THE BENT

OF TAU BETA PI | The Engineering Honor Society | Summer 2018

Masters of Disaster

ΤΒΠ Fellows Named

CHAPTERS

ALUMNI CHAPTERS (78)

• *denotes active chapter*

District 1
- *Central Connecticut, Hartford*
- *Greater Boston Area, MA*

District 2
- Buffalo, NY
- *Central Jersey, NJ*
- Long Island Suburban, NY
- Newark, NJ
- *New York City, NY*
- *New York Capital District, NY*
- *Rochester, NY*
- Southern Tier, Binghamton, NY

District 3
- Lehigh Valley, Bethlehem, PA
- Philadelphia, PA
- *Pittsburgh, PA*
- Wilmington, DE

District 4
- *Baltimore, MD*
- Hampton Roads, Newport News, VA
- Kanawha Valley, Charleston, WV
- *Research Triangle, Durham-Chapel Hill-Raleigh, NC*
- Richmond, VA
- *Washington, DC*

District 5
- *Atlanta, GA*
- Central Florida, Orlando
- Daytona Beach, FL
- Gainesville, FL
- Miami, FL
- Midlands, Columbia, SC
- *Palm Beach/Broward, FL*
- Piedmont, Clemson, SC
- Puerto Rico
- *Tampa Bay, FL*

District 6
- Bluegrass, Lexington-Frankfort, KY
- Central Alabama, Birmingham
- *Great Smoky Mountains, Knoxville-Oak Ridge, TN*
- Greater Gulf Coast, Mobile, AL
- *Louisville, KY*
- Mid-South, Memphis, TN
- *Rocket City, Huntsville, AL*

District 7
- *Ann Arbor Area, MI*
- Central Michigan, Lansing
- Cincinnati, OH
- Columbus, OH
- *Dayton, OH*
- Flint, MI
- *Ohio's North Coast, Cleveland*
- *Southeastern Michigan, Detroit*
- *West Michigan, Grand Rapids*

District 8
- *Chicago Area, IL*
- *Central Illinois, Urbana-Champaign*
- *Indianapolis, IN*
- *Milwaukee Area, WI*

District 9
- *Pioneer, OK*
- Rolla, MO
- *St. Louis, MO*

District 10
- *Central Texas (Austin/San Antonio)*
- *North Texas (Dallas-Fort Worth)*
- *Greater New Orleans, LA*
- *Texas Gulf Coast, Houston*

District 11
- Ames, IA
- *Minnesota, Twin Cities, MN*

District 12
- *Pikes Peak, CO*
- *Front Range, CO/WY*
- Salt Lake City, UT
- *Treasure Valley, Boise, ID*

District 13
- *Albuquerque, NM*
- El Paso, TX
- *Phoenix, AZ*
- Sun City, AZ
- *Tucson, AZ*

District 14
- Columbia River Basin, Richland, WA
- *Portland, OR*
- *Puget Sound, Seattle, WA*

District 15
- *Sacramento Valley, CA*
- *San Francisco Bay Area, CA*
- San Francisco Peninsula, Palo Alto, CA

District 16
- *Los Angeles, CA*
- *Orange County, CA*
- *Greater San Diego, CA*
- Southern California

COLLEGIATE CHAPTERS (254)

Chap.	*Dist.*	*Institution*
AL A	6	Auburn Univ.
AL B	6	Univ. of Alabama
AL Γ	6	Univ. of Ala. at Birmingham
AL Δ	6	Univ. of Ala. in Huntsville
AL E	6	Univ. of South Alabama
AK A	14	Univ. of Alaska Fairbanks
AZ A	13	Univ. of Arizona
AZ B	13	Arizona State Univ.
AZ Γ	13	Northern Arizona Univ.
AZ Δ	13	Embry-Riddle Aero. Univ., Prescott
AR A	9	Univ. of Arkansas
CA A	15	Univ. of California, Berkeley
CA B	16	California Inst. of Technology
CA Γ	15	Stanford Univ.
CA Δ	16	Univ. of Southern California
CA E	16	Univ. of California, Los Angeles
CA Z	15	Santa Clara Univ.
CA H	15	San Jose State Univ.
CA Θ	16	California State Univ., Long Beach
CA I	16	California State Univ., Los Angeles
CA K	16	California State Univ., Northridge
CA Λ	15	Univ. of California, Davis
CA M	15	Calif. Poly. St. Univ., San Luis Obispo
CA N	16	California State Poly. Univ., Pomona
CA Ξ	16	San Diego State Univ.
CA O	16	Loyola Marymount Univ.
CA Π	16	Northrop Univ. (inactive)
CA P	15	California State Univ., Fresno
CA Σ	16	Univ. of California, Santa Barbara
CA T	16	Univ. of California, Irvine
CA Y	15	California State Univ., Sacramento
CA Φ	15	Univ. of the Pacific
CA X	16	California State Univ., Fullerton
CA Ψ	16	Univ. of California, San Diego
CA Ω	16	Harvey Mudd College
CA AA	15	California State Univ., Chico
CA AB	16	Univ. of California, Riverside
CA AΓ	15	San Francisco State Univ.
CA AΔ	15	Univ. of California, Santa Cruz
CA AE	16	Univ. of San Diego
CO A	12	Colorado School of Mines
CO B	12	Univ. of Colorado at Boulder
CO Γ	12	Univ. of Denver (inactive)
CO Δ	12	Colorado State Univ.
CO E	12	Univ. of Colorado at Denver
CO Z	12	United States Air Force Academy
CT A	1	Yale Univ.
CT B	1	Univ. of Connecticut
CT Γ	1	Univ. of Hartford
DE A	3	Univ. of Delaware
DC A	4	Howard Univ.
DC B	4	Catholic Univ. of America
DC Γ	4	George Washington Univ.
FL A	5	Univ. of Florida
FL B	5	Univ. of Miami
FL Γ	5	Univ. of South Florida
FL Δ	5	Univ. of Central Florida
FL E	5	Florida Atlantic Univ.
FL Z	5	Florida Inst. of Technology
FL H	5	Florida A&M Univ.-Florida State Univ.
FL Θ	5	Florida International Univ.
FL I	5	Embry-Riddle Aeronautical Univ.
GA A	5	Georgia Inst. of Technology
GA B	5	Mercer Univ.
ID A	14	Univ. of Idaho
ID B	12	Idaho State Univ.
ID Γ	12	Boise State Univ.
ID Δ	12	Brigham Young University-Idaho
IL A	8	Univ. of Illinois at Urbana-Champaign
IL B	8	Illinois Inst. of Technology
IL Γ	8	Northwestern Univ.
IL Δ	8	Bradley Univ.
IL E	8	Southern Illinois Univ. at Carbondale
IL Z	8	Univ. of Illinois at Chicago
IN A	8	Purdue Univ.
IN B	8	Rose-Hulman Inst. of Technology
IN Γ	8	Univ. of Notre Dame
IN Δ	8	Valparaiso Univ.
IN E	8	Trine Univ.
IN Z	8	Indiana Univ.-Purdue Univ. Indianapolis
IA A	11	Iowa State Univ.
IA B	11	Univ. of Iowa
KS A	9	Univ. of Kansas
KS B	9	Wichita State Univ.
KS Γ	9	Kansas State Univ.
KY A	6	Univ. of Kentucky
KY B	6	Univ. of Louisville
KY Γ	6	Western Kentucky Univ.
LA A	10	Louisiana State Univ.
LA B	10	Tulane Univ.
LA Γ	10	Louisiana Tech Univ.
LA Δ	10	Univ. of Louisiana at Lafayette
LA E	10	Univ. of New Orleans
ME A	1	Univ. of Maine
MD A	4	Johns Hopkins Univ.
MD B	4	Univ. of Maryland
MD Γ	4	United States Naval Academy
MD Δ	4	Univ. of Maryland Baltimore County
MD E	4	Morgan State Univ.
MA A	1	Worcester Polytechnic Inst.
MA B	1	Massachusetts Inst. of Technology
MA Γ	1	Harvard Univ. (inactive)
MA Δ	1	Tufts Univ
MA E	1	Northeastern Univ.
MA Z	1	Univ. of Massachusetts at Amherst
MA H	1	Boston Univ.
MA Θ	1	Univ. of Massachusetts Lowell
MA I	1	Western New England Univ.
MI A	7	Michigan State Univ.
MI B	11	Michigan Tech. Univ.
MI Γ	7	Univ. of Michigan
MI Δ	7	Univ. of Detroit Mercy
MI E	7	Wayne State Univ.
MI Z	7	Kettering Univ.
MI H	7	Lawrence Technological Univ.
MI Θ	7	Oakland Univ.
MI I	7	Univ. of Michigan-Dearborn
MI K	7	Western Michigan Univ.
MI Λ	7	Grand Valley State Univ.
MN A	11	Univ. of Minnesota-Twin Cities
MN B	11	Univ. of Minnesota, Duluth
MS A	6	Mississippi State Univ.
MS B	6	Univ. of Mississippi
MO A	9	Univ. of Missouri-Columbia
MO B	9	Missouri Univ. of Science & Technology
MO Γ	9	Washington Univ.
MO Δ	9	Univ. of Missouri-Kansas City
MO E	9	Saint Louis University
MT A	12	Montana State Univ.
MT B	12	Montana Tech of the Univ. of Montana
NE A	9	Univ. of Nebraska-Lincoln
NV A	15	Univ. of Nevada, Reno
NV B	16	Univ. of Nevada, Las Vegas
NH A	1	Univ. of New Hampshire
NH B	1	Dartmouth College
NJ A	2	Stevens Inst. of Technology
NJ B	2	Rutgers Univ.
NJ Γ	2	New Jersey Inst. of Technology
NJ Δ	2	Princeton Univ.
NJ E	2	Rowan Univ.
NJ Z	2	The College of New Jersey
NM A	13	New Mexico State Univ.
NM B	13	Univ. of New Mexico
NM Γ	13	New Mexico Inst. of Mining & Tech.
NY A	2	Columbia Univ.
NY B	2	Syracuse Univ.
NY Γ	2	Rensselaer Polytechnic Inst.
NY Δ	2	Cornell Univ.
NY E	2	New York Univ. (inactive)
NY Z	2	Polytechnic Inst. of Brooklyn (inactive)
NY H	2	City College of CUNY
NY Θ	2	Clarkson Univ.
NY I	2	Cooper Union School of Engineering
NY K	2	Univ. of Rochester
NY Λ	2	Pratt Inst. (inactive)
NY M	2	Union College
NY N	2	SUNY at Buffalo
NY Ξ	2	Manhattan College
NY O	2	SUNY at Stony Brook
NY Π	2	Rochester Inst. of Technology
NY P	2	Polytechnic Institute of New York Univ.
NY Σ	2	Alfred Univ.
NY T	2	Binghamton University
NY Y	2	United States Military Academy
NC A	4	North Carolina State Univ.
NC B	4	Univ. of N.C. at Chapel Hill (inactive)
NC Γ	4	Duke Univ.
NC Δ	4	Univ. of North Carolina at Charlotte
NC E	4	North Carolina A&T State Univ.
NC Z	4	East Carolina University
ND A	11	North Dakota State Univ.
ND B	11	Univ. of North Dakota
OH A	7	Case Western Reserve Univ.
OH B	7	Univ. of Cincinnati
OH Γ	7	Ohio State Univ.
OH Δ	7	Ohio Univ.
OH E	7	Cleveland State Univ.
OH Z	7	Univ. of Toledo
OH H	7	Air Force Inst. of Technology
OH Θ	7	Univ. of Dayton
OH I	7	Ohio Northern Univ.
OH K	7	Univ. of Akron
OH Λ	7	Youngstown State Univ.
OH M	7	Wright State Univ.
OH N	7	Cedarville Univ.
OH Ξ	7	Miami Univ.
OK A	9	Univ. of Oklahoma
OK B	9	Univ. of Tulsa
OK Γ	9	Oklahoma State Univ.
OR A	14	Oregon State Univ.
OR B	14	Portland State Univ.
OR Γ	14	Univ. of Portland
OR Δ	14	Oregon Institute of Technology
PA A	3	Lehigh Univ.
PA B	3	Pennsylvania State Univ.
PA Γ	3	Carnegie Mellon Univ.
PA Δ	3	Univ. of Pennsylvania
PA E	3	Lafayette College
PA Z	3	Drexel Univ.
PA H	3	Bucknell Univ.
PA Θ	3	Villanova Univ.
PA I	3	Widener Univ.
PA K	3	Swarthmore College
PA Λ	3	Univ. of Pittsburgh
PA M	3	Penn State Erie, The Behrend College
PR A	5	Univ. of Puerto Rico
RI A	1	Brown Univ.
RI B	1	Univ. of Rhode Island
SC A	5	Clemson Univ.
SC B	5	Univ. of South Carolina
SC Γ	5	The Citadel
SD A	12	South Dakota School of Mines & Tech.
SD B	11	South Dakota State Univ.
TN A	6	Univ. of Tennessee
TN B	6	Vanderbilt Univ.
TN Γ	6	Tennessee Tech. Univ.
TN Δ	6	Christian Brothers Univ.
TN E	6	Univ. of Memphis
TN Z	6	Univ. of Tennessee at Chattanooga
TX A	10	Univ. of Texas at Austin
TX B	13	Texas Tech Univ.
TX Γ	10	Rice Univ.
TX Δ	10	Texas A & M Univ.
TX E	10	Univ. of Houston
TX Z	10	Lamar Univ.
TX H	10	Univ. of Texas at Arlington
TX Θ	13	Univ. of Texas at El Paso
TX I	10	Southern Methodist Univ.
TX K	10	Prairie View A & M Univ.
TX Λ	10	Texas A & M Univ.-Kingsville
TX M	10	Univ. of Texas at San Antonio
TX N	10	Univ. of Texas Rio Grande Valley
UT A	12	Univ. of Utah
UT B	12	Brigham Young Univ.
UT Γ	12	Utah State Univ.
VT A	1	Univ. of Vermont
VT B	1	Norwich Univ.
VA A	4	Univ. of Virginia
VA B	4	Virginia Polytechnic Inst. & State Univ.
VA Γ	4	Old Dominion Univ.
VA Δ	4	Virginia Military Inst.
VA E	4	Virginia Commonwealth Univ.
WA A	14	Univ. of Washington
WA B	14	Washington State Univ.
WA Γ	14	Seattle Univ.
WA Δ	14	Gonzaga Univ.
WV A	4	West Virginia Univ.
WV B	4	West Virginia Univ. Inst. of Technology
WI A	8	Univ. of Wisconsin-Madison
WI B	8	Marquette Univ.
WI Γ	8	Univ. of Wisconsin-Milwaukee
WI Δ	8	Milwaukee School of Engineering
WI E	8	Univ. of Wisconsin-Platteville
WY A	12	Univ. of Wyoming

the Bent of Tau Beta Pi
The Engineering Honor Society
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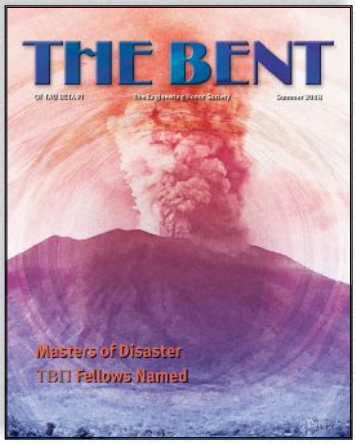
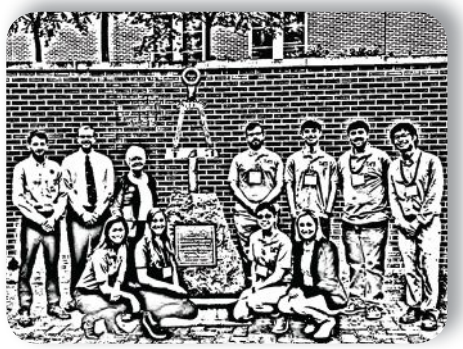
Features



ON THE COVER: Arielle Emmett reports on predicting and dealing with disasters like tsunamis and volcanoes.

Reports

Departments



District 6 Conference hosts from Univ. of South Alabama

founded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent and Trademark Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

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The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. —Preamble to the Constitution

"For Sale: Baby Shoes, Never Worn"

Ernest Hemingway won a wager between writers as to who could tell an entire story in just six words with: "For sale: baby shoes, never worn." You can imagine an entire story from those few words. I want to challenge us all to create an entire story based on just three words: Tau Beta Pi. This story will be different for everyone, but I am confident that it will have a much more pleasant ending than Hemingway's.

As we are engineers, not writers, how do we build a good story? In 1949, Joseph Campbell set out to compare some of history's greatest stories, and what he found is that they all have a similar structure, which he termed "the hero's journey." Like all stories, your ΤΒΠ story needs a hero—a protagonist—and that is you! While we may not slay a dragon or ride a white horse, we all have made significant accomplishments and contributions to engineer a "better world," to paraphrase what our vision so eloquently states.

We must also set the stage for our story. For most of us, it begins when we first were invited to join. That invitation served as our "call to adventure" and the reason we journeyed through a special world. We were welcomed to that world during our initiation ceremony where we learned what the Bent and those three Greek Letters symbolize. For some of us, it may also involve being a chapter officer, attending Convention or a District meeting, taking part in Engineering Futures leadership training, or serving the community with your chapter or as part of our MindSET K-12 STEM outreach.

Trials and Crises

Our story has trials and crises. I recall the challenge of many undergraduate engineering classes, figuring out how to polish the small brass Bent by hand, finding that first job, being laid off when a grant concluded, and so on.

After winning through, the protagonist receives a treasure. This includes our Bent and our membership in Tau Beta Pi, the friends and connections we have made through our membership, receiving our engineering degree, finding our dream job, or so many other possibilities. We emerge a changed person: shaped by beating the challenges and persevering to the end of our journey.

Maybe you have been out of school for a while. There hasn't been much written of your ΤΒΠ story since graduation and it now just sits on a shelf just a few short lines in length. As I want to be sure that it does not end with graduation and emphasize the lifetime membership in our Association, I am issuing to all of us a new "call to adventure": reconnect with and add more to your ΤΒΠ story—help mentor a Tau Bate via our *VineUp* app, connect with fellow members through an alumni chapter, volunteer as an Engineering Futures Facilitator or a District Director, advise a collegiate chapter, or pick one of so many other opportunities. As you continue to write your story, I am sure you will rediscover the treasure of membership and emerge reinvigorated for the journey ahead!

J.P. Blackford

Our goal is not just to create a story, but to make it a tale worth telling. We all need to be passionate about our membership and share it with others so that they too can see how ΤΒΠ is as relevant today as it was when we were founded and that membership in our Association is a great treasure. This can be as simple as displaying your membership certificate in your office, wearing your Bent or other Association apparel, participating in *Tau Beta Pi Day* activities, or anything else that shows you are proud to be a member. I also ask that you share your story with us. I am always inspired to hear from our members and what ΤΒΠ means to them. I know our student members are as well.

I have written before about the Tau Beta Pi family and how we will always be a part of it. Nearly 25 years have passed since I was initiated and my service on the Executive Council is coming to an end. I have reflected on how much my story has left me a changed person and how much "treasure" I have gained through my involvement in the Association and the friends I have made. I hope that I have helped others to write their story and find their own treasure by conquering adversity.

I am optimistic that you also have benefitted from your membership and continue to find value in your association with the Society. I challenge all of us to renew our involvement and contribute to the advancement of our Association and the profession. I am looking forward to my ongoing involvement with our family and continuing to shape my story based on those three simple, yet powerful, words: Tau Beta Pi.

J.P. Blackford, *District of Columbia Gamma '95, Secretary*

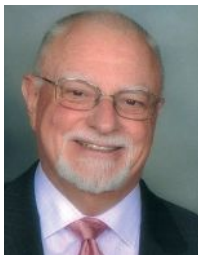
Executive Council Candidates

The 2015 Convention approved amendments, later ratified by the chapters, which restructured the Executive Council. In this new structure, three members of the Council, to serve the 2019-21 term, will be elected by the 2018 Convention in Denver, CO, in October. The terms of President Susan L.R. Holl, Secretary Joseph P. Blackford and Treasurer George J. Morales expire on December 31, but only George Morales will seek another term. In response to the call for candidates, three individuals were nominated, and nominations are closed. The Executive Council is Tau Beta Pi's board of directors and consists of nine members who are alumni and serve a three-year term. The Executive Council names its own officers—chair, who is also President of the Association; vice chair, who is also Vice President; Secretary, Treasurer, and four Councillors. Nominees for the 2019-21 term are as follows:

Rachel K. Alexander, *California Upsilon '15*, was initiated in 2013 and held collegiate chapter positions as Social Chair, President-Elect, and President. As a chapter officer, she focused on building its image on campus with new posters, hand delivering invitations to candidates, and adding ΤΒΠ shirts/hoodies for purchase by members as part of initiation. Each year since 2014, Rachel has attended Convention. After graduating with a B.S. in civil engineering from California State University, Sacramento, she served as Acting Secretary and is currently President of the Sacramento Valley Alumni Chapter (SVAC). This chapter is working with local collegiate chapters to provide guidance on transitioning to the professional world with alumni panel discussions and resume workshops. Rachel is a civil engineer for Sacramento County Department of Airports. She works with contractors, consultants and other agencies to complete projects at four airports, including Sacramento International. Previously, Rachel was with an architectural engineering firm and performed forensic investigations of structures which gave her the unique knowledge of construction defects and design repairs. As a member of the Executive Council, she wants to assist in building our image and reconnecting with alumni. Rachel looks forward to collaborating on ideas for our future growth.

