biologically-relevant nanocarriers, Dr. Kelly hopes to bring next-generation nanomedicine with both disease-specificity and patient-personalization to the clinic.



## CHBE COMMUNITY OUTREACH



Several students took part in an outreach event through the Clemson University Life Sciences Outreach Center earlier this year. The event revolved around filtering apple juice. Students tested a Reverse Osmosis Membrane unit built by undergraduates from Christine Duval and Steven Weinman's Creative Inquiry class to show how membranes can purify water by filtering a blue dye out of an aqueous solution.





## FACULTY HIGHLIGHTS



Dr. Mark Blenner received a new NSF grant, “Controlling Cellular Physiology and Enzyme Localization for an Enhanced Oleochemical Biosynthesis in Yeast” totaling \$347,277 for three years. The endoplasmic reticulum (ER) and peroxisome are the major sites of lipid and fatty acid modification in oleaginous yeast, and the native capacity to accept overexpressed enzymes at these intracellular locations is limited. The objective for this project is to control ER and peroxisome physiology in *Yarrowia lipolytica* to enhance enzyme expression for the synthesis of oleochemicals.

Dr. Blenner’s NASA sponsored research on using urine and astronaut waste to make nutraceuticals and materials was presented at the Fall ACS Meeting. News coverage included articles in the Washington Post, The Guardian, Scientific American, Smithsonian Magazine, and Food and Wine. Dr. Blenner was also named Associate Editor of Bioengineering Journal, and Editorial Board Member for Microbial Cell Factories, and Biochemical Engineering Journal.

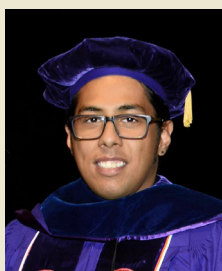


As of October 24<sup>th</sup>, Dr. David Bruce was officially named the Chair of the Chemical and Biomolecular Engineering Department. Dr. Bruce has been a member of the ChBE department for over twenty years, and has served as Interim Chair since March 2016.



Dr. Joseph Scott’s Paper was selected as a winner of the Automatica Paper Prize Award. The paper is titled “Constrained zonotopes: A new tool for set-based estimation and fault detection.” The Automatica Paper Prize is awarded to papers that have made outstanding contributions to the theory and/or practice of control engineering or control science, documented in a paper published in the IFAC Journal Automatica.

## PhD GRADUATE



### Dr. Murtaza Shabbir-Hussain

**Dissertation:** “Expanding the Genetic Toolbox to Improve Metabolic Engineering in the Industrial Oleaginous Yeast, *Yarrowia Lipolytica*”

**Advisor:** Dr. Mark Blenner

**Current Position:** Scientist I  
Zymergen, Inc.

Metabolic Pathway Engineering  
Emeryville, CA

## HOMECOMING 2017

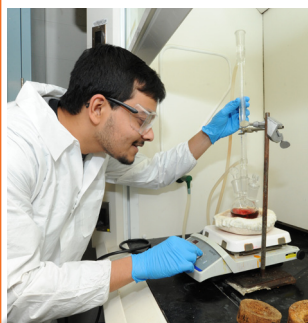


We enjoyed Homecoming 2017 with alumni, faculty, and students before the game against Wake Forest on October 7<sup>th</sup>.