George J. Morales, Ph.D., *Florida Epsilon '06*, has served as an Engineering Futures Facilitator since 2010 as well as serving on the Engineering Futures Planning Committee. He also serves on the 2014-18 Executive Council as Treasurer. George is a graduate of the Pennsylvania State University with a Bachelor of Science in electrical engineering. He also graduated with a M.Sc. and Ph.D. in electrical engineering from Florida Atlantic University. Currently, George is employed at Intel Corporation as a test research and development engineer in Chandler, AZ. He focuses his efforts on test technology development under the sort test technology division group for a variety of client products. George has also been an active participant in the Stay with It! program. This program is based on collaboration between industry, academia and government. The White House Council on Jobs and Competitiveness created the program to address the high dropout rate in undergraduate STEM programs within the United States. George is an avid basketball player and enjoys spending time outdoors and travelling. He has two young daughters and enjoys spending time with them.

Russell W. Pierce, *Washington Alpha '70*, prior to retiring in 2006, had a distinguished management career in aerospace, telecommunications, and consulting. For the past 26 years Russ has been a ΤΒΠ official, being appointed an Engineering Futures Facilitator in 1992 and serving as such for 24 years. From 1995 to 1999, he was also a District 5 Director and from 2002 to 2006 he was an Executive Councillor. Russ was Director of the Engineering Futures Program from 1999 to 2002 and again from 2009 until 2015. He is currently a non-faculty advisor to the Washington Alpha, Tennessee Delta, and Texas Delta (Qatar) Chapters and an Engineering Futures Facilitator. Russ is a United States citizen but was born in England and immigrated to the USA in 1961. He served four years in the U.S. Air Force before earning BS (cum laude) and MS degrees in electrical engineering at the University of Washington. Russ is a member of Eta Kappa Nu, the electrical engineering honor society. In May 1997, he earned a MBA from the Florida Institute of Technology and is a member of Delta Mu Delta, the business administration honor society. From 1999 until 2006, while serving as an information technology director with AT&T Fixed Wireless Company and then managing partner in a boutique consulting company, Russ concurrently taught business classes for the University of Phoenix. In 2004, he founded his own company, USBrit Consulting. Russ lives in Puyallup, WA, with wife, Pauli, with whom he enjoys world travel.



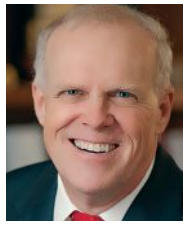
Stephanie G. Adams, Ph.D., *Nebraska Alpha '89*, has become president-elect of the American Society for Engineering Education (ASEE). She will serve one year as president-elect and will become president of the society in June 2019. Adams has been dean of the college of engineering and technology at Old Dominion University in Norfolk, VA, since 2016. She was previously a professor and chair of the department of engineering education at Virginia Tech in Blacksburg.

Daniel Berg, Ph.D., *New York Gamma '50*, top, has been honored for his work in education, technology and the service sector by the International Academy of Information Technology and Quantitative Management (IAITQM) with the creation of a medal in his name. The inaugural Daniel Berg Award in Technology and Service Systems was presented to **Richard C. Larson,** *Massachusetts Beta '65*, below, professor of engineering systems, and civil and environmental engineering at Massachusetts Institute of Technology.

Michael D. Griffin, Ph.D., *Maryland Beta '77*, has become Under Secretary of Defense for Research and Engineering. The physicist and aerospace engineer previously served as administrator of NASA from 2005 to 2009. He oversaw such areas as the future of human spaceflight, the fate of the Hubble telescope and NASA's role in understanding climate change. In April 2009 Griffin, who has an academic background, was named eminent scholar and a professor of mechanical and aerospace engineering at the University of Alabama in Huntsville.

Col. John W. Henderson, P.E., *South Dakota Alpha '94*, is now the Assistant Secretary of the Air Force (Installations, Environment & Energy). He previously served in the U.S. Army as the commander of the Omaha district, Army Corps of Engineers. He has over 23 years of active military experience as an army engineer officer, including two combat tours to Iraq and one to Afghanistan as an engineer battalion task force commander.

John L. Hennessy, Ph.D., *Pennsylvania Theta '73*, is co-recipient of the latest A.M. Turing Award for "pioneering work in the design and evaluation of computer architectures with enduring impact on the microprocessor industry." He shares the prize with retired professor at the University of California, Berkeley, David A. Patterson, Ph.D. The two created an approach to designing faster, lower power, and reduced instruction set computer microprocessors (RISC). Today, they are found in nearly all smartphones and other devices.

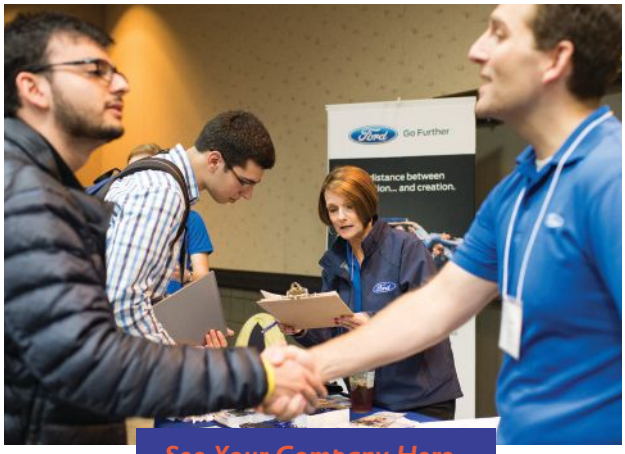


James D. Peery, Ph.D., *Texas Zeta '96*, has been named associate laboratory director at the global security directorate of the Department of Energy's Oak Ridge National Laboratory (ORNL). Peery led critical national security programs at Sandia National Laboratories and held leadership positions at Los Alamos National Laboratory before arriving at ORNL last year as chief scientitst at the directorate. Peery has already begun exploring the lab's potential to focus on fields like data analytics, autonomous systems, high-performance computing, "born-qualified" additive manufacturing, quantum materials, and cyber-physical systems.

Frank T. "Tom" Leighton, Ph.D., *New Jersey Delta '78*, has been chosen to receive the 2018 Marconi Prize at the Marconi Society's annual awards dinner in Bologna, Italy, on October 2. Leighton, who developed the algorithms now used to deliver trillions of content requests over the Internet every day, is the co-founder and CEO of Akamai Technologies, Inc., the world's largest cloud delivery platform. He plans to donate the $100,000 prize money to The Akamai Foundation, to promote the pursuit of excellence in mathematics in grades K-12 and encourage the next generation of technology innovators.

WANTED: Companies to **RECRUIT** the best and the brightest and **SPONSOR** activities at the annual *TAU BETA PI* Convention!

October 11-13, Denver, Colorado



See Your Company Here

By participating in the Convention, you can showcase your company and gain national exposure among top engineering achievers and leaders.

Recruiting Fair – Friday, October 12

As a member, you know that Tau Bates are among the brightest and most talented engineers in the country. Your company will want a chance to hire more valuable employees like you!

Meet diverse candidates from 247 colleges and universities, most of whom hold leadership positions in their chapters.

Receive a DVD with resumes of nearly 1,500 ΤΒΠ students from most engineering curricula and computer science.

Picture your company at Tau Beta Pi's Recruiting Fair. The corporate booth fees start at $750. Visit *www.tbp.org/conv/careerFair.cfm.*

Sponsorships

Gain added visibility and speaking opportunities by sponsoring one of the Convention meals. Range is $1450 to $15,000 (Banquets, Breakfasts, Lunches, Refreshment break). Visit *www.tbp.org/conv/sponsorshipOpps.cfm.*

Who knows better how talented our students are but Tau Bates themselves? Through contacts by our member-employees, ΤΒΠ has formed relationships with companies like BAE Systems, Ford, KLA-Tencor, Sandia, Shell, Northrop Grumman, and Texas Instruments, who saw the value in hiring fellow members.

Contact Pat McDaniel at *pat@tbp.org* for more info.

Tau Beta Pi Fellows for 2018-19

RECIPIENT	CHAPTER	FIELD OF ADVANCED STUDY	FELLOWSHIP
Monica N. Agrawal	CA Γ '17	Computer Science	Forge No. 7
Mohammad A. Alkhadra	CA Ψ '17	Chemical Engineering	Fife No. 216
Marie E. Armbruster	TN B '18	Chemical Engineering	Fife No. 217
Naveen T. Arunachalam	CA B '18	Chemical Engineering	Dodson No. 5
Garrett F. Beeghly	VA A '17	Biomedical Engineering	Fife No. 218
Rachel F. Bellisle	RI B '18	Medical Engg. & Medical Physics	Fife No. 219
Latarence J. Butts	FL H '18	High Frequency Devices	GEICO No. 3
Alisha Y. Chan	MD B '17	Chemical & Environmental Engg.	Nagel No. 21
Darcie Christensen	UT Γ '17	Environmental Engineering	Record No. 6
Elizabeth L. Crist	MO Γ '17	Biomedical Engineering	Record No. 7
Carlisle R. DeJulius	OH K '18	Biomedical Engineering	Record No. 8
Delaney G. Fisher	TN A '18	Biomedical Engineering	Record No. 9
Catherine C. Henry	VA A '16	Biological Engineering	Record No. 10
Emily A. Jewell	WI A '17	Aeronautical & Astronautical Engg.	Record No. 11
Beau P. Johnson	AL Γ '18	Mechanical Engineering	Arm No. 10
Eshita Khera	MI Γ '15	Chemical Engineering	Spencer No. 63
Phiwat Klomkaew	AL E '18	Chemical Engineering	Centennial No. 33
Margarita T. Kovalchuk	CA Y '18	Environmental Fluid Mechanics	Stark No. 40
Brianna M. Lax	MI Γ '17	Chemical Engineering	Anderson No. 12
Patrick A. Leggieri	PA E '18	Chemical Engineering	Tau Beta Pi No. 818
Isaac A. Mastalski	PA Λ '18	Chemical Engineering	Tau Beta Pi No. 819
Ava K. Mauser	NM B '18	Biomedical Engineering	Sigma Tau No. 44
Carly J. Romnes	NM B '18	Nuclear Engineering	Tau Beta Pi No. 820
Abigail J. Shelton	KY A '18	Industrial Engg. & Operations Res.	Swalin No. 2
Chen Song	TX Γ '18	Chemical Engineering	Record No. 12
Simone M.M. Stanley	DC A '17	Biotechnology	Zimmerman No. 7
Marina Swanepoel	AL E '17	Mechanical Engineering	Tau Beta Pi No. 821
Chris Torres	NM B '18	Chemical & Biomolecular Engg.	Williams No. 39
Tranice' R. Warner	CA P '17	Environmental Engineering	Matthews No. 21
Nathaniel Weger	IA B '18	Mechanical Engineering	King No. 57
Hao Xing	MA B '16	Biomedical Engineering	Tau Beta Pi No. 822

The Fellowship Board chose 31 engineering students from 329 applicants for graduate fellowships in 2018-19. Twenty nine of this year's recipients will receive cash stipends of $10,000 for their advanced study. More than $7,000,000 in stipends will have been given by the Society when this 85th group of fellows complete their graduate work.

The Fellowship Program remains a principal philanthropic activity of the Association and continues to receive strong support from alumni. The program was initiated with funds from the operating budget of the Society, including the eventual transfer of fees from deceased life subscribers of *The Bent*. Since that time, gifts from alumni, industry, corporate matches, friends, and the earnings of the invested Fellowship Fund have all contributed.

Fellowships are awarded on the competitive criteria of high scholarship, campus leadership and service, and promise of future contributions to the engineering profession. Fellows are members of the Association and may do their graduate work at any institution they choose.

The **Anderson Fellowship** is named for Mabel E. and

Marshall Anderson, *MI Γ '32*, who was TBP Fellow No. 20 and left a bequest to the Society in 2005. The Association received a bequest from the estates of David L. Arm, *PA E '30*, and his wife, Rena Miller Arm, sufficient to permanently endow the **Arm Fellowship** in 2007.

Given for the 33rd time, the **Centennial Fellowship** honors the Society's most outstanding fellow and commemorates Tau Beta Pi's 100th anniversary. The **Dodson Fellowship** is sponsored by Charles R. Dodson, *MD B '30*, who made a gift to the Association in 1998.

The four **James Fife Fellowships** are presented in memory of the father of the late member William Fife, *CA A '21*. The **Forge Fellowship** is named for Charles O. Forge, *CA Γ '56*, who left a bequest in 2010.

The **Harold M. King Fellowship,** awarded for the 57th time, honors the 1954-58 president of Tau Beta Pi, Harold M. King, *MA A 1910*, and is given to that recipient whose participation in his/her technical society is judged worthy of special mention.

The **Matthews Fellowship** is awarded in honor of R.C. "Red" Matthews, *IL A 1902*, who served as Secretary and Secretary-Treasurer from 1905-47 and as Secretary-Treasurer Emeritus in 1947-78. The **Nagel Fellowship** is given in honor of Robert H. Nagel, P.E., *NY Δ '39*, for his service as Editor and Secretary-Treasurer from 1942-82, and as Secretary-Treasurer Emeritus in 1982-97.

The **Record Fellowships** are awarded for the second time commemorating Leroy E. Record, *KS A '29*, whose generous bequest will provide earnings to support awards in perpetuity. The **Sigma Tau Fellowship,** given for the 44th time, perpetuates the name of Sigma Tau, a national engineering honor society founded at the University of Nebraska in 1904 and merged into Tau Beta Pi in 1974. It also commemorates Sigma Tau's former national president and secretary-treasurer, Clarel B. Mapes.

The **Charles H. Spencer Fellowship** is given for the 63rd time. Named for Tau Beta Pi's national president from 1936-47, Charles H. Spencer, *IL B 1913*, it is awarded to that recipient whose contributions to his/her collegiate chapter are judged worthy of commendation. The **Donald A. Stark Fellowship** is supported by a gift from a charitable trust named for the man who contributed much to progress in the fluid-power industry.

The **Swalin Fellowship** is named in honor of Helen M. and Richard A. Swalin, Ph.D., *MN A '52*. Dr. Swalin and his wife left Tau Beta Pi a bequest in 2015 to support scholarships and fellowships. The five **Tau Beta Pi Fellowships** are supported by matching gifts from firms as part of the annual alumni giving.

The **Edward H. Williams Jr. Fellowship,** awarded for the 39th time, honors the founder of Tau Beta Pi. It is given to a recipient who plans to earn a doctoral degree and become a professional engineering teacher, as was Dr. Williams, *PA A 1875*.

The **Zimmerman Fellowship** is named for Marlin U. Zimmerman Jr., *MD A '44*, who left a bequest in 2010. The **GEICO Fellowship** is sponsored by GEICO Insurance.

These awards bring the total to 1,634 fellowships granted since the program was inaugurated in 1929.

With the large number of applicants, the Fellowship Board engages the services of additional ΤΒΠ members to read and rank applicants. The Fellowship Board used this information to make the final Fellow selections in March. The Association is grateful to these members for their role in the selection process. Reviewers and volunteers are listed at *www.tbp.org/fellowships.cfm*.

Forge Fellow No. 7

Monica N. Agrawal

Monica graduated from Stanford University with an M.S. in computer science with a concentration in artificial intelligence. Previously, she earned her bachelor's degree with honors and distinction from Stanford, majoring in computer science and minoring in mathematics. She served as California Gamma Vice President of Operations. As a student, she tutored peers in math, coded for Engineers for a Sustainable World, and taught high school students computer science. Her research on campus involved using network analysis and machine learning to understand biological networks. During her summers, she interned at Google and Flatiron Health. Monica will pursue a Ph.D. in computer science at MIT, where she will conduct research at the intersection of machine learning and healthcare. After graduate school, she plans to develop healthcare solutions in a research laboratory or industry setting.

Fife Fellow No. 216

Mohammad A. Alkhadra

Mohammad grew up in Saudi Arabia and moved to the U.S. in 2013. Four years later, he graduated summa cum laude with a B.S. from the chemical engineering program at UC San Diego (UCSD) at the top of his class. Mohammad remained at UCSD to complete an M.S. in chemical engineering and will begin his doctorate this fall at MIT. As an undergraduate, he received two departmental awards—both given to the top overall student—for excellence in academics, leadership, and service. During his time at UCSD, Mohammad published two first-author papers (one of which received the Chemistry of Materials Lectureship and Best Paper Award for 2017), a first-author book chapter, and four additional co-author papers; he also gained substantial mentoring experience, having served at both UCSD and Crawford High School. After his Ph.D., he strives to conduct research as a principal investigator at a prominent U.S. university.

Fife Fellow No. 217

Marie E. Armbruster

Marie triple majored in chemical engineering, chemistry, and Spanish at Vanderbilt University. Her broad interests intersect at teaching and mentoring, and she intends to pursue a career as a professor after graduate school. Marie is passionate about energy and has engaged in research at the Air Force Research Laboratory, National Renewable Energy Laboratory (NREL), and Vanderbilt University. Her work at NREL focused on solution processing of perovskite solar cells and her work at Vanderbilt used Photosystem I proteins from spinach in novel ways to generate photocurrent. She was a 2016 Goldwater Scholar and will be an NSF Graduate Research Fellow. Outside of the lab, Marie enjoys rock climbing and going to concerts in Nashville. She will pursue her passion for teaching next year on a Fulbright fellowship teaching English in Spain before starting graduate school at the University of Colorado-Boulder.

Dodson Fellow No. 5

Naveen T. Arunachalam

Naveen graduated from the California Institute of Technology with a B.S. in chemical engineering. He has served on campus as both AIChE and ΤΒΠ Chapter President and as a teaching assistant for undergraduate and graduate-level courses. His research interests lie in the application of theoretical and computational methods to improve alternative energy and fuel production. At Caltech, he researched protein structure determination and ion diffusion in polymer electrolytes as a summer undergraduate research fellow. He was also a chemical process development intern in Japan at Kaneka. Naveen is a 2017 ΤΒΠ Scholar and received multiple institutional awards such as the Gross-Lockheed and Jorgensen Endowed scholarships. As an NSF Graduate Research Fellow, he will attend MIT to pursue a Ph.D. in chemical engineering. Naveen's ambition is to be a professor at a research university and engage in entrepreneurship to translate basic science into improvements in environmental health.

GEICO Fellow No. 3

Latarence J. Butts

Latarence is a third year senior majoring in electrical engineering at the FAMU-FSU College of Engineering where he served as Florida Eta Chapter Vice President. He is a 2016-17 ΤΒΠ Scholar and conducts undergraduate research in cathodic catalysts for increased performance in lithium air batteries under the NSF sponsored FREEDM Systems Center. Latarence recently received the honor of the Student Academic Award in the Black Engineer of the Year Awards, as well as the Doctoral Academy Fellowship from the University of Arkansas. He spends his summers interning with Northrop Grumman Corporation in San Diego, CA, and interns at H2Engineering Inc. in Tallahassee, FL, throughout the school year. Latarence is excited to pursue a Ph.D. in high frequency devices and circuits at the University of Arkansas.

Fife Fellow No. 218

Garrett F. Beeghly

Garrett graduated with highest distinction from the University of Virginia where he received a B.S. in biomedical engineering. He joined Virginia Alpha as a third-year student and became a chapter officer during his fourth year. In addition, he served as editor-in-chief of the *Virginia Engineering and Science Research Journal* and as a TA for the department of biomedical engineering. Garrett was named a Rodman Scholar and received a Harrison undergraduate research award to develop tissue-engineered models of the tumor microenvironment. After graduating, he moved to the UK to continue his research at the Univ. of Cambridge on a Whitaker International Fellowship. Next, Garrett will pursue a Ph.D. in biomedical engineering at Cornell Univ. as a Presidential Life Science Fellow. He hopes to use his background in engineering to examine how microenvironmental cues drive tumor progression and how patient heterogeneity can be exploited to personalize cancer treatment.

Nagel No. 21

Alisha Y. Chan

Alisha graduated with Latin honors from The University of Maryland, College Park with a bachelor's degree in civil & environmental engineering. She served as Maryland Beta Chapter Vice President and worked as an undergrad research assistant studying the associations of green infrastructure density and sociodemographics. She was first author to multiple publications including a textbook chapter and a manuscript about her research. Alisha often volunteered in Women in Engineering conferences and MindSET sessions to promote science and engineering to women and children. She is currently pursuing her Ph.D. at Yale University's department of chemical and environmental engineering where she has been researching green infrastructure placement with Dr. Michelle Bell's group. After earning her Ph.D., Alisha hopes to eventually become a professor. In her free time, Alisha enjoys participating in Yale's juggling club.

Fife Fellow No. 219

Rachel F. Bellisle

Rachel is graduating from the University of Rhode Island with a B.S. in biomedical engineering, a minor in general business, and as a member of the honors program. She has held leadership positions, including Society of Women Engineers VP, Engineering in Medicine and Biology Society president, student engineering council co-chair, and Rhode Island Beta Secretary. For the past three years, Rachel has worked with the URI neuro rehabilitation lab and its start-up company, CREmedical, where she has worked with EEG systems. During the summer of 2017, she participated in the NIH biomedical engineering summer internship program and worked with an exoskeleton for children with cerebral palsy. She plans to continue research in neuroengineering, biomechanics, and assistive devices and to further her interest in bioastronautics. She will attend MIT, through the Harvard-MIT health sciences & tech., medical eng'g, & medical physics Ph.D. program, where she was also accepted into the bioastronautics program.

Record Fellow No. 6

Darcie Christensen

Darcie graduated summa cum laude with university and departmental honors from Utah State University with a B.S. in biological engineering. She performed undergraduate research in various fields, such as root mimetics, antibiotic inhibition, bioretention, and engineering education. She filed a provisional patent on an external fixation device developed with an industry partner during her capstone project. Darcie served the Utah Gamma Chapter as both Recording Secretary and Vice President. Darcie is highly involved with the engineering student council, Engineering Ambassadors, and Society of Women Engineers. She was the college of engineering outstanding senior and the scholar of the year for the entire university in 2017. She is pursuing an M.E. in environmental engineering and a Ph.D. in engineering education, both at Utah State University. Her research interest is on self-efficacy of engineering students. She intends to work as an engineering instructor and specialist in recruitment and retention.

Record Fellow No. 7

Elizabeth L. Crist

Lizzy graduated summa cum laude with a degree in biomedical engineering from Washington University in St. Louis. She played varsity soccer, won the first women's soccer Div. III National Championship in school history, and was named the NCAA Woman of the Year & an NCAA Top-10 student-athlete. She was also involved in several outreach and mentoring programs, where she visited local children's hospitals to teach science to patients, and engineering student services through which she mentored and tutored underclassmen. As a researcher in Dr. Steven George's tissue engineering lab, she researched the role of cancer-associated fibroblasts in promoting blood vessel growth around tumors. Lizzy is a Ph.D. candidate in the biomedical engineering program at the University of Minnesota. Her thesis will focus on investigating the plasticity of cancer cell phenotypes in the context of cell migration during metastasis. She holds officer positions in student groups promoting STEM education.

Record Fellow No. 8

Carlisle R. DeJulius

Carlisle will graduate from The University of Akron with a B.S. in biomedical engineering and a chemistry minor. Undergraduate research has been one of her passions. In her first project, she studied the effect of electrical stimulation on fibroblast migration, and made significant contributions for second authorship on a journal publication. Carlisle spent one summer at Cornell University working on angiogenesis in cancer. She is studying how Schwann cell environment influences its function of supporting peripheral nerves. Carlisle has been very involved in SWE, ΤΒΠ, and the Biomedical Engineering Society, serving leadership roles in each. After graduation, she will pursue a Ph.D. in biomedical engineering at Vanderbilt University. Her work will focus on polymeric drug delivery strategies for osteoarthritis. Carlisle is still considering career options in academia and industry, but as an independent researcher plans to use tissue engineering strategies to combat autoimmune disorders.

Record Fellow No. 9

Delaney Fisher

Delaney graduated summa cum laude with a B.S. in chemical engineering and a biomolecular engineering concentration from the University of Tennessee at Knoxville. At UTK, she was involved in undergraduate research examining experience-dependent plasticity in a female mouse model of Rett Syndrome, a rare neurodevelopmental disorder. Delaney served as the 2017-18 Tennessee Alpha President and as the 2016-17 American Institute of Chemical Engineers (AIChE) UTK chapter social chair. She was awarded the 2018 AIChE Outstanding Student Award and the 2016-17 Tutor of the Year Award. Additionally, she has served as an undergraduate teaching assistant and participates in intermural soccer. Delaney will be pursuing a Ph.D. in biomedical engineering at the University of Virginia.

Record Fellow No. 10

Catherine C. Henry

Catherine graduated with highest distinction from the University of Virginia with a B.S. in biomedical engineering. While at UVA, she worked on a myriad of research projects, played piccolo in the marching band, served as Virginia Alpha President, and planned the 2016 ΤΒΠ District 4 Conference. As an undergraduate, Catherine studied structural and cellular variations in the dystrophic diaphragm for development of more targeted treatments for Duchenne Muscular Dystrophy. She was a Beckman Scholar and a Goldwater Scholar, allowing her to present work at national conferences. After graduating, she worked at the National Cancer Institute developing tools to study the early stages of cancer. She is pursuing a Ph.D. in biological engineering at MIT, where she plans to engineer technologies to improve small-molecule probe discovery for oncogenic transcription. Ultimately, she hopes to work on devices and therapeutics for cancers and diseases with limited treatment options.

Record Fellow No. 11

Emily A. Jewell

Emily graduated with honors from the University of Wisconsin-Madison. She received a B.S. in engineering mechanics, as a distinguished scholar, and B.S. in mathematics. She was a two-time Wisconsin Alpha officer, founding member of the Engineering Physics student advisory executive committee, STEM volunteer, and a member of the UW women's club ultimate frisbee team. Emily was heavily involved in both research and science outreach. She held research appointments for seven semesters and spent her last three years on campus in the structural dynamics research group where she developed a novel analysis method to predict nonlinearities of bolted joints. She primary authored and presented an international conference paper and received numerous national accolades, including being named a Goldwater Scholar. She will continue computational mechanics research, outreach and leadership initiatives at Stanford University where she will pursue M.S. and Ph.D. degrees in aeronautics and astronautics.

Arm Fellow No. 10

Beau P. Johnson

Beau graduated summa cum laude from the University of Alabama at Birmingham, where he worked with the vehicle and robotics lab under Dr. Vladimir Vantsevich and the sports and highway safety lab under Dr. Dean Sicking. His work included mechatronic system design and analysis, computational modeling of impacts, and the design and testing of highway safety equipment and football helmets. He also spent his summers as a research intern at the HudsonAlpha Institute for Biotechnology, where he generated a knockout line of the CFTR gene using CRISPR/Cas9 technology under Dr. Eric Mendenhall and Vanderbilt University, where he developed a novel hydraulic actuator under Dr. Michael Goldfarb. He will attend graduate school at Vanderbilt University, to pursue a Ph.D. in mechanical engineering and conduct research in the field of rehabilitation robotics. After his graduate studies, he hopes to start his own company developing rehabilitative and assistive devices.

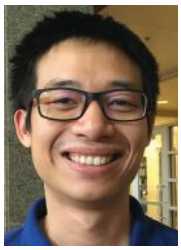
Spencer Fellow No. 63

Eshita Khera

Eshita has a B.E. in biotechnology from India and graduated summa cum laude with an M.S. in biomedical eng'g from the University of Michigan. She is pursuing a Ph.D. in chemical engineering at UM. She has extensive research experience, holds several research publications, and a patent. Her Ph.D. research is focused on engineering molecular agents with NIRF dyes for targeted cancer treatment. Eshita joined Michigan Gamma in 2015 and will be the fall 2018 Service Coordinator. As a previous MI Γ Vice President, Eshita started the ΤΒΠ graduate student speaker series, a college-wide series of professional development events to enhance students' scientific communication skills. She was also the MI Γ Convention arrangements chair, responsible for management of the 2017 ΤΒΠ Annual Convention. Eshita hopes to employ her education and experiences to pursue a career in biomedical entrepreneurship and scientific communication. She enjoys read-' ing, painting, and walking in 'The Arb.'

Centennial Fellow No. 33

Phiwat Klomkaew



Phiwat, a native Thai, graduated summa cum laude from the University of South Alabama with a B.S. in chemical engineering. Phiwat served as the 2017 Alabama Epsilon President and the chapter's scholarship and integral beta competition committee chair. At the 2017 Convention, he served as the finance committee secretary. During his undergraduate years, Phiwat co-founded the meditation & mindfulness club and the student organization for academic research. He was also the student ambassador for the Office of Undergraduate Research and the College of Engineering. An honors college student, Phiwat did his undergraduate research in modeling a power-to-gas energy storage systems for a greener bus system. After graduation, he will pursue his Ph.D. in chemical engineering at the University of Texas at Austin, working on an energy-related project with the goal of pursuing a career in academia. Phiwat is a ΤΒΠ Student Advisory Board member.

Stark Fellow No. 40

Margarita T. Kovalchuk

Margarita graduated from California State University Sacramento (CSUS) with a B.S. in civil engineering. At CSUS, she served as a physics TA, and ΤΒΠ and ASCE officer, SWE president, and University President's ambassador. Her research consisted of field and laboratory investigations of the role of flow rates and oxygen on subsidence reversal in the California Delta. She completed internships at the California Energy Commission, Kennedy/Jenks Consultants, and Black & Veatch. She also studied contaminant transport and methane hydrates at the Univ. of Nebraska Lincoln and Texas A&M Univ., respectively. Outside of school, she enjoyed teaching Sunday school, playing piano, and singing in the choir of her local church. Margarita is a 2016 ΤΒΠ Scholar, 2017 DiscoverE New Face of Engineering, and 2018 NSF Graduate Research Fellow. She looks forward to graduate study in environmental fluid mechanics at Stanford University's department of civil and environmental engineering.

Anderson Fellow No. 12

Brianna M. Lax

Brianna graduated summa cum laude with a B.S.E. in chemical engineering and a minor in environmental engineering from the University of Michigan, Ann Arbor. During her time at Michigan, she researched microfluidic devices and sensors in the Burns group. She spent a summer as an Amgen Scholar at UC, Berkeley, researching in a natural product discovery lab and presented this research at the 2017 AIChE Conference. She served as an instructional aide and tutor for the chemical engineering department and a study group facilitator for the chemistry department. She also served as President, External Vice President, and Activities Officer for Michigan Gamma, and was a 2017 ΤΒΠ Scholarship recipient. In the fall, Brianna will begin her Ph.D. in chemical engineering at MIT as an NSF fellow, focusing her research on metabolic engineering. She aspires to become a professor after graduate school.

Tau Beta Pi Fellow No. 818

Patrick A. Leggieri

Patrick graduated from Lafayette College with a B.S. in chemical engineering and a minor in biotechnology. At Lafayette, he served as Pennsylvania Epsilon Treasurer, was involved in AIChE, and served as a peer tutor for organic chemistry, calculus, and differential equations. He is the first author of a publication on his early undergraduate research in biodiesel cold flow properties. He completed an NSF REU at the Johns Hopkins Inst. for Nanobiotechnology where he assessed the effects of shear stress on the blood brain barrier. In his senior honors thesis, he evaluated the potential for mixotrophic cultivation of microalgae for biorefinery applications. In 2017-18, he was awarded Goldwater and ΤΒΠ scholarships, as well as an honorable mention for the NSF Graduate Research Fellowship Program. Outside of school, he enjoys playing soccer and hockey, watching football, and playing bass in his band. He is pursuing his Ph.D. in chemical engineering at the University of California, Santa Barbara.

Tau Beta Pi Fellow No. 819

Isaac A. Mastalski

Isaac graduated summa cum laude with a B.S. in chemical engineering and minors in chemistry and music from the University of Pittsburgh. He has performed research on a highly sustainable catalytic pathway to convert natural gas into useful chemicals, which resulted in a first-author paper and several presentations. He also researched a public policy project designed to help cities adopt solar energy by augmenting it with natural gas. He completed an internship at NASA Goddard, where he studied electrochemical bath properties for an upcoming satellite. Isaac is the Pennsylvania Lambda Vice President, maintains leadership roles in several honors societies, and plays first chair viola in the Univ. of Pittsburgh Symphony Orchestra. He also participates in numerous engineering and musical outreach events in the community. He will begin pursuing a Ph.D. in chemical engineering at the University of Minnesota, with the hopes of becoming a tenured professor or entering an R&D position in industry.

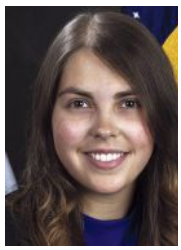
Sigma Tau Fellow No. 44

Ava K. Mauser

Ava will graduate from the University of New Mexico with a B.S. in chemical engineering, concentration in bioengineering, and a minor in mathematics. She is a 2017-18 ΤΒΠ Scholar and has served as New Mexico Beta Vice President and President. During her undergraduate career, she has worked at Los Alamos National Labs, refined an iOS application, and was a teacher's assistant for transport phenomena. She works as a teacher's assistant for mass transfer and a research assistant for the orthopedic biomechanics and biomaterials laboratory (OBBL). While at OBBL, she implemented decellularized bovine bone into bio-inks for 3D printing scaffolds of the bone-ligament interface. Her work at OBBL drove her to pursue graduate school in biomedical engineering. Ava will work at Los Alamos National Lab this summer then continue her education at the Univ. of Michigan within the biomedical eng'g Ph.D. program. She plans to continue being involved in organizations and promoting STEM fields to minorities.

Tau Beta Pi Fellow No. 820

Carly J. Romnes



Carly is graduating with a B.S. in nuclear engineering and minors in mathematics & psychology from University of New Mexico. She served as New Mexico Beta Chapter External Vice President. Carly tutors high school students and is an intern in the extreme materials lab at UNM where she studies the effects of radiation on various types of materials. Her plan is to pursue this type of research during graduate school. Carly is enrolling in a Ph.D. program in nuclear engineering with a focus on materials science and engineering at the Univ. of Illinois, at Urbana-Champaign. She is also a NASA MUREP scholar and completed two internships at NASA's Marshall Space Flight Center and will complete a third this coming summer. Carly received both the outstanding junior award and the outstanding senior award from UNM's nuclear engineering department. Last year, two of her four conference papers won best paper. After grad school, she plans to either work for NASA or at a national lab.

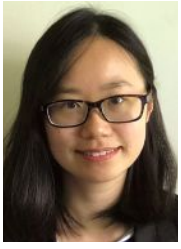
Swalin Fellow No. 2

Abigail J. Shelton

Abby graduated summa cum laude from the University of Kentucky (UK) with a B.S. in electrical engineering and a mathematics minor. She pursued a Power and Energy Institute of Kentucky undergraduate certificate and conducted research on sustainably designed greenhouses within the UK College of Design. Outside of UK, she completed two co-ops at CMTA Consulting Engineers, designing the electrical systems for education and healthcare facilities. In 2017, Abby was recognized as an IEEE Power and Energy Society John W. Estey Outstanding Scholar. Additionally, she worked as a resident advisor, served on the student sustainability council, and represented ΤΒΠ on the engineering student council. Abby will pursue a M.Eng. in industrial engineering and operations research with a focus on energy systems at the Univ. of California, Berkeley. Ultimately, she plans to contribute to the power and energy field by modernizing the power grid to efficiently distribute power and accommodate the widespread adoption of renewable energy sources.

Record Fellow No. 12

Chen Song



Chen graduated summa cum laude from Rice University with a dual-degree B.S in chemical engineering and B.A. in economics. At Rice, she served as ΤΒΠ Vice President and helped to organize several events to make the group more visible on campus. She worked at two research groups focusing on secondary oil recovery and asphaltene precipitation mechanism and detection. Upon graduation, she won the award for distinction in research and creative work, and the Ann and Joe Hightower Superior Award, which is the highest award given to an undergraduate in the ChemE department. Chen is now a first year Ph.D. student at MIT studying chemical engineering. Her research focuses on investigating the fouling mechanism of oil in water microfiltration using electrospun fibrous membranes. After graduation, she plans to solve energy related problems in the oil and gas industry.

Zimmerman Fellow No. 7

Simone M.M. Stanley

Simone graduated summa cum laude with a B.S. in chemical engineering. At Howard University, she conducted independent research under Dr. Patrick Ymele-Leki. The purpose of the study was to develop an experiment based app to introduce fundamental engineering principles. The app, ThermoHUE, helps students learn about chemical kinetics and reactions. This led to a publication in the *Chemical Engineering Education Journal*, and an award from AIChE. Simone was a 2017 ΤΒΠ Laureate for achievements in the arts and hopes to continue her work in addressing STEM education innovation through art. Her career interests also include addressing health disparities with the use of technology. Currently at the NIH, she works in the National Institute of Neurological Disorders and Stroke in the circuit dynamics and connectivity unit studying the gene expression of cells that undergo neurogenesis. Simone will enroll in a master's in biotechnology program at Georgetown University in D.C.

Tau Beta Pi No. 821

Marina Swanepoel

Marina graduated cum laude from the University of South Alabama with a B.S. in mechanical engineering and a minor in mathematics. During the 2016-17 academic year, she served as Alabama Epsilon President. While Marina was president, the chapter received the R.C. Matthews Award for Most Outstanding Chapter. As a student, she published the journal article "Low-Cost, Multi-Purpose Autopilot for Ground and Aerial Vehicles Using an Arduino MEGA with Transistor Array Safety Circuit" as co-author, interned at Airbus, and was a member of the South Alabama track and field team that won the Sun Belt Conference title. Marina is pursuing an M.S. in mechanical engineering at the University of South Alabama with a focus in metallography, and interning at Automation and Controls Engineering, LLC. Her long-term goal is to establish a company dedicated to finding new and innovative ways to design and build aircraft.

Williams Fellow No. 39

Chris Torres

Chris graduated summa cum laude with a B.S. in chemical engineering with honors distinction and a minor in mathematics from the University of New Mexico. He spent four years contributing to research efforts related to uranium mobility in the Southwest from abandoned mine wastes to local waters, resulting in two published scientific manuscripts, 15 poster presentations, four oral presentations, and a senior thesis. As an intern at the Univ. of Pittsburgh and at the National Institute of Technology, he conducted nanomaterials research. Chris is active with AIChE and the Alliance for Minority Participation, and seeks to further the advancement of underrepresented students in STEM. He has served as a peer learning facilitator for three semesters to chemical engineering underclassmen, developing a passion for teaching. He will attend the Univ. of Illinois at Urbana-Champaign for a Ph.D. in chemical & biomolecular engineering and then pursue a career in academia to serve as a teacher, mentor, and researcher.

Tau Beta Pi Fellow No. 822

Hao Xing

Hao graduated from MIT with a perfect GPA, majoring in biological engineering and minoring in mechanical engineering. He is pursuing his Ph.D. in the Kyriakides Lab at the department of biomedical engineering at Yale University. As an undergrad, Hao and colleagues at Weiss Lab engineered a mammalian cell cross-talk system, which won the iGEM silver medal. He also investigated the effect of mechanical flow on tumor-associated macrophages in Kamm Lab, which resulted in two high-impact publications and the Znaty-Merck Prize awarded by MIT. Hao's current research is to study extracellular matrix dynamics in diabetes to develop a biomaterial to induce regeneration in diabetic chronic wounds. As a co-founder of the MIT biotech group undergraduate initiative, he continues his passion for translational technology at Yale by working with Canaan Partners and the center for biomedical innovation and technology to bridge the gap between research and clinical reality. Hao is a nationally-ranked competitive ballroom dancer in China.

Matthews Fellow No. 21

Tranice' R. Warner

Tranice', a Kansas City, MO, native, completed her B.S. in civil engineering with a concentration in water resources and geotechnical design at California State University, Fresno. As a Husband Boeing Honors Scholar, Tranice' has conducted undergraduate research regarding producing biodegradable plastic from various waste streams. In 2017, Tranice' accepted a merit-based fellowship from the Sonny Astani dept. of civil and environmental engineering at the Univ. of Southern California to pursue a Ph.D. in environmental engineering. Her research focuses on how anaerobic membrane bioreactors can be designed and operated for extraction of energy and water from waste streams. In 2018, Tranice' was recognized as an NSF GRFP fellow and received an honorable mention from the Ford Foundation. Tranice' previously served on the board of directors for the National Society of Black Engineers and will continue to serve NSBE as a mentor and advocate for underrepresented groups in STEM.

King Fellow No. 57

Nathaniel Weger

Nate completed an undergraduate degree in mechanical engineering at the University of Iowa. During this time, he led multiple research projects where he studied different biomasses to be used to produce energy through the gasification process, as well as the possibility of using gasification technology to prevent avian influenza outbreaks. He worked in another lab where he analyzed the use of drones and helicopters to improve flood-mapping processes. Nate was the president of Continental Crossings for two years, where he worked to assist rurally isolated communities in Nicaragua with bridge construction in order for them to have access to schools, hospitals, and markets. He was a senator for the Univ. of Iowa student government, a Grand Challenges Scholar, a five-semester teaching assistant, and an avid volunteer in his community. Nate will pursue his Ph.D. in mechanical engineering at the Univ. of California, Berkeley, where he will be working to research and develop energy technology.

Chapter Endowment Update

247 Collegiate chapters.

60 chapters with at least the minimum gift of $5,000.

16 chapters funded at or above $100,000.

171 chapters with NO gifts to date.

"It's nice to know you've left a legacy for future engineering students. Thanks for making that happen for me."
Stephen W. Ricks, IN Alpha '63
CEI donor supporting IN A at Purdue

Contact Sherry Jennings-King, TN A '93, for more information on the Chapter Endowment Initiative. Reach her by phone at (612) 226-2922 or by email: *sherry.jenningsking@tbp.org*.

Challenges/Matches: The minimum gift being accepted for this initiative is $5,000. To date we have four open challenges/matches launched by alumni in support of the following chapters:

California Alpha	University of California, Berkeley	(David E. Kepler, CA A '75)	$20,000
	$10,000 needed to complete this challenge.		
Iowa Beta	University of Iowa	(David D. Kilzer, IA A '96)	$20,000
	$5,000 needed to complete this challenge.		
Ohio Alpha	Case Western Reserve University	(Charles E. Reed, OH A '34)	$20,000
	$10,000 needed to complete this challenge.		
Pennsylvania Theta	Villanova University	(John L. Hennessy, PA Θ '73)	$25,000
	$20,000 needed to complete this challenge.		

Masters of Disaster

Indonesia, Ground Zero for Tsunami, Earthquake, and Volcano Disasters, Applies Technology—and Local Wisdom—to Help Save Lives

By **Arielle Emmett**

Indonesia is the world's largest island country, a widely dispersed necklace of more than 17,000 tropical isles riding atop four clashing tectonic plates. The country has 34,000 miles of coastline, some of it sinking, 266 million people inhabiting more than 6,000 islands, and a remarkable 100,000 year history of dwarf-size hobbits (*Homo floresiensis*) and related species that have pushed back the timeline for human tool and art making, raising new questions about the origins and migration patterns of early man.