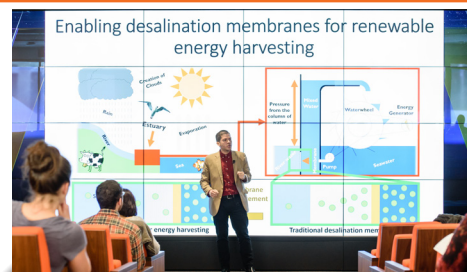




# STUDENT HIGHLIGHTS

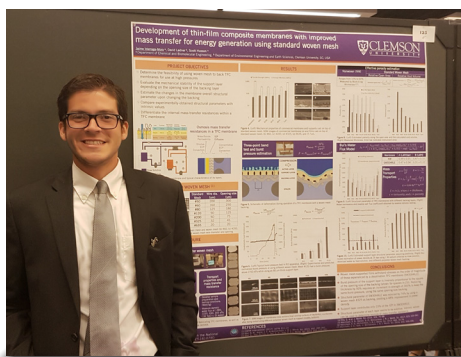
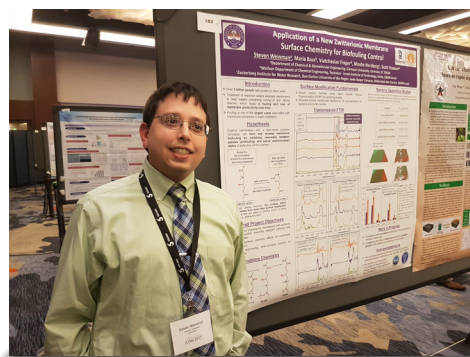


Graduate student **Saptarshi Chakraborty** accepted the Doctoral Dissertation Completion Award in the amount of \$5,000 from the Office of the Vice President for Research at Clemson University. This award will allow Saptarshi to attend conferences and purchase scientific supplies that are essential for the completion of his dissertation. His advisor is Dr. Chris Kitchens.



**Jaime Idarraga-Mora** won second place in the category PhD/Masters Student for the Three-minute thesis competition (3MT) on November 3<sup>rd</sup> at the Watt Innovation Center.

Several Graduate students accompanied Dr. Husson at the International Congress on Membranes and Membrane Processes. This event took place from July 29<sup>th</sup> through August 4<sup>th</sup>, where **Steven Weinman** won the 2017 North American Membrane Society Student Fellowship Award.



**Steven Weinman** won the TED-Sep Rapid Fire Presentation Competition at AIChE this year, hosted by the Separations Division. This contest was designed to be like a TED talk, in that competitors were allowed five minutes to present their research. Steven's presentation will be uploaded to the AIChE Separations Division YouTube channel.

Eleven ChBE students participated in the Summer Undergraduate Research Symposium in the Watt Family Innovation Center on July 27<sup>th</sup>, showcasing the research they completed this summer. The symposium included poster sessions for undergraduate researchers within the College of Engineering, Computing, and Applied Sciences.

**Adam Beitz:** *"Determining the Effects of Site Specific Linker Attachment on Activity for Enzyme Immobilization"*

**Sara Edgecomb:** *"Understanding the Mechanism for Fatty Acid Regulation in the Lipid Loving Yeast, Yarrowia Lipolytica"*

**Calvin Martin:** *"Characterization of Promoters in Yarrowia Lipolytica"*

**Jenna Schoenfield:** *"Increasing Enzyme Solubility by Gene Shuffling ATF Homologs"*

**Sarah Smith:** *"Growth Characterization of Cutaneotrichosporon Oleaginosus in Non-Conventional Feedstocks"*

**Camilo Suescum:** *"Laccase Expression in Yarrowia Lipolytica"*

**Jack Tabb:** *"Dynamic Regulation of the Production of Biodiesel"*

**Meredith Bailey:** *"Engineering Plasmid Performance in Yarrowia Lipolytica"*

**Cheyenne Brady:** *"Characterizing Growth of Oleaginous Yeast in Ionic Liquid Media"*

**Andrew Bingham and Alexis Cocolas:** *"Aqueous Phase Catalysis; Synthesis, Characterization and Troubleshooting"*



Four undergraduates participated in a summer study abroad program in Copenhagen, Denmark with Professor Eric Davis. **Jed Gist, Chris Brown, Marie Joy Amurao,** and **Jessica Zahn** chose to take the demanding Unit Operations course in Denmark rather than taking ChE 4070 at Clemson in the fall. The students highly recommend the program and enjoyed this opportunity to study abroad.





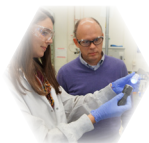


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Advanced Materials  
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Biotechnology & Biomolecular Engineering  
Computational Chemical Engineering



The Department of Chemical and Biomolecular Engineering  
is pleased to present

# *The Centennial Associate Professorship Endowment*

Be part of a legacy. Donate today!

This new endowed fund will help the department retain Associate  
Professors to continue improving our outstanding faculty.

Please see insert for more details.