That said, Indonesia also sits on the Ring of Fire, the nexus of the Pacific Basin and its continental shelves, all of them subject to violent earthquakes, volcanoes, and continuous ocean trench movements. *Sundaland*, for example, the name for a continental shelf extending southeast from the Malay Peninsula, once encompassed the larger Indonesian islands of Sumatra, Java, and Borneo. Exposed at maximum size (1,800,000 km^2) 20,000 years ago during the peak of the last Ice Age, Sundaland showed evidence of human habitation—pyramid structures and tools—suggesting it may have held a civilization akin to Atlantis. The continental shelf disappeared again under rising oceans at the tail end of the Younger Dryas (12,500 to 9,600 BC), a transitional period pre-Holocene marked by intense cold followed by abrupt global warming and rapidly melting glacial ice. Producing storm surges and floods, earthquakes and volcanic eruptions, the Dryas etched the richly biodiverse island ecology of Indonesia today. This ecology persists; Indonesia remains a dartboard of natural disasters, one of the most Edenic and seismically hazardous places on earth to live.

I visited Indonesia in late December 2017 to investigate what progress had been made in the science of natural disaster prediction and warning. This was my third time in a land that haunts me for its beauty, risk-taking, and "a smiling-through-the-apocalypse" attitude of its people.

What I learned is that precision technologies to predict and warn against natural calamities are growing. In particular geodesy—the science of measuring the earth's surface—especially geodetic measurements of plate activity, is beginning to exert some life-saving control over seismic events. Scientists now can identify many of the "hot spots" in Indonesia, enabling government planners and residents to listen, learn, and adopt proactive measures to mitigate calamities and even forecast their probable location and severity in order to save lives.

Sudden Rupture

No one can forget the devastation of the 9.2 magnitude earthquake and Indian Ocean Tsunami of December 26, 2004, an event that killed 280,000 people in 14 countries. After lying dormant for nearly 1,000 years, the sudden rupture of the Sunda Megathrust, the gigantic ocean fault paralleling the western edge of Sumatra Island and sweeping southeast beneath Java island, ripped a seam in the earth's crust 1,600 kilometers long. The rupture sped north-northwest from the ocean epicenter west of Banda Aceh toward Myanmar at the rate of 2.5 kilometers (1.5 miles) a second. This was the longest earthquake in recorded history—10 minutes—releasing enough energy to equal 23,000 Hiroshima-size atomic bombs.

The resulting uplift of the ocean floor tilted the nearby Andaman Islands 15 degrees, generating walls of water that spread across the Indian Ocean as far as Sri Lanka, Thailand, and East Africa. Without adequate warning or experience in spotting the signs of tsunamis, the people of Aceh province in northern Sumatra were hardest hit by three giant waves. The last one, a black thundering wall of water nearly 30 meters high (98 feet), pushed one ocean-going vessel five miles inland as it drowned or trapped 170,000 Indonesians.

PHOTOS CLOCKWISE FROM RIGHT: Mount Agung erupting on November 27, 2017. Photo: Michael W. Ishak. Head of tsunami mitigation Weniza explains the Indonesian Tsunami and Earthquake Warning System at BMKG's Jakarta headquarters. Photo: Wibi Pangestu Pratama. The remains of a house surrounded by ruins in Banda Aceh after the 2004 tsunami. Photo: U.S. Dept. of Defense.

Three months later, just to the south, another slippage along a 350 km stretch of the Sunda Megathrust produced an 8.6 magnitude quake and lesser tsunami that killed 1,300 Indonesians. Dozens of other earthquakes of magnitude 7.8 or higher—some generating tsunamis, some not—have struck repeatedly in the same area (2005, 2007, 2008, 2009, 2010, 2012, 2016).

Seismologists now believe the next "big one" most likely will originate in the Mentawai Gap, an ocean section of the Megathrust subduction zone further south from the Aceh-Andaman epicenter of 2004. This area of the Gap hasn't experienced a major earthquake in the past 200 years. Scientists at the Earth Observatory of Singapore (EOS) are using a precision GPS array to monitor crustal and plate deformation at the Gap. They now expect that built-up stresses will trigger an earthquake and tsunami soon—no one knows exactly when. But this one, they believe, may rival or exceed in magnitude the 2004 Sumatra/Indian Ocean 9.2 tsunami event.

One Sumatran coastal city, Padang, population 833,000, is situated only 90 nautical miles directly east of the Gap. In the event of an ocean earthquake in Mentawai greater than magnitude 7, this is the city where a tsunami could strike first.

"Padang is the riskiest city in the world for tsunamis," said Patra Rina Dewi, a tsunami hazard education specialist based there, citing a *National Geographic* article on tsunami dangers. Since the 2004 tsunami, she has been working with the community to educate members and develop an evacuation and shelter plan. "We now tell our community that if you feel a strong earthquake lasting 30 seconds or more and you can't stand properly, you must evacuate," she said. "Don't take your vehicles, just walk. The people should get three kilometers from the beach in less than half an hour. Or they have to reach a higher building or higher land at least 15 meters high to be safe."

Coping without End

That message is pervasive around Indonesia's island fault lines. "Our subduction zones are three times greater in size than Japan's, and Mentawai is one of the most suspicious areas," said Danny Natawidjaja, Ph.D., a paleo-seismologist with the Indonesian Institute of Sciences *(Lem-*

PHOTOS FROM LEFT: Balinese boys near the Mount Agung Volcano Observatory wear the head covering known as *Udeng*, Bali's traditional head covering for men. Photo: Wibi Pangestu Pratama. A village near Banda Aceh is still semi-submerged seven days after the December 26, 2004, tsunami. Photo: U.S. Navy.

baga Ilmu Pengetahuan Indonesia, LIPI). Natawidjaja is best known for mapping Indonesia's deepest ocean and land faults. Collaborating with American seismologist Kerry Sieh, Director of the Earth Observatory of Singapore, he also predicted within six months the likelihood of the 2004 Indian Ocean Tsunami. Today he worries the work is too overwhelming. "The main focus of the government is to make people ready for a tsunami, [but] we have to have a focus on which one is most likely. To do that, we need enough knowledge about earthquake sources that have the most potential for damage in the near future." Research money is never enough, he says, and there are huge swaths of Indonesia that have yet to be mapped or explored.

What, then, do Indonesians do to cope, prepare, and survive? The answers are complex. First of all, few Westerners, much less Indonesians, understand the frequency and unpredictability of seismic disasters across the 3,000-mile wide archipelago. With 6,000 islands housing the Indonesian population, the "last mile" is the biggest problem; many islanders are still without regular access to the Internet, cell phones/SMS, or even a radio. It's hard to disseminate disaster warnings and information to affected remote areas in time, especially if provincial or local community officials are preoccupied or incredulous.

Big Progress Made

Further, the science of earthquake prediction hasn't advanced sufficiently to assure precise timings or schedules. Scientists have made big progress measuring plate movement and fluid dynamics of the earth's lithosphere; and a hot new area of interest in Indonesia, especially, is studying the uplift of coral micro-atolls, many of them displaced during past earthquakes. These uplifts suggest potential cycles of tectonic history; an elevated atoll shows physical changes that may also yield clues leading to forecasts of future seismic events.

Volcanic eruptions, on the other hand, are easier to forecast and much noisier. In November and December 2017, for example, Mount Agung in Bali and Sumatra's Mount Sinabung, which sits on the Sumatran Fault (a second fault bifurcating Sumatra island that runs parallel to the Sunda Megathrust), both erupted under predictable circumstances. Mount Sinabung, the 2,460-metre stratovolcano, started erupting in August 2010 for the first time in more than 400 years; after three years of inactivity, Sinabung erupted again in September 2013 and has remained highly active since. Eastern Bali's Mount Agung hadn't erupted since 1963, but it showed all the signs beginning last August into September, according to Dr. Devy Kamil Syahbana, a scientist monitoring the volcano with the Indonesian Center for Volcanology and Geological Hazard Mitigation (*Pusat Vulkanologi dan Mitigasi Bencana Geologi Badan*).

"In September we saw smoke coming out of the crater; and though for other volcanoes it might be normal to see smoking, for Agung it's not normal. Agung is a phreatic-magmatic eruption," he said, which means that the volcano combines magma and ground water, releasing intensifying emissions of steam and gray ash into the stratosphere. Phreatic eruptions can be abrupt and sudden—or they can escalate predictably as Agung did.

"Because of the technical changes in volcanic science, we have fewer victims in the past 20 years," Kamil said. "For example, two decades ago we didn't have broadband seismometers or multi-gas analyzer spectroscopy to give us insights into the physical processes inside a volcano," he said. "Now, volcanic eruptions are among the most predictable of geological disruptions. Still, you can't predict earthquakes, and that hasn't changed."

Fires, Floods, and Tornadoes

Although the 2004 Aceh-Andaman quake was certainly classified among scientists and the media as a "showstopper," possibly because it represented a once in a century or two occurrence, Indonesia actually experiences an average of 2,000 natural disasters a year. More than 90% are caused by storms and wet weather (rainy season lasts from October to May). The country battles flooding rains and mudslides, frequent tornadoes, along with forest fires, some of them from farmers burning peat lands and jungle to cultivate palm oil and other plantations, especially in Sumatra and Kalimantan (the Indonesian part of Borneo). This leads to air pollution and island "subsidence"—sinking; in Sumatra, subsidence is already a huge problem.

In 2016, Indonesia logged 2,342 natural disasters, the highest in 15 years, according to the National Disaster Mitigation Agency in Jakarta, the overall coordinating center for disaster preparedness (BNPB, short for *Badan Koordinasi Nasional Penanggulangan Bencana)*. In 2017, Indonesians reported 787 floods, 716 tornadoes, 614 landslides, 96 forest and land fires, 19 droughts, 20 earthquakes, two eruptions (Mount Sinabung, Sumatra and Mount Agung, Bali) and 11 tidal waves. Further, 3.4 million people were displaced that year as a result of single or compound incidents. More than 300 were killed; a thousand were injured; and that's just an aver-

age year. An earthquake in Yogyakarta in 2006, for example, killed 5,000 local residents, destroying or damaging 150,000 homes. The quake also knocked the heads and torsos off thousand year–old stone guardians and avatars leading to the 9th century temples of Borobudur and Prambanan, two of Indonesia's most sacred Buddhist and Hindu sites.

While Indonesian scientists have called for new technology to more quickly detect natural disasters in order to save lives, an array of other factors intervene. These include Indonesian politics and poverty—some localities just don't pay attention to disaster warnings or mitigation efforts until it's too late, while weak infrastructure, budgets, and conflicting agendas of multiple disaster agencies may muck up cooperative efforts. In addition, too many homegrown government IT systems and databases have hampered cooperation because the systems were essentially incompatible.

"Before 2012, even with the earthquake disasters of 2004 and 2009, Indonesia didn't have a good warning or monitoring system for disaster management," explained Dr. Sutopo Nugroho, information director of BNPB, the organization responsible for spearheading response to natural calamities. "If we had an earthquake or volcano and lots of citizens accessed our websites for information, too often the sites crashed," he said.

Single Platform

Since 2012, with the help of the Pacific Disaster Center (PDC) and USAID, BNPB has modernized. It's now adopted a single international platform for monitoring and acting on all flavors of natural hazards in real time. Known as InAWARE 6, a variant of DisasterAWARE, the system creates a series of interactive (touch-screen) graphical displays integrating island(s)' population data and risk maps with multiple data feeds showing the severity and size of Indonesian weather events, along with colored "bulls-eyes" indicating the locations of earthquakes, volcanoes, fire, mudslides, and tsunamis. Decision makers at headquarters then analyze the data and issue advisories, instructions, and disaster mitigation plans.

"InAWARE 6 isn't a prediction system," said Chris Chiesa, Deputy Director of PDC, the organization responsible for supporting the Indonesian deployment along with USAID. "But rather it incorporates data and alerts from various international and national sources of tsunami warning, volcanoes, and others hazards." Among those inputs are alerts from BMKG *(Badan Meteorologi, Klimatologi, dan Geofisika)*, Indonesia's domestic agency for geosciences and meteorology, *BIG (Bersama Menata Indonesia)*, a domestic geospatial mapping agency. The United States Geological Service (USGS), the US National Oceanic and Atmospheric Administration's (NOA) Pacific Tsunami Warning Center also take part, along with other hazard monitoring centers from Japan, Australia, and from India, members of the Indian Ocean Tsunami Warning System (IOTWS).

"Disaster mitigation is really a matter of people to people communication," Nugroho continued. "So information systems is just a supporting thing. What BNPB is trying to integrate is the local wisdom of communities with the technology so that people can build community capacity to cope with the disaster itself." An example: BNPB interviewed members of the Yogyakarta community about how they wished to be evacuated when the volcano Mount Merapi erupted in 2010. "The townspeople said they wouldn't move without their assets," Nugroho said, "so BNPB coordinated with President Joko Widodo who signed an order allowing the military to evacuate the local community to temporary shelters along with their livestock." The same strategy was used to successfully evacuate residents of Mount Agung in Bali in November 2017 when the volcano began spewing fountains of gas and ash, disrupting commercial air traffic and darkening the Bali skies.

Nugroho, 48, who holds a doctorate in agricultural science, is Indonesia's face of disaster relief, a veritable "master of disaster" who speaks frequently to the press

PHOTOS FROM LEFT: Patra Rina Dewi, an earthquake and tsunami education specialist in Padang, describes the challenges of disaster preparedness. Iwan Hermawan of the Earth Observatory of Singapore (EOS) explains the operation of a GPS station, one of nearly 60 deployed for seismic research in the Indonesian islands. Photos: Wibi Pangestu Pratama.

and enjoys guiding visitors to BNPB's fabulous headquarters museum featuring bas reliefs of rescue personnel along with graphical displays of Indonesia's most notorious earthquakes, tsunamis, and volcanic disasters. Nugroho has also guided the country's modernization efforts over the past decade to improve communications, disaster warnings, and outreach to local communities. For example, Indonesia now has a network of seismic, tsunami, and volcanic detection systems, however imperfect, that include strategically placed seismometers and accelerometers in and around subduction zones in Sumatra, Java, Bali, Sulawesi, and Papua, among other islands, along with shoreline tidal gauges, and on-beach cameras. BMKG developed a tsunami warning and decision support system, known as InaTEWS, in conjunction with German scientists after 2004. The system, effectively deployed in 2008, promises a tsunami threat response and dissemination of initial data and advisories (including color-coded tsunami warnings) within five minutes of a suspicious quake event.

Vandalized Buoys

While seismometers and other equipment work reasonably well in the InaTEWS network, the tsunami warning system still lacks GPS geodetic equipment and a series of functional ocean buoys, pressure sensors or DARTS—aka Deep Ocean Assessment and Reporting sensors—to confirm findings about suspicious events.

DARTS are positioned on sea bottoms to measure changes in water pressure and depth as an earthquake shakes the sensors and, in some instances, a tsunami wave passes overhead. The sensors should, in theory, send their data to the network of ocean buoys outfitted with electronics that send data to the BMKG Tsunami Warning Center (BMKG also monitors weather, climate change, geology, and other threats). However, in March 2016, all 22 of the Indonesian ocean buoys installed for this purpose failed during a 7.8 magnitude earthquake that struck about 500 miles from Padang on Sumatra's west coast. The quake prompted immediate BMKG tsunami evacuation warnings, sending local disaster organizers and panicky residents of Padang scurrying to higher ground. But no killer wave materialized. It took authorities three hours to rescind the evacuation order.

"Of the 22 buoys, they're gone because of vandalism and lack of funding for maintenance," acknowledged Ariska Rudyanto, a seismologist and disaster preparedness engineer with BMKG in Jakarta. Reportedly, all the buoys were stripped for parts or used, unwittingly, by local fishermen seeking anchors for their boats.

"Seismic data is supposed to be integrated with a geodetic system and GPS [to confirm tsunami findings]," said LIPI's Natawidjaja. Of 18 tsunami warnings issued by BMKG thus far, for example, six have been false alarms, a failure rate about comparable to that of Japan. The Japanese, though, are conditioned to obey all tsunami warnings, while Indonesians are more casual. "If people perceive too many false warnings, then they don't pay attention to the real things coming," Natawidjaja said.

More Vexing Issues

There are other, more vexing issues behind the technology snafus. For example, Jörn Behrens, professor of mathematics, University of Hamburg, who was heavily involved in developing the simulation system within the German-Indonesian Tsunami Early Warning System (2006-2009), says politics too often got in the way of common sense. In 2006, for example, though German politicians supported the warning project, they were facing elections, and "they wanted to see fast results." So when the buoys were deployed in Indonesian waters, they were not thoroughly tested. "Technically, they did work, providing data, but they were placed too close to the source of potential tsunamis." While this poses the problem that the buoy cannot distinguish between water waves and earthquake signals, it is—on the other hand—required, since otherwise the warning time is too short or nonexistent. "The wave could reach the shore even before reaching the buoy!" Behrens explained. He believes the 2016 media exposure of the failed buoys was really part of another agenda—namely, to draw attention to Indonesia's desperate need for more funds to repair or replace the ocean buoys entirely with another, more effective earthquake and tsunami sensing technology.

As Behrens and Natawidjaja are well aware, the hazardous Mentawai Gap is a likely target for the next quake and tsunami event. Though the Gap, which is part of the Sunda Megathrust, has been quiescent for around 200 years, accumulating stresses caused by subduction of the Indo-Australian plate beneath the lighter Sunda subplate (part of the Eurasian plate) are causing concern. The rate of subduction is 5 to 7 cm a year, but in all, the heavier plate has already been pulled under 15 to 18 meters, causing significant deformation of the upper plate, which is shortening and bowing downward, storing potential

energy like a loaded spring (this phase is known as *interseismic)*. When the rupture finally occurs, the lower plate will move deeper—10-30 meters on average, while the upper plate will spring back to its original elevation, raising the ocean floor, and with it, the possibility of tsunami.

"The Gap is locked and loading energy, and there has to be an event to release the stored energy," said Iwan Hermawan, Ph.D., a geodesist and research fellow at EOS. This particular patch of the Mentawai Gap is most vulnerable to a big shake because earlier quakes have already released significant energy from sections both north (Aceh-Andaman 2004, 2005), and further south. "The epicenter of the 2007 quakes was roughly 300-400 kilometers south of the coastal city of Padang," Hermawan explained. "In 2007 in Bengkulu Province we experienced a big shake but no tsunami because at this location the earthquake was quite deep. But this part of the Mentawai [faces] the most populated area of Sumatra, Padang, so the risk is high."

High, yes, but not impossible to overcome. Patra Rina Dewi of Padang says the town has actually built a tsunami shelter close to the coast. The structure resembles a multi-story parking lot with concrete stairs, rails, and circles and gates—presumably to drain water. But it's hard to imagine what would happen if the size of a tidal wave exceeded 20 meters or more.

'Scaring the Tourists'

After the 2004 disaster, Dewi recalled, "at first we tried to deny it…people here even said 'Don't mention the word *tsunami* because it will invite one.'" By 2005, even with EOS's Kerry Sieh trying to convince local stakeholders to prepare, people resisted, she continued. "The Padang government asked us to stop our education program because they said we were scaring the tourists. But after the earthquakes of September 2007 that were greater than 7+ magnitude, the government woke up and started trusting our organization. They gave us money for one year."

Both BMKG and BNPB provided content for educating children and adults, she added, but today government money for training and drills is scarce. Dewi persists, but fears that a key bridge providing the only escape route inside one quarter in Padang will collapse during a tsunami evacuation, leaving as many as 200,000 people without a way out.

Technology and infrastructure improvements, in fact, may only go so far to ensure survival. The best way to save Indonesia's people will be education, disaster preparedness, and reliance on group memory. EOS's Kerry Sieh and Danny Natawidjaja say that relatively inexpensive measures could have saved tens of thousands of lives in 2004—and will still be effective now.

"We think that a sophisticated early warning system is not as crucial for saving lives as knowledge, which is much more crucial," Natawidjaja said. Scientific research linked to public education about the hazards—when, where, and why they are likely to occur—plus adequate warning and a strong emergency preparedness plan, including identifying the best escape routes, could mitigate hazards. At-risk Indonesian communities can also strengthen buildings against shaking or move low lying coastal homes and businesses to higher ground.

And then there's the matter of local wisdom: "During the 2004 quake and tsunami, the people of Simeulue island, only 40 miles from the epicenter, were saved because they learned from the experience of their ancestors who recalled the 1907 tsunami," Natawidjaja said. "When locals saw the sea receding from the shore, they knew what to do and escaped to higher ground."

Only seven people on Simeulue perished in the 2004 tsunami out of a population of 70,000—an amazingly low number compared to the 170,000 who died in nearby Aceh Province because they failed to recognize the tsunami warning signs. Sutopo Nugroho praises "local wisdom," and says that self-reliance and local knowledge can help people survive. "We inherit *gotong royong*, the 'working together' spirit," he said. "Our budget is not big enough to handle all these challenges. But people in local communities can use the stimulus money we provide to rebuild themselves.

"People here help their neighbors, and that's according to local wisdom," Nugroho explained. "They know that disaster belongs to us. It's our responsibility to deal with it. Working together is our strength."

Arielle Emmett, Ph.D., writes about aerospace, aviation, energy and biotechnology for *Smithsonian.com, Smithsonian Air & Space,* and many other magazines and journals. She is a 2018-19 Fulbright Scholar who will conduct research in East Africa. Emmett lives in Mooresville, NC.

Why do we call it a...Watt?

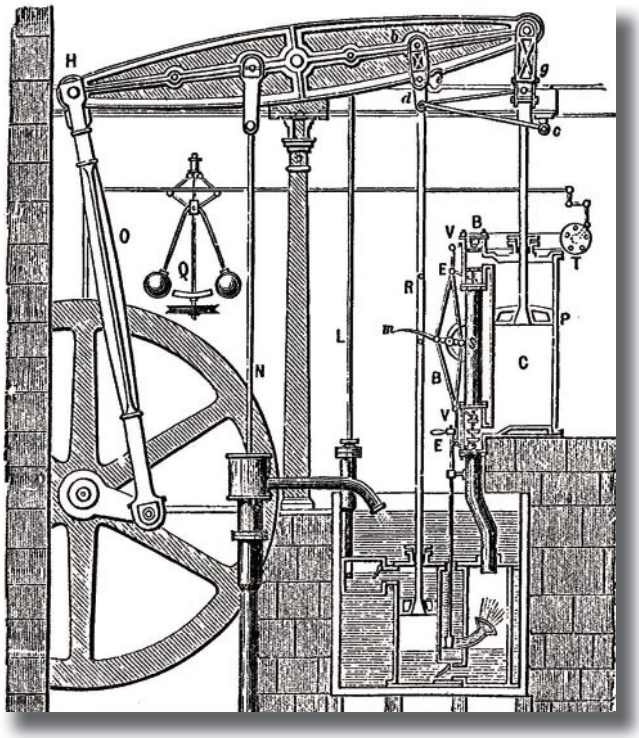
by Lyle D. Feisel, Ph.D., P.E. (Ret.), *Iowa Alpha '61*

This is the third in a series of articles that explore the history of science and engineering. One way in which this history has been preserved is in the names of the scientific units that we commonly use. Those units will serve as starting points for these articles as we explore "Why do we call it a…?"

First we wrote about Volta. Then we wrote about Ampère. What's next? Well, make that question into an affirmative statement and you have your answer. Watt's next.

Volts, which are the units in which electric potential is measured, are interesting, but we know that nothing useful happens until we also have some current, measured in amperes. When we have a voltage *and* a current, energy is converted from one form to another; from mechanical to electrical, say, or electrical to thermal. As we all know, the *rate* at which that energy is converted is measured in watts, one watt being equal to one joule per second.

The namesake of the watt is James Watt who was born in Scotland in 1736 and died in 1819. While most people for whom physical units are named would be considered scientists, Watt was first and foremost an engineer and craftsman, and also an entrepreneur. It's not that he didn't understand the science of the day, which was still in its infancy. That was important to him, but he appears to have been motivated primarily by the goal of making machines that did something useful and also —not incidentally—would generate some income. Sounds like an engineer.



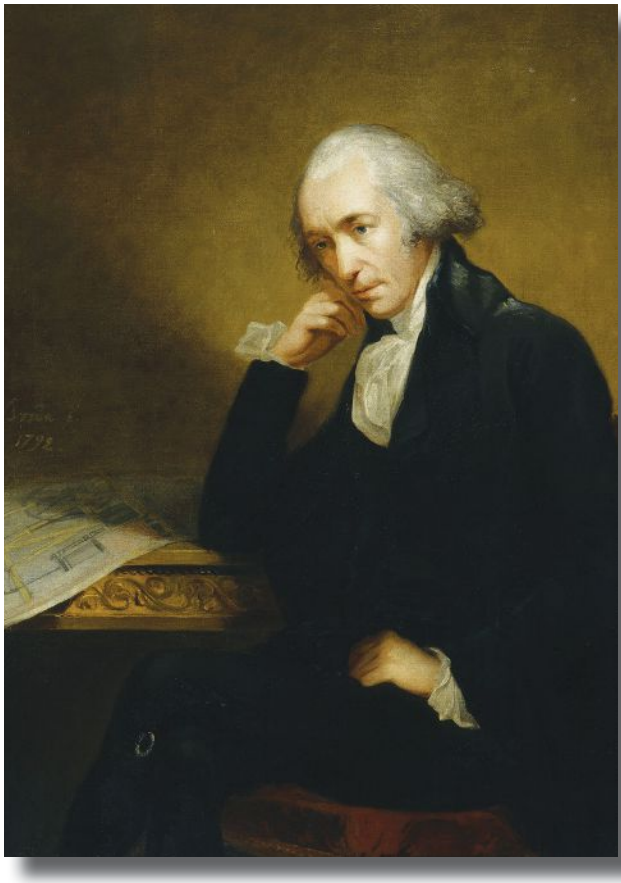
Boulton and Watt steam engine of 1784. The Watt external condenser is at the bottom, right, shown with a spray of water.

Watt's family was what we would probably call upper middle class today. His father was a ship builder and his mother was well educated, not too common for a woman in the 18th century. His first few years of schooling were provided by his mother at home but he was later enrolled in a formal school. At the age of 18, he began studying the practice of instrument making. This was a time when there was great interest in science by both scholars and amateur scientists. Hence there was considerable demand for various precision instruments ranging from accurate scales to astronomical telescopes to mechanical calculators. These scientists couldn't simply pick up a catalog (or go to the Internet) to find what they wanted; rather, they would visit an instrument maker like Watt and either find what they needed or work with the craftsman to have it built. But we don't remember Watt for his instrument making.

Power was Limited

To appreciate Watt's contribution to our history, we have to go back to the early 1700s. At that time, Britain—and indeed much of Europe—was shifting from charcoal to coal as a fuel for cooking, heating and fueling industrial processes such as smelting. That coal, along with the ores that fed those processes, was generally produced from underground mines, which, since they were below the water table, collected water. To keep the mines dry—or at least dry enough for miners to work—this water had to be removed using pumps powered by humans, horses, waterwheels or windmills. But the power available from those sources is limited and consequently, so was the depth at which mines could be profitable.

In 1712, this limitation was alleviated when Thomas Newcomen invented the first workable steam engine. In the Newcomen engine, a piston in a vertical cylinder was connected to one end of a pivoted beam and a pump rod to the other. When steam was introduced into the cylinder, it pushed the piston up and allowed the pump



A portrait of James Watt painted by Carl Fredrick von Breda around 1792.

rod to go down. Once the cylinder was full of steam, the inlet valve was closed and cold water was sprayed into the cylinder, causing the steam to condense and form a partial vacuum. Atmospheric pressure on the top of the piston then pushed the piston down, causing the pump rod to come up, bringing with it a load of water. The process was then repeated and the water was pumped from the mine.

The Newcomen engine, however, had a major flaw. When steam was introduced into the cylinder, a significant fraction of its energy was used to heat the walls of the cylinder which were then cooled by the spray of cold water. This energy produced no useful work. And here is where our hero, James Watt, enters the story. Around 1775—at the time of the American revolution and some 60 years after introduction of the Newcomen engine—Watt recognized that the steam could be let into another chamber, an external condenser, where the walls could be kept cold while the walls of the cylinder remained hot. This resulted in a significant increase in efficiency (from perhaps 0.05 % to 0.5%) and thus was born the Watt steam engine for which James Watt is famous.

Reciprocating steam engines are rarely used today, but steam turbines perform the same function of converting thermal energy into mechanical energy. And to be efficient, the turbines need to exhaust into an external condenser, just like in Watt's engine of 200 years ago. The huge cooling towers seen near thermal power plants cool the water that in turn cools the condenser.

James Watt is also noted for another achievement closely related to the naming of the unit of power in his honor. As he designed and built ever larger and more efficient steam engines, he recognized that he needed some way to compare their outputs to each other and to the other sources of energy that his engines were replacing. I can imagine—without any historical justification whatsoever—that he considered defining the personpower but decided that was too small to be convenient. So he defined horsepower instead. He determined experimentally that if a typical horse was hoisting a load at a reasonable rate, that horse could lift a load of 550 pounds at a speed of one foot per second. He called this, quite logically, one horsepower.

A horsepower is roughly equal to 746 joules per second, i.e., 746 watts. But we still use horsepower to rate engines. My car is purported to have a 268 horsepower engine. Fortuitously, that equates to a nice round 200 kilowatts but that figure isn't used by the manufacturer.

Precision Machining

In this age of computers, 3D printing, and precision machining, it is hard to imagine how difficult it was to build these steam engines some 250 years ago. For one thing, they were huge; cylinders were several feet in diameter and the piston stroke could be six to ten feet. There were no machines for boring cylinders of that size, so they were often fabricated from sheet metal and ground and hammered until they were reasonably circular. Leather seals helped to reduce leakage. It is no wonder these early steam engines had such low efficiencies.

Watt and his partner, Matthew Boulton, continued to improve their steam engines and to sell them broadly to the mining industry. They also developed the machinery to convert the linear motion of a piston to the rotary motion that was useful in driving many of the machines involved in the Industrial Revolution. Watt didn't invent the first steam engine but he made it practical. And he defined the horsepower, which is a unit of power, just like the watt. And that is why we call a watt a watt.

Want to know more about our history? Check out the Engineering Technology and History Wiki: *http://ethw.org/*.

Lyle D. Feisel, Ph.D., P.E. (Ret.) is dean emeritus of the school of engineering and applied science and professor emeritus of electrical engineering at the State University of New York at Binghamton. Following service in the U.S. Navy, he received B.S., M.S., and Ph.D. degrees in electrical engineering from Iowa State University. From 1964 to 1983, he was a member of the faculty of the South Dakota School of Mines and Technology, serving as head of EE from 1975-83. Feisel was a national visiting professor at Cheng Kung University in Tainan, Taiwan, during 1969-70, and served as the founding dean of engineering at SUNY Binghamton from 1983 to 2001. He was named Tau Beta Pi Outstanding Alumnus in 2002. Feisel is a life fellow of the IEEE and a fellow of ASEE and NSPE.

District 4

The 40th annual **District 4 Conference** was a great success, with 77 attendees.

The event was hosted by North Carolina Gamma at Duke University in Durham, NC. The day began with a welcoming from the NC Γ team, Duke's Sr. Associate Dean of Engineering George A. Truskey, Ph.D., *PA Δ '79*, the District Directors, and Executive Councillor J.P. Blackford, *DC Γ '95*. Edward Linker, a charter member of NC Γ 1948, also attended.

Business included a presentation of ΤΒΠ programs, the online reporting system, officer transitions, alumnus and eminent engineers, and Engineering Futures. Attendees divided into groups for Interactive Chapter Exchange sessions and spent time brainstorming ideas on chapter growth cycle topics: improving membership, providing leadership, and adding activities that fit the chapter's "personality," and enhancing ΤΒΠ's image on campus.

District 5

More than 70 members from 11 collegiate and 3 alumni chapters in FL, GA, SC, and Puerto Rico met in Miami on April 7-8. The Florida Beta Chapter at the University of Miami was the **District 5 Conference** host.

Students were briefed on the organization of the Association, learned about chapter operations, heard chapter highlights, and exchanged ideas. On Saturday, Rachana Vidhi, Ph.D., *FL Γ '14*; Larry M. Smith, P.E., *FL E '87*; and Michelle J.S. Heethawakage, *FL Θ '07*, presented the 3rd series of "Tau Talks." Topics included innovations in renewable energy, professional development, and thinking outside the box.

Next year's Conference in Orlando will be hosted by the Florida Delta Chapter and the newly reactivated Central Florida Alumni Chapter.

District 8

The **District 8 Conference** was hosted by Indiana Gamma at the University of Notre Dame. There was excellent turnout of more than 60 members.

Activities took place in the new additions to Notre Dame Stadium and featured professional development sessions and an alumni panel.

District 9

The OK Gamma Chapter had a great time hosting the **District 9 Conference** February 23-24. Students had a chance to meet each other at an informal dinner Friday night.

On Saturday the 75 students, advisors, and Directors gathered at Oklahoma State University's campus for chapter introductions, executive council information, and ICE breakout sessions.

After lunch, the hosts gave a campus tour followed by an alumni panel, and chapter operations information.

Following Conference activities, everyone got a chance to enjoy delicious cheese fries from the famous Eskimo Joes.

In conjunction with the Festival a new Bent monument was dedicated and revealed. (Image right)

The Conference was great preparation for the upcoming 2018 ΤΒΠ Convention in Denver, when the district looks forward to hosting Tau Bates from throughout the United States.

District 12

Chapters from the Rocky Mountain region convened at the University of Colorado at Denver for the **District 12 Conference** hosted by Colorado Epsilon.

It was an excellent day of chapter reporting activities, a district-level informational chapter exchange, a Q&A session with local alumni, and a welcoming from ΤΒΠ VP Wayne B. Paugh, LL.M., JD, *FL Γ'93*, who also spoke on ways to stay involved when the students' professional careers begin.

District 14

The **District 14 Conference** was held March 3-4 at the 3D Systems Portland, Oregon campus with 31 students and four advisors from eight collegiate chapters present.

Training included the newest Engineering Futures module presented by Cheryl Cheng, *MI Γ '00*. The biggest hit of the Conference was the alumni dinner, where students had the opportunity to network with area alumni.

SPOTLIGHT

'More Women" Call
A report by the Canada-United States Council for Advancement of Women Entrepreneurs and Business Leaders, and co-authored by GM CEO Mary T. Barra, *Michigan Zeta '85*, found that "governments and companies should do more to attract and retain women and people from other underrepresented groups to science-related fields."

The report includes recommendations for increasing the number of women who pursue careers in STEM subjects, and reducing barriers to keep women in the field throughout their careers. It adds, "To leverage the widest possible range of ideas and creativity, we must tap into the entire population in all its diversity. If half the population is not playing its full role in ground-breaking fields such as artificial intelligence, self-driving vehicles, advanced materials and 3D printing, we face a grave risk of debilitating labor shortages and, as a result, slower growth for the entire economy."

Ethical Challenges
The Chronicle of Higher Education recently reported on the ethical challenges facing a tech industry beset by the racism and sexism that proliferate on social media, the spread of fake news, and perceptions that data sharing have rendered privacy obsolete.

Jim Malazita, an assistant professor of science and technology studies at Rensselaer Polytechnic Institute, believes higher education has played a role. He thinks there's something about how the STEM disciplines are taught that discourages students from considering ethical questions as they learn the skills they need to work for big technology companies.

The Chronicle said Malazita has launched a pilot "initiative to inject discussions of ethics and politics into introductory computer science courses at Rensselaer, in New York. He is pushing back against the idea that programmers should focus purely on technical work and leave questions about how their products are used to social scientists."

Technology Talent Scarce
West Coast technology companies are facing "one of the biggest challenges to US economic growth right now: a scarcity of technology talent," reports *Bloomberg News*.

Software engineers are in great demand, *Bloomberg* writes, stating that "when the American job market heats up, demand for technology talent boils." It adds that while the national unemployment rate is projected to decline to 4% in recent Labor Department data, "for software developers, the unemployment rate was 1.9% in 2017, down from 4% in 2011."

In response, companies are "adopting new strategies to find engineers for an economy where software is penetrating even mundane processes," and they "are focusing more on training, sourcing new talent through apprenticeships, and looking at atypical pools of candidates who have transferable skills."

Space Workforce Losses
The space industry's struggle to draw young professionals is causing its workforce to lose members faster than they are gained, according to research from Deloitte Consulting.

Deloitte consultant Jeff Matthews cited attrition, workforce issues, and increased competition from the technology industry as factors. Lockheed Martin Space Systems vice president of strategy and business evelopment Kay Sears argued that the industry is "competing for these engineers as they come out of school, and we have to make space exciting...we are not telling that story enough to attract the talent."

PEOPLE

Adnan Akay, Ph.D., *North Carolina Alpha '71*, is the the provost and chair of the mechanical engineering department at Bilkent University, in Ankara, Turkey. He joined Bilkent on January 1, 2009 as vice president and to start a new mechanical engineering department, taking a leave of absence from Carnegie Mellon University. Previously, Akay served at the U.S. National Science Foundation as director of the civil, mechanical and manufacturing innovation division.

Andreas C. Cangellaris, Ph.D., *Illinois Alpha '81*, has become vice chancellor for academic affairs and provost for the University of Illinois at Urbana-Champaign. He was previously dean of the college of engineering at Illinois. Prior to serving as dean, he was head of the department of electrical and computer engineering. Cangellaris joined the University of Illinois in 1997 from the University of Arizona, Tucson.

Wayne T. Davis, Ph.D., *Tennessee Alpha '73*, University of Tennessee's engineering dean, postponed a June retirement to serve as UT's interim chancellor after the dismissal of chancellor Beverly Davenport with 15 months in the post. He has 44 years of faculty and administrative roles.

Amy S. Fleischer, Ph.D., *Pennsylvania Theta '91*, has become become dean of California Polytechnic State Univ.-San Luis Obispo college of engineering. She was a professor and chair of mechanical engineering at Villanova University, where she had taught since 2000. Fleischer also served as director of the National Science Foundation's Energy Smart electronic research center

Richard J. Koubek, Ph.D., *Ohio Mu '85*, is the new president of Michigan Technological University. He was previously executive vice president and provost of Louisiana State University. Koubek succeeded Glenn Mroz, who stepped down after 14 years to rejoin the faculty. Before joining Lousiana State in 2009, Koubek was head of Pennsylvania State University's department of industrial and manufacturing engineering.

Christopher S. Lynch, Ph.D., *California Iota '83*, has been named as dean of the college of engineering at University of California, Riverside. He had been professor and chair of the UCLA Samueli School of engineering's mechanical and aerospace department since 2016. Lynch joined the UCLA faculty in 2007 from Georgia Institute of Technology.

James R. Martin II, Ph.D., *South Carolina Gamma '85*, has been named as new dean of the college of engineering at the University of Pittsburgh. He has been chair of Clemson University's department of civil engineering since 2013, as the first African American engineering chair at the school. A Clemson news release said his tenure brought new partnerships, millions in funding and a consistent push for big-picture thinking.

Jeffrey N. Phillips, Ph.D., *Missouri Gamma '81*, is the first director of Hanover College's engineering program. He is a mechanical engineer, power industry expert and former National Science Foundation Fellow who has spent the past 10 years as a senior project manager at Electric Power Research Institute, an independent nonprofit for public interest energy and environmental research.

Sharon L. Walker, Ph.D., *California Delta '98*, has been appointed dean of Drexel University's college of engineering and will be the first female to head the department when she starts on September 1. Walker moves from the University of California-Riverside, where she has been dean of the engineering school. The chemical and environmetal engineer has also been serving as Advisor to CA AB.

Alan D. "Dale" Whittaker, Ph.D., *Texas Delta '83*, is now the president of the University of Central Florida, which he joined as provost in 2014. Whittaker joined UCF after 12 years on the faculty at Purdue University, latterly as vice provost for undergraduate academic affairs. Previously, he spent 16 years in various roles at Texas A&M

FACILITIES

University of Maine has received a $10 million gift for its new engineering building. The Kennebec Journal reports UMaine president Susan Hunter said the gift is from the family of a graduate of the school's engineering program. The donor will be identified later and the building will be named after them. University officials say the donation is the largest gift ever from a living donor.

UMaine's undergraduate engineering program has grown 70% in enrollment since 2011. Officials say the new building will help with this growing demand. Lawmakers previously approved a $50 million package to help fund the $80 million building. Construction is scheduled to begin in spring 2020.

University of Michigan college of engineering and other officials gathered recently for a groundbreaking ceremony for the school's $75 million Ford Motor Company Robotics Building. Scheduled to open in early 2020, the 140,000-square-foot, four-story complex will house classrooms, offices, a startup-style open collaboration area and tailored lab space for a variety of robotic technologies. Plans include a three-story fly zone for autonomous aerial vehicles, an outdoor obstacle course for walking robots, high-bay garage for self-driving cars, and space for rehabilitation and mobility robots such as prosthetics and exoskeletons.

University of Tennessee plans to demolish Estabrook Hall, a historic academic edifice built in 1898 and home to ΤΒΠ HQ from 1907-50, to construct an engineering building. The hall is one of only five buildings at UT from before 1900, and the low ceilings with limited duct space make preserving the building for academic use extremely difficult. UT plans to create a "virtual reality" format to view and tour the building to document the hall's historic value.

The new hall will include flexible research laboratories and "maker spaces" with 3D printers.

2018 Alumni Giving Program February-April Contributors

The names of 3,096 Tau Beta Pi alumni who made donations to the Association in the 2018 Alumni Giving Program appear in two separate sections on the following pages. Their gifts totaling $520,602 arrived between February 1, 2018, and April 30, 2018. **Gifts received after April 30 do not appear here but will be published in the Fall 2018 issue of** *The Bent.*

The generous support of each member is deeply appreciated by the Executive Council and other Association Officials. The financial resources have permitted strengthening our programs in several areas that emphasize the importance of Tau Beta Pi's basic objectives and that help all collegiate chapters and student members.

Recognition Club Donors are listed alphabetically within their chapters and appear in the first section below. Member-contributors appear in the subsequent section. Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests. In addition to gifts acknowledged here, several were made anonymously through the Combined Federal Campaign and are also deeply appreciated.

Donor Recognition Clubs

The names of 2,686 Tau Bates appear in this first section. They made donations to the Alumni Giving Program between February 1, and April 30, 2018, AND they have also made CUMULATIVE contributions (in some cases including matching gifts) and bequests to Tau Beta Pi through the years totaling from $250 to more than $1,000,000.

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. Such continuous support significantly contributes to the overall strength of the Association and allows our Society, with confidence in our financial resources, to plan for modest growth in our services to the engineering profession. These clubs were chartered by the Executive Council in 1986 and have been set at the following levels:

Matthews Club	500,000	Alpha Club	25,000	Chi Club	1,000
Nagel Club	250,000	Beta Club	10,000	Second Century Club	500
Williams Club	100,000	Delta Club	5,000	Founder's Club	250
Heikes Club	50,000	Zeta Club	2,500		

WILLIAMS CLUB
NY Δ Wright, Peter A. '75
VA A White, Dudley '76

HEIKES CLUB
AZ B Myers, Jerry Elwyn '70
MI E Anderson, James Anton '66
TX H Taylor, Lee Deatherage '68

ALPHA CLUB
CA Γ Levin, Robert Edmond '53
IL A Berthold, Thomas Robert '70
IN A Clements, David '80
MI Γ Clark, Terry Blue '69
RI B Brennan Jr., John Francis '81
Keddie, William Joseph '59
WV A Clutter Jr., James H. '70
WY A Schoenborn, Renee Margal '85

BETA CLUB
AK A Stella, Damien F. '82
AR A Brotherton, Robert Harold '67
CA A Kepler II, David Edwin '75
Masatani, Peter James '04
CA E Case, Daniel Keyte '87
CO B Hasund, Svein Harald '67
CT B Hunziker, Robert Neal '83
FL B Robert, Raymond W. '66
GA A Amelio, Gil Frank '65
IL B Gendron, Roger Joseph '55
Miyasaki, John Kenji '54
IN Γ Lucey, Jo Ann '80
IN E Dausman, Alan Vernon '77
IA A Burmeister, Jon Barth '68
MD B Crane, Thomas Clemson '62
MA H Sin, Chi-Kai '88
MI A Colbry, Katy Luchini '99
Colbry, Dirk Joel '06
MI E Gomulinski, Curt Dennis '01
NY Ξ Denning, Peter James '64
OH Γ Mahaffey, Jack L. '54
OH Δ Robe, Richard '55
OK A Morris, Jay Kevin '81
PA B Klingensmith, Rick Lee '82
PA Δ de Leon Jr., Manuel '51
Harker, Patrick Timothy '81
PA A Anonymous '90
SD A Gomulinski, Tricia Elizabeth '98
TN A King III, Philip Woodson '66
TX A Adamo, Paul Magness '85
TX Δ Fox, Craig Alan '77

DELTA CLUB
AL A Bowers, Charles Judson '69
Griffith, Gordon Harvey '57
AL Δ Fogle, Frank Risher '80
AL E Pierre Jr., Steve '90
AZ A Carrillo, Danny J. '95
CA A Cocotis, Paul Alexander '90
Ikeda, Kenneth Akira '62
CA Γ Davis Jr., Joseph Stancliffe '59
CA H Trebaol, George Olivier '75
CA N Joy Jr., Robert Lee '66
Lytle, Scott K. '86
CA Ξ Boyd, Robert Alan '74
CA T Fable, Scott Edward '96
CA Y Idenmill, Ethan Matthew '04
Mukhar, Marwan John '93
CO B Kinzie, Edward Ottis '64
DE A Sharp III, Rodney '60
FL A Shacter, Philip '79
Uhler, Robert Bruce '74
IL A Luzbetak, Paul Daniel '96
IL B Bernhardt, John Edward '89
IN A Ricks, Stephen Wayne '63
Vosteen, Louis Frederick '52
IN Δ Brandt, Daniel Melvin '74
IA A Peterson, Michael Laurel '89
IA B Glasgow, Justin Mathew '05
KS A Powell, Ricky Steven '80
KS B Mueller, Robert Lynn '67
LA Γ Baldwin Jr., George A. '78
Mohr, James Donald '55
Rivers, John Vernon '63
MD B Burgio, Robert Blake '87
MA B Venturini, Eugene Leo '67
MA Z Lewis, Nelson David '73
MA H Wotiz, Robert Paul '78
MI Γ Anonymous '82
Halverson, Mark Wayne '72
Hopping, William Daniel '71
Tielking, Tom '62
MI E Lahti, Gerald Paul '59
Schmuhl, John Curtis '71
Strebendt, Richard Ernest '65
MI Z Dymale, Raymond C. '70
Quaid, Richard C. '65
MI Θ Pivitt, Barry Robert '88
MN A Stanley, Steven F. '84
MS A Nelms, Larry Thomas '63
MO A Edgington, Bobbie George '69
MO B Jinkerson, Kenneth R. '75
MO Γ Philipp, Patrick William '98
NE A Walcott, Gwen Sharyn '82
NJ A Forslund, Donald Charles '60
Skowronski, Victor J. '71
NJ B Boysen, Robert Lorenz '63
NJ Δ Lim, Yung Bong '87
NM B Modrall, David Righter '91
NY A Elwell, Bill Edward '78
NY B Fleisher, Richard Stephen '72
NY Γ Gorin, Ralph Edgar '70
NY Δ Swanson, John Arthur '62
NY H Butterman, Heidi Carol '79
NY Θ Bauer, Richard Carlton '66
OH A Ferencz, Robert Mark '80
Markuson, Donald Miner '80
Oran, William Alex '63
Rasbold, James Charles '83
OH Θ Abdoo, Richard Anthony '65
OR A Carlson, Burton Carter '53
PA A Brunner, Thomas Morris '63
PA B Reese, J. Mark '80
PA E Scott, Walter Alfred '59
PA Z Walter, Donald Kenneth '53
PR A Garcia, Carlos E. '77
TN A Rosser, Howard Ward '70
Wilson, Wayne '77
TN B Thomas, James Louis '77
TN Δ Stewart, John Dale '78
TX A Knight, Graham B. '48
TX B Ingram, Wesley Warren '77
TX Δ Fowler, Joe Robert '68
Rushing, Jay Alan '76
Sisney, Steven Lynn '83
TX Z Hambrick, Joanna Ruth '86
VT A Brand, Ronald Parsons '60

ZETA CLUB
AL A Reynolds, Edgar Lee '70
Stone, Jeffrey Ira '79
AL B Mosley, Talmadge Mordant '65
AL Δ Styles, Ellen S. '85
AZ A Dickson Jr., Paul Wesley '54
AZ B Berry, John Bradley '89
AR A Biggadike, Robert Holden '58
Gunderman, Tony Raymond '89
Jenkins, Lynn Page '61
CA A Crooks, Lawrence E. '71
Kirschman, Randall Keenan '66
CA B Drowley, Clifford Ian '75
CA Γ Fowle, Mark C. '76
Street, Robert Lynnwood '56
CA E Brunton, Daniel William '78
McCandless, Roger James '65
Warner Jr., John Hilliard '63
CA H Van Zwol, Jason '77
CA A Holl, Sue '76
Horn, Jeffrey Ben '79
CA N Erickson, Ralph Edward '71
Shimokawa, Reyn Yukio '95
Steenhoven, Jerry C. '77
CO A Van Dinter, Jennifer Ann '97
CO B Aerstin, Franklyn George '64
Franchino, Robert Anthony '60
CT B Mastracchio, Robert '64
DE A Morrow Jr., John Louis '73
Swope, Richard Dale '60
DC A Engram, Robert Louis '69
DC B Walsh, Bryan Patrick '97
DC Γ Altamore, Annette '79
Keene, Warren Elmer '57
FL A Lewis, Lee Conley '91
O'Steen, John Andrew '67
Passman, Alan Joseph '06
FL Γ Lyons Jr., Thomas Francis '76
GA A Jenkins, William Craig '68
IL A Beernink, Kurt Patrick '82
McGinnis, Gerald Edward '58
Wait, Jay Jenner '71
IL B Carter, David William '68
Forish Jr., George Edward '75
IL Γ Carlson, Norman Wesley '81
Dixon, David Allen '63
IN A Houze Jr., Gerald Lucian '58
Ihlenfeld, Jay Vining '74
McDonald, John Douglas '73
Novy, Robert Alan '85
Suzuki, Wayne Takashi '67
Weigand Jr., Karl Russell '66
IN Γ Jackewicz Jr., Joseph I. '75
Kelly, Robert A. '65
McDonald, Patrick John '60
Zupcic, Anthony Marie '70
IN Δ Epperly, Michael Philip '65
Luecke, Edgar Jacob '55
IA A Berkholtz, Nicholas Evald '56
Harms, Richard Paul '65
Manning, Thomas William '64
Pride, Richard Allen '47
Snyder, Merrill Herbert '68
IA B Schmidt, Charles Chris '73
KS A Becker, Frank Joe '58
Conrad, Kenneth F. '74
Reid, Jack Powell '57
KS B Patton, Robert Eugene '70
Wilson, Bryan Keith '85
KS Γ Hefty, Keith William '87
KY A Upshaw, Buddy Smith '65
LA Δ Lejeune, James Joseph '73
LA E Champagne Jr., Pierre '76
ME A Blaisdell, John Robert '66
Hamilton, Wayne Andrew '58
Jefts, Alan Robert '73
MD A Gutsmuth, Henry Ronald '56
MD B Beard, James Lawrence '67
De Oms, James Howard '68
Morgan, Anne F. '87
MA A Descoteaux, Kenneth G. '89
MA B Dettmer, Robert Gerhart '55
Giaimo III, Edward Charles '74
Grossweiler III, Philip J. '72
Hirsch, Alan Robert '66
Mandell, Gordon Keith '69
McInnes, Harold A B '49
McKim, Thomas Francis '75
MA Δ Sullivan, Gerard Francis '68
MA E Brunetto, Thomas P. '74
MA Z Boraski, Nicholas '50
Lastella, Michael James '72
Strzegowski Jr., Joseph C. '67
MA H Penafiel, Jay Buhay '90
MI A Chiti, James D. '71
MI B Ojala, William Keith '54
MI Γ Burchfield, Jack Edward '56
Frederick, Frank Thomas '71
Gromer, John David '74
Seidel, David Allen '81
Smithies, Henry '49
Vlasic, Robert Joseph '49
Wackenhut, Thomas Carol '69
MI Δ Eberl, Edward George '74
Rose, Jonathan Douglas '81
Stanczak, John Stephen '70
MI E Boileau, James Maurice '87
Husak, Philip William '72
Kolodziej, David Gregory '59
Szafranski, Joseph Paul '66
MI H Obudzinski, Gary Thomas '76
MN A Holzmer, Donald Nicholas '60
Petesch, Douglas John '84
Ziemer, Rodger Edmund '61
MS A Coley, James William '61
Owens, John Kent '65
Sims, Joseph Hilton '63
MO A Meyer, Roland P. '64
MO Γ Gillespie, Charles K. '57
Hurwitz, Dan Norman '50
Taber, Norma J. '80
MT A Brown, Lloyd Robert '72
NE A Schmidt, Wayne William '70
NJ B Dougherty, Steven Patrick '64
Schelke, Joseph Anton '51
NJ Γ Riede, Bruce Erwin '67
Weibrecht Jr., Edwin H. '68
Wojslawowicz, Jack E. '70
NM B Menako, Jack Allen '84
NY B Wedlake, Raymond A. '73
NY Γ Anderlik, Jeffrey David '89
Chamberlin, Donald M. '67
Geschwindner Jr., Louis F. '67
Hartung, Edward Clinton '63
Uber, Charles Bertram '55
NY Δ Altschuler, Stan Jon '63
Aylesworth, William A. '65
Dougherty, Jack William '59
Hart, Marjorie Leigh '51
Nelson, Arnold Stanley '50
Zises, Matthew Scott '96
NY E Esformes, Ira '71
Freier, Otto Albert '70
Martin, Kent Richard '66
NY Z Frohman, John E. '72
NY H Arminski, Leslie M. '75
Varon, Michael '73
NY K Mastro, Noreen Louise '79
NY A Kern, Peter Leonard '62
Kuras, John Edward '69
Moon, Monte Lee '75
NY M Czuba, John Stanley '78
NY N Rataj, Paul Stephen '83
Sherman, Lawrence Joseph '74
Sisson, Albert Eugene '66
NY Ξ Mancuso, Richard G. '92
Runowich, Carl Joseph '84

ZETA CLUB, CONTINUED

NY Π Cole, David Michael '88
NY P Calfa Jr., Frank Salvatore '81
NC A Hunter, Stuart '47
Searle, John Randolph '70
NC Γ Linker, Edward Markham '47
OH A Gropp, William Douglas '77
Ikeda, George Toshinori '54
Linsalata, Frank N. '63
Soeder, James Frank '72
OH B Totten, James Ernest '56
OH Γ Riedel, Kimberly Sue '90
Story, Cook '68
Wolff, Mark Frederick '88
OH E Rogers, William Michael '53
OH Z Armstrong, Chris Kent '00
Armstrong, Ellie Rebecca '01
Bliss, Douglas Paul '75
Libbe, John Franklin '58
Rose, John David '82
Tenney, Thomas Harold '67
OH K Yannayon, Benjamin C. '05
OH M Kelly, Gregory Joseph '88
OK A Johnson, James '59
Markland, Ralph John '88
OK B Bobo, James Edward '77
OR A Cantwell, Gary Kenneth '80
Hansen, Steven William '69
Milton, Stuart W. '84
Paynter III, W. Burton '74
Thresher, Robert Wallace '62
PA A Berglund, Thomas Arthur '82
Nisley, Elmer Edward '74
PA B Cirota, Marcie Dale '95
PA Γ McIlvried III, Howard G.
Shaffer, David Bruce '68
PA Δ Bordogna, Joseph Raymond '55
PA E Babbitt, Walter Howard '77
PA Z Forbes, Blair Carleton '58
Pechulis, Michael John '97
PA H Reiner, Robert Elmer '64
PA I Salyers, John Marshall '01
SC A Dalrymple, Gerald Andrew '83
Davis, Joseph Howard '91
SC B Husband, D. Mark '83
Pinckney, Charles Porcher '77
SC Γ Attanasio, Roger Alfred '57
Hanes, Richard Michael '67
TN A Bounds, John Alan '80
Lillard Jr., James Dennis '75
Slaughter, Joseph Tipton '65
Vandenbulck, Charles F. '56
Whitten, James Raymond '59
TN B Casson Jr., Walter Andrew '56
Shackleford III, James R. '60
TX A Batla, August Joseph '66
TX B Bourdon III, Lynn Louis '84
Ellisen, Arthur Raymond '62
TX Γ Dobbins, James Roy '74
TX Δ Ash Jr., Henry G. '59
Clinton Jr., Daniel Darius '52
Glasscock, Melbern Gilbert '59
Latham, Raymond Edgar '56
Porter, Larry Gene '64
TX Z Norwood, Larry Dwight '73
TX H Falk, Nathan Max '75
Nicholson, James Eric '75
UT A Endo, Thomas Minoru '62
Lyman, George Randall '79
VT A Scribner, Charles Franklin '70
VA A Agosti, Steven J. '81
Harpel, Barbara McL. '96
VA B Anderson, Mark Evan '76
Creslein III, William E. '52
Friar, Billy Wade '58
Tolson, Robert Heath '58
VA Γ Labelle Jr., William M. '89
WA A Ross, Robert Bruce '61
Williams, Donald Sidney '66
WA B Anderson, Bud L. '66
Oakley, Fanning Tucker '53
WV A Costanza, Russell Vincent '62
Fourney, Michael Eugene '58
WV B Ashman, Michael D. '84
Hughes II, Paul Kendrick '71
Payne, Michael E. '81
WI A Crooker, Thomas W. '60
Forkner, Stacey L. '96
WI B Cockayne, John E. '65
Hayes, John John '81
WI Γ Klos, Timothy Allen '88
WY A Davidson, Steven Lee '80

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AL A Henderson, Phillip Roy '62
Hill, Gregory John '74
AL B Hopper, Jeffrey Clark '78
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Haggard, Warren O. '94
AL Δ Appleton, Robert Scott '90
Selby, Michael W. '96
Styles, Robert Charles '76
AL E Miney, John Wayne '70
AK A Hamer, Brendan Tully '83
Keeney, Joseph Harry '78
Keiser, Jan Ann '76
AZ A Brock, Steven Bartmus '66
Davis, Robert Allen '79
Frondorf, U. George '69
Lundquist, Thomas George '72
AZ B Jackson, Stephen R. '90
Leach, David Robert '76
Wong, Jack Onc '81
AR A Gunderman, Stacy Linda '88
Jones, Michael D. '67
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Dietsche, Laura Jean '81
Mar, Wing Jong '79
May, Howard Russell '51
Reynolds, Barry Duane '84
Robson, Clayton William '58
Secor, Kenneth Eugene '55
Trezek, George James '61
CA Γ Barnum, James Robert '65
Frantz, Paul James '78
Hamilton, Willard Ellis '48
McClendon, Scott '60
McDonald, John Charles '59
Reneau, Leon R. '58
Root, Steven Dale '75
Taniguchi, Brian Yoshito '77
CA Δ Barr, Juliana '80
Brandow, Gregg Everett '67
Fernandez, Ferdinand F. '58
Haririan, Vida '94
Johnson, Wesley Walter '66
Moulton, James Ritchie '54
Nakatani, David Takeshi '63
CA E Dobbs, Michael Wayne '66
Goss, John Ray '52
Holzman, Eric Louis '84
Kovar, Linda A. '81
Ohgi, Frank '60
Simsarian, Gregory Garabed '82
Suyematsu, Herbert Takashi '58
Testa, Lori Ann '01
CA Z Greenley, Dale Robert '86
Hensley, Henry Paul '63
Lampe, Fred Paul '79
Mooney, Frank Carleton '58
Nulk, Robert Anthony '58
Perrin, Michael Elton '67
Pham, Alexander H.N. '88
Wagner, J. Arthur '61
CA H Clark, William Charles '72
Rawson, Rollin Fred '61
Thornton, Roger Lane '93
Zimmerman, Norman Bach '57
CA Θ Berg, Jeffrey A. '84
Blanco, Catherine Elaine '97
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CA M Freeman, Karl Allen '89
Hagler, Richard Dwight '85
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Tucker, Naftalia France '89
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Curry, Robert Stanley '94
Greco, Anna Maria Elvira '81
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CA O Campbell, William James '65
Elliott, Pamela Ann '88
Mulvihill, Michael Edmund '60
CA Π Mullen, Merritt David '70
Steinberg, Dennis Philip '72
CA P Kraft, Lyle David '87
CA Σ Radasky, William Albert '81
CA Y Dawson, Carole Jeanne '85
CA Φ Shelly, Ronald W. '62
CO A Cochran, Noelle Renee '86
Maurer, Mike Allen '87
Ruebush, John Charles '78
CO B Austin, Stephen Coe '74
Cormack, Christopher W. '82
Frey, Bryce Alfred '56
Geist, Jerry Douglas '56
Talcott Jr., Noel A. '73
Walker, John Sherwood '53
CO Γ Mead, Richard Wilson '63
Pearson, Larry '64
CT A Cleland, Alan Stuart '60
King III, C. Judson '56
Livingston, Robert McLean '57
Terry, Elene Sharon '01
Verges, Hugo Ponce '49
CT B Follette, Jean Marie '73
Kane, Martin Paul '86
Staiger, Eugene Harold '57
Thompson, Gerald Franklin '50
CT Γ Judd, Kyle Peter '91
DE A Cercy, Michael James '81
Folsom, Steven Allen '77
Hahn, Charles Rodney '73
Packard, Lawrence Bruce '88
DC B Ford, Martha '74
Gaffney, Joseph M. '83
Maggio, John Joseph '81
Orzech, Joseph Miller '71
Ratto, Christopher R. '07
DC Γ Grassel, Herbert Hans '77
FL A Giolma, J. Paul '69
Higgins, Adam Steven '03
Iwens, Ralph Peter '62
Johnson, Hjalma Eugene '58
Layman, Robert William '68
Lorberbaum, Henri Stuart '77
Vande Walle, Robert John '72
FL B Alvarez, Vicente '64
FL Γ Brookins, Thomas Michael '81
Chenkin, Joseph Alan '82
Dip, Anthony '86
Emerson, Michael James '83
Garcia, Gerardo Pascual '83
Stagner, Ralph Scott '82
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FL Z Hatfield, Thomas Anthony '87
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Hirth, Roy Michael '78
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Hefter, Harry Oscar '51
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Williams, Michael Joe '95
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IL Z Glait, Scott Steven '84
IN A Binash, Irene Marie '79
Brinson, Robert James '60
Cooper, David Bourie '56
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Easto, William D. '79
Edwards, Deborah Jane '85
Findley, Richard Allen '66
Frazer, William Bradley '47
Hall, Thomas Wayne '67
Harvey, James Alan '81
Menke, Richard Henry '56
Moeschl, Stanley Francis '57
Montgomery, Stephen T. '71
Muehlbauer, James Herman '63
Rea, David Richard '62
Risa, Kristen '69
Roby, Dennis Edgar '60
Roth, Lisa Ann '87
Saavedra, Joaquin Antonio '52
Sosnay, Richard Gordon '66
Warren, Scot William '83
Willis Jr., Charles Pressley '48
Woosnam, Thomas Jay '65
Yoder, Norman Everett '71
IN B Carpenter, Stanley Robert '56
Friel, Leroy '57
Graham, James Henry '72
Rose, Willis Earl '44
Schipper, Michael Joseph '82
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Fitzgerald, Edward John '86
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Olson, Stephen Robert '87
Valenti, Paul M. '01
IN E Liechty, Douglas Lynn '73

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Coffman, Vance Dean '67
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Maifield, Christopher James '95
Pedersen, Robert Dennis '62
Rustwick, John Douglas '71
Smith, William James '66
IA B Aron, Gert '58
Boldt, Donald Bernard '57
Dawson, Robert Jerrold '60
Lawson, James Theodore '70
KS A Benso, William Eldon '59
Harmony, Marlin Dale '58
Nahman, Norris Stanley '51
KS B Bradburn, Wayne Everett '72
Marks, Kevin Bruce '79
KS Γ Erickson, Larry Eugene '60
Gemaehlich, Donald Joel '83
Tracey, Deborah S. '86
KY A Anderson, Lee Roy '71
Congleton, Stephen D. '79
Craig, Joe Lockett '50
Davis Jr., Lewis Berkley '66
Elwood, Persis Ann '85
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Hord, Jesse '56
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Thornton, Patrick Joseph '82
LA A Armistead, William T. '71
Capell III, Robert L. '70
Levert Jr., Freddie Joseph '62
Nelson Jr., George Gus '52
Smith, Stewart Van '73
LA B Bourgeois, Brian Steven '82
Bourgeois, Edit Jorgelina '91
Klegar, David '53
Rogers, R. Bradford '79
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LA Δ Barbay, Norman John '74
Blaylock, Martin Edward '61
Landry, Glen Ray '75
ME A Palmer, Gerald Milton '61
Petherbridge, David F. '56
Smiley, Edward Leon '48
Welch, Peter James '72
MD A Gitomer, Steven Joel '64
Guzy, Jeffrey David '83
Kuchta, Francis W. '53
Linaweaver, F. Pierce '55
Lu, Stanley '95
Monmonier, Mark '64
Sadilek, Albert Charles '72
Winter, George William '48
MD B Antony, Roger William '71
Brownstein, Barry Jay '68
Dimarzo, Marino '76
Himes, Doug Lamar '82
Iacangelo, Gerard Felix '80
Joseph, John Hamilton '85
Moorcones, Joseph John '67
Powers, Kenneth Ryan '01
Zalesch, Steven Elliot '73
MD Γ Quint, John H. '84
MA A Alley, Christopher P. '85
FitzMaurice, Mark James '81
Gudewicz, Thomas Michael '78
Lescoe, James Terrence '05
MA B Ball, Norman Addison '60
Broughton, William Joseph '61
Chang, Nancy Tien-Tien '87
Dodson, John Orville '68
Efimba, Bob E. '63
Guppy Jr., John Warren '53
Honke, James Kazuo '63
Isnardi, Michael Anthony '82
Klein, Harrison John '71
Marks, Lloyd Alan '71
Osterberg, Peter Maynard '78
Patterson, John Bryan '68
Slifka, Richard Barry '61
Smith, Alan Jay '71
Vlahakes, Gus John '71
MA Δ Brown, Linfield Cutter '64
Gunn, John F. '64
Hildebrant, Eric Michael '92
Milauskas, Ronald Joseph '62
Russell, Jack Hesseltine '54
Savage, Paul David '77
Smeglin, Anthony Michael '76
Stark, Lucius Dickinson '64
MA E Bittner, Douglas E. '83
Calvo, Alberto Bruno '70
Hayden, Thomas Lee '62
Linscott, Anne Wiklord '80
Présumé, Hantz Antony '89
MA Z Brindis, Samuel B. '80
Ewell, Kenneth Albert '68
Hellyar, Kenneth George '69
Meurer Jr., Glenn William '86
Scott, George Lee '63
MA I Musiak, Ronald E. '68
MI A Chaffee, Stanley Wendell '74
Deleeuw, Samuel Leonard '56
Hudson, Dean '58
Regenstreif, Joyce '78
Shannon, David Harlow '59
Tscharner, Christopher G. '83
Woelzlein, Wilmar Marvin '51
MI B Bekins, Randell Lee '80
Bentley, James Herbert '57
Bohrer, Timothy Henry '71
Dejonge, Michael Kent '65
Maki, Steven Michael '76
Mattson, James Arthor '70
Stehulak, Edward Stephen '86
Vukovich, Robert James '83
MI Γ Ableson, Michael Fowler '82
Ardis, Robert Boyd '46
Bonfanti, Giovanni '62
Burkholder, Earl F. '73
Colby, Gary Charles '82
Davies, John Richard '50
Delgass, William Nicholas '64
Fertel, Howard Kevin '79
Finnegan, Patrick Marion '57
Grossman, Michael Alan '88
Hansen, Charles '46
Leeds, Thomas Murray '85
Miller, Stephen Scott '78
Miller, Carol Jean '79
Nobunaga, Alan Shizuo '83
Pendleton III, Winston K. '62
Schoenhals, Robert James '56
Scott, Richard A. '57
Snyder, Robert Joseph '77
Stewart, David Mark '76
Subramanian, Suresh '88
Travers, Arthur '59
Washburn, John Robert '69
Wentzel, Richard Dimert '60

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Special gifts were received from Stephan Angyal, NJ Γ '63, in honor of his grandson, Nikolas M. Angyal, NY K '19, who became a third generation member this spring at The University of Rochester; and from Larue Amaya, in memory of her husband, Alejandro Amaya, MI B '71. A special gift was made in November 2017 by Mary Jean Volpe, President of the Hurlbert Family Foundation, in memory of Gordon C. Hurlbert, WI B '46, and in honor of David R. Volpe, MI Z '74 and Michael D. Volpe, TN B '06.

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Wingard, Joseph '80
MI Δ Caste, Richard Alan '68
Dolan, William John '62
Elward, Robert M. '75
Rossi, Nicholas Michael '63
Rutherford, Charles Robert '53
Rutkowski, Paul John '69
MI E Chudd, Richard Alan '66
Doughty, Robert Earl '65
Hong, Albert Edward '80
Sigler, David Rudolph '76
Zickafoose, Michael Wayne '97
MI Z Foraker Jr., David Ernest '58
Kovacs, Robert Lewis '86
Reardon, Robert Warren '74
Wright, Hugh Douglas '55
MI H Grupp, Jeffry Bernard '74
Hock, Darryl Allen '81
Zwally, C. Lee '41
MI K Seymour Jr., Richard L. '97
MN A Benjamin, Harrison Russell '57
Christensen, Thomas M.'79
Hegna, Harwood Allan '69
Kaiser, Gary L. '70
Lapakko, Kim Alan '76
Maus, Brian Wayne '81
O'Leary, Stephen Holmes '69
Polacek, James Hills '52
Sandell Jr., Nils Richard '70
Van Essen, John Scott '74
MS A Black, Howard Wayne '95
Gelman, Stephen '73
Hatmaker Jr., John William '79
Hibbard, Janet C. '86
Hibbard, Michael Joseph '78
Hotard, Daniel Gerard '76
Seitz, Thomas Bingham '63
Wang, Jyh-Ping Johnny '79
MS B Woody, Marvin David '79
MO A Caruthers, James Ronald '69
Geers, Arthur Edward '48
Hammar, Phillip Carl '65
Zimmerman, Mary M. '87
MO B Arnoldy, Richard Raymond '69
Dampf, Donald Peter '50
Elliott, Joseph Oscar '71
Fennewald, Gary Joseph '73
Ferrell, C. Stuart '64
Frankenberger, Richard B. '93
Hahn, Gail Louise '82
Leitterman, Dennis W. '76
Mahin, Clifford Alan '76
Miller, Michael John '74
Pannone, Gregory Michael '82
Sedovic, Pete Stephen '81
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MO Γ Fisher, John William '56
Galambos, Theodore Victor '53
Gatley, William Stuart '56
Salman, Naif Diab '56
Shomber, Henry Rolan '78
Standridge, Charles Robert '75
MT A Courville, George Eugene '59
Pearce, Mary Ann '76
Whitcomb, David L. '64
NE A Kaminski, Wayne Alan '79
Plummer, Scott Royce '81
Schaufelberger, Don E. '49
Watson, Gene D. '59
NV B Nietling, John J. '90
NH A Bailey, Joseph Gregory '86
Stirk, James Andrew '81
NJ A Hoyt III, John George '76
Kimmich, Herbert Ludwig '57
Osborne, Scott Reynard '70
Seventko, Joseph M. '60
NJ B Babb, John Everett '71
Herrmann, Eric Peter '69
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Starr, James W. '73
NJ Γ Angyal, Stephen '63
DeWaal, Johannes '70
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Furtado, Victor Cunha '58
Mandle, John Bauer '52
Praschak, Joseph John '73
Puhan, Robert '75
Reitsma, David '65
Rij, Jerry Jerome '72
Szebenyi, Thomas A. '69
Terry, Frederic Theodore '67
Tucker, John Harold '67
Vandemeulebroeke, Leon '89
Zierau, Siegfried Max '61
NJ Δ Brown, Geoffrey Scott '83
Coco, Elizabeth Halliday '87
NM A Gonzales, Omega Santiago '53
Havens Jr., Kenneth H. '78
James, Jonathan '97
NM B Andrews, Mark Jay '91
Donnelly, Carolyn Elaine '01
Gonzales, Michael Anthony '74
Salas, Thomas M. '85
NM Γ Perna, Trina '84
Rocco, Jim Robert '85
NY A Breckenridge, John Robert '99
Epling Jr., William Young '83
Kundakci, Vace '73
Morgan, Thomas Arthur '78
Reich, Herbert '84
Seckler, Howard Noel '48
NY B Chandler, George Dennis '70
Poulsen, Neils Ray '57
NY Γ Bergenthal, Jon Francis '75
Bond, Paul William '72
Brand, Terrance Alan '90
Dowgwillo, Robert Michael '75
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Joyce, Michael Edward '82
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Miller, Rollin Ted '46
Mucher, Craig Allen '82
Ordway III, Fred Delancy '69
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Schultz, Stephen Parker '70
Smith III, George Earl '80
Vilardi, Gregory Henry '90
Wadsworth Jr., Winthrop '76
Zmroczek, Leon Anthony '78
NY Δ Bauer, Douglas Cufford '61
Frantz Jr., Rolf A. '66
Frederick, Thomas Robert '87
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Humphrey, John Morgan '67
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Klepeis, John Emrich '85
Livingston, Laura Jane '73
Schwenker, David William '67
NY E Grace, John Thomas '55
Hendrickson, John L. '71
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Weissman, Martin J. '58
NY Z Gersten, Marvin Charles '60
Kaczmarek, Richard '73
Keller, Norman Kurt '58
Labianca, Frank Michael '61
Markman, Steven '66
Pawelko, Michael James '53
Sindel, Fred H. '59
Zieve, Robert M. '55
NY H Filipek, Stephan John '82
Goodman, Alvin Solomon '44
Lum, Jean Ping '85
Schlein, Robert George '72
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Cornett, Dean Leo '71
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Suran, Jerome J. '49
Thomas, John Anthony '86
Tracey, Michael Steven '86
NY I De Fazio, Michael Joseph '67
Grant, Richard Joseph '88
Teitelbaum, Howard Allan '79
Trentacosta, Joseph Daniel '69
NY K Allyn, Elwyn George '61
Casper, David A. '88
Hinshaw, David John '86
NY M Meader, Lyla Rebecca '86
Willis, Michael James '82
NY N Barnes, Robert Edward '84
Humphrey, David Kenneth '67
Kocher, Lawrence Harold '67
Kuberka, Gregory '80
Stearns, Richard Earl '67
Tabaczynski, Rodney John '66
Zarchy, Andrew Stephen '73
NY Ξ Byrnes, Richard Dennis '83
Murphy, Vincent Gerard '65
Sanderson, Ellen Irene '81
NY O Baxter, Scott Charles '85
Doynow, Donald '75
Froeschl, Gary George '71
NY Π Barber, R. Todd '87
Frank, Ian Joseph '09
Grosch, David A. '85
Hill, David Alan '77
NY P Vebeliunas, Rimas V. '74
Wong, Wai Kin '85
NY T Olenik, Anthony Michael '08
NC A Alexander, Ralph Bell '76
Allen, William Dowell '88
Blair, John Ramsey '77
Capps, Dickson Michael '75
Franke, Deborah A L '85
Frierson III, J. Lawrence '66
Mitchell Jr., Glenwood J. '60
Morton, Rodney Eugene '84
Phoenix, John Stuart '77
Teague, Lisa Jones '81
NC Γ Hovis, John Garrison '78
Prevatt III, Richard M. '77
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ND A Herbold, Frederick Jon '69
Sauvageau, Donald Richard '70
ND B Dehen Jr., James John '80
OH A Bacevice Jr., Anthony E. '70
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Ehlert, Donald Arthur '84
Gschwind, Leon Donald '55
Hamilton, Joshua J. '09
Hoh, Ka-Pi '84
Oblak, John Michael '62
Schuerger, Thomas Robert '50
OH B Allspach, Eugene Robert '70
Burger III, George Dean '68
Dobashi, Harry Hideo '68
Ruebusch, Robert Joseph '70
Wood, Ronald Eugene '89
Yost, David Brian '87
Zimmerman, Thomas A. '65
OH Γ Bouman, Robert William '60
Case, William Frederick '64
Cowan II, Robert Lee '66
Edwards, Dale Clifford '61
Hancock, Sarah Ellen '86
Johnston Jr., Robert Paul '67
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Kinzel, Gary Leo '68
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Risch, Gary Allan '76
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OH Z Folgate, Kent Roland '58
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Pyers, Dean Hale '84
OH H Bloom, Richard Larry '74
Breuder, Andrew Joseph '70
Campbell, John Joseph '76
Fraass, Ronald Guy '78
Freyer, Gustav John '60
Gressang, Randall Vernon '72
Leifeste, Sam Ernest '63
Murawinski, Daniel J.J. '77
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Rall, Richard Maurice '56
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Usleman, Robert T. '71
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OH K Billman, Randy William '82
Paridon, Charles Albert '81
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OH Λ Chegar, John Thomas '90
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Suhar, Richard Allen '83
OK A Blakeburn II, Dave Lowry '83
Dotson, Neil A. '84
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Wustenberg, John Walter '84
OK B Schmude, Donald Jude '86
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Sossamon, Dana Ray '76
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OK Γ Matson, John Andrew '02
OR A Buxton, Charles Edward '62
Jones, Reilly Cadet '75
Miller, George Edward '77
Sias, James Frederick '57
PA A Kankelborg, Carol C. '86
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Knox, Robert Seiple '53
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Lasser, Howard Gilbert '50
Leitch, Donald George '56
Lynch, Sarah Hayward '89
Melvin, William Larkin '89
O'Hara, John James '73
Vosseller, Kenneth F. '62
Wentzel, Alan Ray '75
PA B Andrichak, Stephen Michael '58
Dreibelbies, George Adam '55
Gibson, John Parke '64
Huber, Ronald Karl '70
Kardos, John Louis '61
Kolivosky Jr., John Edward '92
Longenecker, John Robert '71
Matthias, Tracey Dawn '89
McGivern, Patrick John '90
Thompson Jr., Frederick '63
Weston, Matthew Wayne '93
Zimmerman, Susan Louise '78
PA Γ Hudson, Robert Harris '77
Kornuta, Nick Joseph '81
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PA E Amman, Richard Walter '64
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Matsumoto, Tadashi C. '60
Rodite, Robert R R '64
Ryan, Richard Edward '86
Wetzel, Edward Donald '74
Yoder, Paul Eugene '49
PA Z Aepli, Theodore Carl '62
Hudak, Joseph David '79
Poplawski, Edward G. '80
Talecki, Stephen A. '76
Weggel, John Richard '64
PA Θ Coyle, Todd Frederick '77
Dever, Patrick Brian '94
Diener, David E. '67
Fozo, Geza '63
Gallen, Robert Michael '64
Girondo, Dominic Peter '70
Kneidinger, Carl Frederick '70
Lacz, Walter '69
Latimer, Jose Ramon '77
Meyer, James Leo '68
Threston, Joseph Thomas '57
Warczyglowa, Clarence A. '76
PA I Dehoff, Gregg Alan '86
PA Λ Janocko, David Jeffrey '81
Musselman, Thomas A. '73
Reedy, Herman Earl '75
PR A Blasini, Francois Rene '82
Irizarry, Arcelio '86
Ramirez, Miguel Angel '73
Sanchez, Hector Luis '76
RI A Foster, Nigel John '81
Fradkin, Henry Edward '68
Nielsen Jr., Carl Ernest '56
RI B Brady III, William James '80
Karnes, Jeffrey S. '80
Smith, Robert Alan '83
SC A Alexander, Samuel David '73
Drennan Jr., Robert F. '70
Gray Jr., Blaine Edward '72
Johnson III, Wilson U. '82
Mims Jr., Paul Wilson '71
Prothro, Joseph E. '63
SC B Haggerty, N. Kent '72
Shippey Jr., Kelley Ford '64
Wilson Jr., Robert Lewis '69
SC Γ Gooley, Thomas Joseph '55
Gustafson, Richard A. '63
Reed II, Henry McDavid '60
SD A Case, Robert Howard '75
Johnson, Jerry Allen '92
TN A Ayers, William Ralph '80
Burnett, William Allen '71
Conner Jr., Harold Tilton '68
Davis, Wayne Thomas '73
Evans, Colby Russell '94
Hickman, Charles Edward '57
Hutchinson, C. Milton '82
Jackson, Karen Elizabeth '81
Kennedy, Michael Earl '86
Layman, Ronald Terry '77
McCracken, Stephen H. '72
Meriwether, George H. '74
Moore, Terry M. '67
Shafer, Robert Weldon '47
Sheffey, David Wells '66
Trundle, Max Don '72
TN B Cook, George Edward '60
Kepper III, James Henry '71
Pentecost, Gene Edgar '50
Petersen, Eric Scott '84
Petersen, Stephanie Anne '84
TN Γ Buell, Phillip Ray '95
Denny, Hugh Wayne '60
Harvey, James Bruce '63
Thompson Jr., W. William '68
TN Δ Miles, Thomas O. '81
TN E Climer, Charles Edward '82
Nolte, Jennifer Jan '77
Nolte, Paul Allen '77
Smith, Craig '80
TX A Abad-Fitts, Carmen B. '80
Courtney Jr., Lonzo C. '58
Dillard, Frank Jeffery '72
Dodge, Nathan B. '68
Edgar, Arlen Lewis '57
Fuller, William Burke '82
Garrett, Darrel Wayne '70
Haley, Dennis Clyde '70
Hicks, Frank Mark '82
Hogan, David William '69
Hurst, Terry Lee '76
Kopecky, Johnny Anthony '65
Peet, Ed '69
Peterson, Robert Adrian '80
Rosales, Julian Francisco '83
Setliff, Sanford Ray '69
Stanley, William Robert '94
Turner, William Danny '61
Whitesides Jr., John L '65
TX B Berthold, Kristopher David '04
Boyd, Suzanna Ruth '81
Gilmer, Tracy F. '80
Hoiberg, John Arnold '64
Hood, David Leamon '73
Marasco, David Foster '87
Newkirk, Todd Leland '87
Soules, James Gregory '79
Upchurch, James Alan '76
TX Γ Fisher, John David '70
Griswold, Ronald Kent '71
Hagler, Marion Otho '63
Koonce, Kenneth Terry '60
Larkins, Robert Pruett '56
Smith, Fred Lewis '62
TX Δ Armstrong, Bryan Marcus '95
Boortz, Marielle Jean '77
Bradford, Craig Allen '93
Brittan, Charles Laury '65
Herring, Robert Lee '65
Simpson, Stancy Jean '79
Swink II, Marvin Neel '80
Williams, Walter Lazenby '49
TX E Douglas, William Johnson '70
Hillegeist, Reynold Ben '63
Power, L. Douglas '66
Smith, Kevin George '81
Lim-Smith, Yee Lan '82
TX Z Storey Jr., Arthur L. '65
TX H Bishop, Neil Erasmus '66
Cawoski, Victor George '74
Dye, Steve Edgar '82
Godwin, Albert Eugene '84
Hightower, Janice M. '67
Hoffman, Heather Janell '92
Lachman, Teri Ann '87
Schaeper, Wilfred H. '76
Southall, Hugh Landon '68
Thompson, James A. '72
TX Θ Alvarado, Ruben Armando '72
Havo, Karen Patricia '86
TX K Daniels, Jerry D. '79
TX Λ Alsop, Albert Walter '80
Carter, Jason Oliver '87
Carter, Norhanani B. '87
Saenz, Ida F. '84
UT A Malmquist, David August '62
Patrick, William Moss '74
UT Γ Torgesen, Greg Lau '80
VT A Kellogg, David Holt '62
VA A Conway Jr., George F. '70
Donoho, Thomas English '59
Johnson, W. Reed '53
MacKay-Smith Jr., A. '59
VA B Bucklen, Okley Bert '59
Dawson, Herbert M. '61
Mann, Richard Jeffrey '75
Marcus, Larry Allen '72
Shearer, Richard Lee '70
Smith Jr., Sidney Crawley '63
VA Γ Abbott, Terence Scott '75
Bergrab, Stephen Thomas '79
Sturm, Carroll Clark '78
VA Δ Michael, Glenn P. '66
WA A Brewer, Brian J. '82
Chandler, Alan Scott '77
Fosberg, Theodore Michael '59
Hulsizer, Stephen Anthony '69
Kinell, Donald Karl '64
Larkin, Robert Semple '61
Matteson, James Harris '66
Orr, Peter Courtney '71
Otteman, Lloyd Gilbert '54
Porte, Jeffrey A. '77
Simpson, David Paul '76
Strickland, Elizabeth Ann '77
WA B Ambrose, William Donnell '51
Hartup Jr., John Dewey '50
Large, Robert William '60
Nemitz, Rodney Eugene '86
Wahl, David John '62
WA Γ Damman, Lawrence Marvin '71
WV A Lilly, Larry Joe '64
Palmer, Charles Bennett '69
Spence, Peter Larkin '80
WV B Young, Jeffrey Lee '72
WI A Goehring, Henry G. '57
Hoffman, Carl A. '85
Holzman, Perry A. '85
Klanderman, Kent Arlen '58
Schuh, Peter Otto '63
Shimko, Darl Vann '79
Stahl, Bernhard '63
Stickles, Kenneth '67
Tennie, John Charles '64
Trnka, John Thomas '69
WI B Bauer, Kurt Walter '51
Dschida, Linda Maria '82
Hutton, Teresa Jean '91
Jaye, Deborah Ann '03
Lugthart, Cornell William '51
Swiontek, Thomas John '69
WI Γ Formella, John Patrick '81
Stachowicz, Robert Walter '70
WY A Dwan, Terrence Edward '68
Riley, Robert Hugh '82

SECOND CENTURY CLUB

AL A Carey, George Walter '69
Essing, John Earl '67
Hardy, Joseph Fletcher '74
Hawkins, Lawrence Allen '81
Malseed, Robert Allen '77
Moore, John Paul '55
Reed III, Wilmer Handy '48
Shivers, Charles Herbert '75
AL B Barnes, Constance Lee '78
Davidson, Janet L. '78
Mason, William Warren '89
AL Γ Guest, James Mark '89
AL E Zozulin, Alexander Joseph '91
AK A McFadden, Terry T. '60
AZ A de Shazo Jr., Thomas E. '62
Fish, James J. '50
Mahr, Eric Michael '97
McSpadden Jr., William R. '56
Smith, William G. '78
Tretschok, Cody D. '89
Young, James Roy '80
AZ B Beemer, Jeffrey Brian '80
Harary, Robert Mark '82
Takinen, Scott Alan '79
Wilson, Richard Allen '72
AR A Lehnen, Robert Anthony '90
Reed, John Lee '68
Stice, James Edward '49
Williams, Curtis Ray '63
CA A Lee, Chilton '65
Rae, James William '52

SECOND CENTURY CLUB, CONTINUED

CA B Lalli, Stephen John '86
CA Γ Grolle, Timothy Floyd '78
Holsinger, Kevin Karl '84
Putt, Brian Hollis '72
Rassieur, Robert Terry '79
Weaver, James A. '71
CA Δ Goodin, James Douglas '57
Kester, Larry Arthur '78
Koppany, Charles Robert '63
Lawson, William Edward '62
MacDonald, Kirk Stewart '70
Rey, Daniel '66
Roum, James Henry '80
CA E Miller, Richard Edward '87
Reichert, Ralph Jeffrey '67
Vehrencamp, John Edward '50
Walker, David Allen '78
Zarin, Oren '95
CA Z Bauerle, Richard Dennis '59
Blaney, Timothy John '86
Cepollina, Frank J. '59
Sako, Mitchell E. '79
Zwingman, Robert Leo '70
CA H Bautista, Anthony H. '94
Hong, Chi-Seng Michael '84
Kruusmagi, Daniel Thomas '13
Rossow, Terry Lynn '66
Thurston, Jeannie Lynn '77
CA Θ Carpenter, Gordon Lee '49
Kolderup, Nils Petter '60
Skalka, Gregory Dennis '82
Wiering, Larry Arthur '77
CA I Dembegiotes, Pantele '84
Hanna, Hugh Allen '60
Schneringer, Paul '65
CA K Moncsko, George Edward '68
CA Λ Fujitani, Paul Edward '79
Johnston, Brian David '95
Wells, Russell Patrick '77
CA N Caballero, Luis Alberto '85
Johnson, Michael Robert '86
Rheinhardt, Mark Edward '84
Robertson, Alix Ann '03
CA Ξ Baxley, Paul Alma '81
Doeing, Brian James '81
Gee, Warren Alan '84
Patterson, Richard Harold '74
Preston, Kimberly Denise '96
Smith II, Gordon F. '97
CA Π Nakauchi, Edward M. '69
CA P Hall, Mark Corwin '88
Motogawa, Bruce Joji '75
CA Σ Tabar, Denise Shaw '87
CA T Breneman, Kenneth Philip '89
Lotocky, Daniel A. '84
Tabar, Anton '81
CA Φ Ramos, Eduardo Nicolas '13
CO A Deluca, Frank Anthony '80
Devoe, Tracie Kay '82
Stratton, Joan Victoria '74
CO B Akers, David A. '78
Brooks Jr., Lowell Ward '62
Castleman, Curtis Hulen '67
Dadd, Susan Jane '96
Graham, Leroy Cullen '50
Gustafson, Molly B. '85
Lafollette, Jack '59
Sorensen, Chris David '79
CO Δ Baldwin, Lionel V. '54
Dadd, Jeffery Scott '97
CT A McEligot, Donald Marinus '52
Weber, John William '53
CT B Dembiczak, Gerald Joseph '74
Fappiano, Michael D. '87
Greene Jr., Joseph Fred '53
Sobol III, Anthony Joseph '70
CT Γ Boccia, Chris-Michael '97
Godbout, Louis Francis '72
DE A Neimeyer, Terry Francis '77
Rae, Kirk Alfred '88
Smith Jr., Lewis Soherr '85
DC A Amisial, Wilfrid Jean '71
DC B Cizler, Martin Alan '86
Delgado, Antonio J. '93
Seely Jr., Daniel Cecil '72
DC Γ Hill, Howard Thiebaut '62
Kee, Orron Eugene '57
Potterton, Richard Lee '60
Whitham, Charles Lamont '61
Wilhelm, Eugene Bailey '86
FL A Browell, Edward Vern '68
Cooper Jr., Wayne Will '81
Jones Jr., Luther Curtis '71
Milburn, David M. '91
Noden, David Keith '83
Pitt, Gary Alvis '70
Rauth, Terry Jean B. '77
Van Horn, William Alfred '82
Vande Vusse Jr., Gerald '65
Wabbersen Jr., William G. '90
Westphal, R. A. '86
FL B Berman, Gerald Adrian '55
FL Γ Luce, John Wharton '50
Phares, Harold Paul '80
Suter, Bruce Wilsey '72
FL Δ Woods, David Wayne '81
FL Z Seip, Ralf '90
FL Θ Lund, Karen Elizabeth '98
GA A Axon, Michael William '90
Bodner, Douglas Anthony '87
Burgess, John Milton '61
Curry Jr., John Charles '58
Faulkinberry, David Laws '77
Flegal, William Malcolm '66
Glover, Edmund Cook '60
Gulley, John Quentin '67
Menges, Thomas Abel '78
Schueler, William Frederick '72
Uehling, Jeffrey Steven '79
GA B Jones, David Neal '92
ID A Ketchum, Steven Lee '85
Spangrude, Gene Ronald '73
IL A Angus, Richard Myers '57
Bassler III, Robert Edward '74
Baumgartner, Richard A. '69
Benjamin, Roland John '50
Buboltz, Lisa Ann '01
Davis, Stephen Robert '63
Fisher, Robert Lee '80
Graham, Joseph Gund '51
Guill, Daniel Allan '73
Hendron Jr., Alfred Joseph '59
Jacobson, Jerome '50
Jonas, Steven Geza '66
Kraft, Donald Edward '52
Lane, Brad Glenn '84
Lanzerotti, Louis John '60
Marlowe, Lyle Harrison '65
Mueller, Vernon Charles '59
Picus, Joel '79
Rebeschini, Michael E. '77
Splitt, Frank George '52
Szumski, Daniel Raymond '80
Tonelli, Arthur Duane '57
Wallace, John Robert '61
IL B Kaplan, Edward '65
McBlaine, Michael Richard '75
Schlueter, Richard Paul '83
Thomas, Robert James '82
IL Γ Puscher, Wilfried Alex '74
IL E Joseph, Howard Lowell '83
IN A Alexander, John Albert '56
Atterholt, James William '57
Becker, Kenneth Alan '81
Bertsch, Patricia Babette '76
Bower, William Walter '67
Capasso Jr., Vincent N. '54
Colville, James '59
Cross, Perry Gregory '74
Cunny, Robert William '46
Dillard, James Orland '77
Ferrell, John Charles '61
Gearan, William Keaveny '58
Hibbard, George Lewis '65
Holwager, Thomas '57
Jebsen, Eric Richard '80
Lee, Robert Edward '67
Levine, Jerrold Louis '61
Lin, Jeffrey Eugene '97
Meyer, David George '73
Mucha, Thomas Jerome '60
Murphy, Thomas Frank '70
Pigman, Stuart Marchant '50
Rentz, Peter Eugene '55
Rieter, Robert Frederick '65
Sheets, Paul Wilbur '82
Smigielski, Thomas Stanley '65
Stepanek, William Donald '56
Stimson, Jon Richard '60
Travis, John Charles '47
Wolff, Jay Ralian '48
IN B Jones Jr., Thomas George '49
IN Γ Bajura, Richard Albert '62
Crowley Jr., Richard D.'56
Flynn, Michael Joseph '89
Yogan, Thomas James '82
IN Δ Herkamp, Nathan Daniel '69
Zendzian, Daniel D. '95
IA A Carosella, Sandy L. '88
Haack, Leland Arthur '53
Irvine, Alexander John '79
Johnson, David Charles '64
Kurtz, John Wendell '45
Leonard, Randall Charles '77
Matheson, Harold Moffat '55
McGinnis, Bryan John '63
Nichols, Donald Orville '61
Oguntimein, Gbekeloluwa B '74
Olson, Scott E. '69.
Watson, Stephen Louis '67
IA B Croissant, Welton '50
Gozali, Paul '85
McSwiggin, Thomas G. '61
Sears, Larry Mac '61
Weber, Steven Wheeler '71
KS A Ashbrook, J. '66
Hinton, Robert Allan '61
Meyer, John Edward '50
Miller, Robert Edward '52
Muirhead, Vincent Uriel '41
Peters, Paul Eugene '57
KS B Straka, James Lavern '89
KS Γ Cutler, Verne Clifton '50
Hightower, Ray E. '64
Roberts, Thomas Carrol '70
Terrill, Scott Allen '04
KY A Blevins, Parker Ray '64
Click, Randall Robert '00
Midkiff Jr., Kenneth Clark '79
Mullins, Chuck '87
Wells, William Lochridge '62
KY B Black, Leslie Edward '50
Hauenstein, Bruce Robert '76
Jodrie, Mary Clare '85
Meyers, James Frank '69
LA A Arman, Ara '55
Champagne, Sidney Alfred '68
Knighten, James Leo '65
LA B Garrido, Louis A. '57
Lazarus, William B. '79
LA Γ Guice, Les Keith '78
Jenkins, James S. '80
Jones Jr., G. Clifton '64
Owen, Mark Enos '92
Thomas, Robin Carol '92
LA Λ Key, John Autry '75
ME A Connor, Edward John '53
Hutchison, Mark Evray '77
McBurnie, Jeffrey Charles '82
McCarthy Jr., Robert H. '68
Mortenson Jr., Victor A '70
Whitten, Donald Lee '57
MD A Aaron, Nelson Harris '80
Armstrong, John Ernest '56
Beatty Jr., Millard Fillmore '59
Cummings, Lori Lynn '83
Flynn, Paul David '48
Gift, Elwood H. '54
Hartlove Jr., Charles L. '76
Piedrafita, James L. '78
Sabater, Juan Miguel '60
Ver Valen, Henry Clay '73
MD B Amtmann, Louis Gerard '66
Birkmire, John Christopher '95
Errera, David Raymond '75
Halvorsen, Fred H. '64
Horner, Matthew Lewis '01
Law Jr., Preston Eugene '60
Leasure Jr., William A. l'66
Lenhoff, Carl Edward '65
McCracken, Richard Paul '70
Mitchell, Reginald Henry '72
Roberts, Victor David '64
Sacks, Herbert Kenneth '64
Schulman, Joseph Robert '44
Wong, James Bok '50
MD Γ Hauge, Todd Allen '83
MA A Ahern, Michael Francis '78
Andel, Robert Matthew '73
Auclair, Jared Robert '01
Brown, Mark William '82
Griffith, Rebecca Anne '91
Haringa, Glenn E. '74
Mangiarelli, Christopher A, '96
Proulx, Thomas Joseph '92
Saltus, George Edwin '53
Weeks, Frank Edward '46
Wielk, Michael Christopher '86
Zlotek, David Alan '69
MA B Bengtson, Sture Robert '55
Bishop, Peter B. '70
Hui, Anthony Y. '00
Kendall, Robert Edward '50
Marx, Austin Frederick '49
Midney, John Henry '47
Miller, Paul George '49
Mleziva, Matt Louis '65
Rogers, Peter Todd '82
Smith, Kenneth Alan '58
Smith, Thomas L. '67
Weinberg, Marc Steven '70
Woolling Jr., Kenneth Rau '71
MA Δ Babaian, Peter Martin '99
Bloch, Frederick Hersh '68
MA E Hamel, Mark David '77
Roberts, Carl Bertrand '82
Sarafinas, Aaron '82
Schoenfeld, Richard Alan '71
Vesce, Paul James '64
MA Z Benwood, Bruce Robert '69

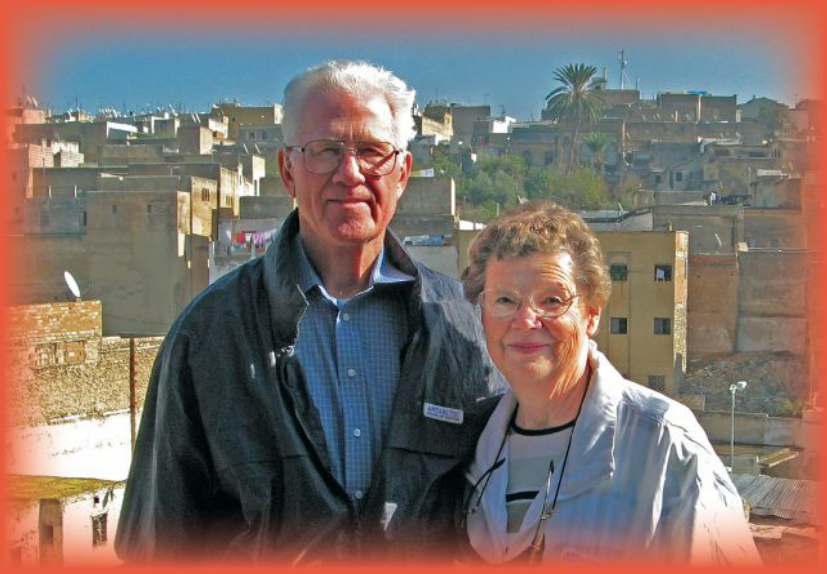
Lyle's Latest Law

the heritage society

The Heritage Society was created to recognize those who include Tau Beta Pi in their estate plans. Becoming a member can help the Association achieve its mission. For more information, call Pat McDaniel at 865-546-4578 or visit www.tbp.org/giving.cfm

"Tau Beta Pi has been very important to me from the time of my induction in 1960 to the present. It embodies the 4 E's that have been the focus of my professional career: Engineering, Education, Excellence, and Ethics. As such, it has provided inspiration and incentive to thousands of engineering students and alumni and funded hundreds of graduate fellowships. Recognizing that the good things done by Tau Beta Pi require money, Dorothy and I have supported the Society financially as we have been able. We also saw the opportunity to continue our support after we are gone by including Tau Beta Pi as a beneficiary in our wills. It is gratifying to know that the Society will continue its work well into the future and that our legacy will help it to do so."

Lyle's Law *creator and frequent contributor to* The Bent, *Lyle D. Feisel, Ph.D., P.E. (Ret.), Iowa Alpha '61, is dean emeritus of the school of engineering and applied science at SUNY at Binghamton. His new series* Why Do We Call it a...? *appears each Summer and Winter.*



Lyle and Dorothy during a visit to the ancient Moroccan city of Fez.

TAU BETA PI
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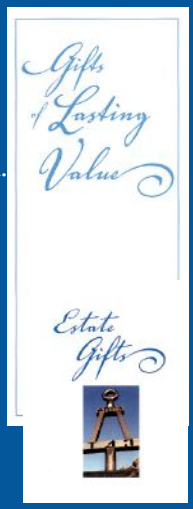

SECOND CENTURY CLUB, CONTINUED

Cooper, Perry A. '62
Miller Jr., Melton Myron '55
MA I Schreiner, Steven '86
Smith, David Robert '87
Walczak, Raymond '74
MI A Arnold, Charles Jay '59
Brewer, Frederick Evans '57
Lowry, Peter Alexander '60
Othmer, Hans George '65
Suszko, Andrew M. '73
Watanabe, Gerry Torao '72
MI B Anderson, William Harold '57
Klein, Raymond John '84
Plutchak, Raoul Edward '62
Pollock, Craig Allen '80
Rom, David Bruce '56
Weber, Scott Charles '88
MI Γ Atkinson, David Eugene '60
Beman, Thomas J. '72
Blair, David John '57
Bloomer, Craig D. '80
Bloomer, Kristine Marie '81
Brown, John M. '67
Harris, Frederick Allan '64
Lambert, Thomas Joffre '77
Lasher, William Charles '76
Margolese, Kate Mary '84
McCormick, James Robert '58
Othman, Roger Mohamad '74
Pace Jr., George Donald '61
Vaughn, Wayne Allen '73
Wilkes, James Oscroft '54
Winter, Steven D. '81
Youse, Rex Jacob '57
MI Δ Brining, Dennis Wayne '68
Dauerer, Walter Peter '60
Devere, Gerald Joseph '59
Kaunelis, Pranciskus S. '69
Olex, Michael Bernard '74
MI E Benci, John Edward '83
Billion, Godwin Paul '75
Jerome Jr., George G. '94
Klaetke, George H. '55
Pogats, Russel Jay '92
Sieg, Mary Henderson '77
MI Z Lobkovich, Thomas Michael '83
Sitko, James Robert '70
Verhoff, Stephen John '00
Zywiol, Gary Steven '76
MI H Polkinghorne, Bruce R. '50
MI Θ Kanfer, Marvin Eliot '71
Messer, Bryan James '98
Stade, Phyllis Ruth '83
MI K Sikkenga, Chad Douglas '98
MN A Betterman, Lanny Ray '92
Grill, Susan Marie '82
Halladay, Henry Earnest '64
Hess, Craig Allen '72
Larson, Michael Lane '59
Magney, Mark Charles '79
Olson, Gary Elden '64
Oss, Don Gordon '58
Tran, Binh Van '89
MS A Bui, Tuan Thanh '90
Clements, Nathan Scott '96
Dabney, Emily Catherine '88
Miller, Elton Ray '70
Warren, James T. '60
MO A Fitzgibbons, Thomas J. '87
Gardner, Roger William '63
Gritzo, Ludwig Adam '58
Herman Jr., Donald Louis '84
Jorden Jr., Bill '56
Manes Jr., Ezra Earl '69
Potter, Charles Jarrett '71
MO B Agnew Jr., Lewis Edgar '50
Bodenhamer, Steven D. '75
Bondurant, David William '71
Brockhaus, Douglas Adolph '68
Buenemann Jr., Morris '82
Charles, Albert Lee '78
Elfrink, Lindell Herman '62
Hendrickson, Richard C. '53
McDaniels, John Louis '60
McJimsey, Edward Clair '71
Preston, Scott Steven '97
Roam, John Harold '69
Scherrer, Paul Keith '71
Steele, James Dean '66
Stevens, Robert E. '85
Willoughby, Ronald D. '73
MO Γ Lingren, Terry Dale '80
Swallow, Louis John '54
MT A Brin, Beth Leann '79
Delaney, Robert Charles '88
Jellison, Gabe Lee '98
Kolb, Robert C. '61
MT B Jackson, Darron Boyd '86
NE A Claar, Stephen Beryl '73
Cowling, Edgar Charles '75
Moore, Thomas Paul '78
Nelson, Stuart Owen '50
NV A Ericksen, Spencer Lee '99
Jones, Keith Alan '85
NV B Vodrazka Sr., Walter C. '55
NH A Amazeen, Bruce Edward '65
Lof, Richard J A '71
Stephens, Jay Edward '73
Zecchini, Charles Robert '50
NH B Cloyd, Joseph R. '02
NJ A Carow, Walter Marvin '50
Ricco, Robert Philip '70
Swanson, Frederick James '68
Tabola, Michael David '84
NJ B Badgley Jr., Robert Henry '60
Dola, Steven '55
Emmons Jr., Harry LeRoy '40
Futehko, Frederick '55
Masaryk, Joseph Stephen '67
Nixon, Allen Mackenzie '62
Richards, John Reed '76
Viechnicki, Dennis '62
NJ Γ Andrus, James '02
Barry, James J. '70
DiDomenico, Michael John '65
Gupta, Punit Kumar '96
Kasuba, Peter Francis '65
Scibilia, John '89
Spinnler, Gerard Francis '75
Tabor, Vincent Joseph '75
Tehve, Toomas '64
Thompson, Susan M. '92
Tubello, Jeffrey '76
NJ Δ Adrignolo III, Anthony J. '89
Cole, Peter Preston '72
Nash Jr., Raymond Allen '60
Nisonger, Thomas Mitchell '78
Shaw, Michael Miller '82
Usas, Alan Michael '71
NM A Aragon, Frank Garcia '77
NM B Tills, Jack Lee '78
NY A Seader, David '67
NY B Baleno, Anthony Paul '66
Bolstad, Richard L. '80
Borst, Kenneth Joseph '49
Roberts, Christopher Alan '94
NY Γ Brenneman, Scott Andrew '83
Buttz, Charles William '56
Dupier, Dennis George '61
Garland, Newton Cluff '46
Lewandowski, Michael '96
Natale, Michael Robert '02
Opsahl, Richard Bernhard '53
Schrier, Steven Brett '82
Segal, Joshua L. '68
Yaros, Steven Francis '63
NY Δ Goldstein, Steven Mark '81
Hodgson Jr., Edward W. '68
Hurta Jr., Gary Paul '06
Lampell, David Mark '73
Reth, Thomas Bernard '64
Roseman, Ann Lynn '81
NY E Lee, John H-J '70
NY Z Brook, John Walter '56
NY H Shakun, Melvin F. '50
Wolf, Murray '48
NY Θ Baldwin, Alan Richard '70
Berlat, Norman Robert '62
Dec, Eugene Bernard '72
Gorski, Gerald Ervin '82
Grubb, Michael Alan '78
Harris, Everette C. '76
Hunt II, William Edward '59
Lawrence, Brian Leonard '87
Libutti, Richard Joseph '70
Thiemann, Peter Ernest '79
Tuttle, James Raymond '63
Wells, Eugene Francis '50
Ziki, Ann Louise '86
NY I Berger, Jack Solomon '61
Boehm, Robert Andrew '79
Hartmann, Hans Gustav '70
Hoffner, Jeffrey Norman '71
Millman, David Seth '72
Selinger, Carl S. '67
NY Λ Cilento, Eugene Vito '73
Killeen, Michael James '73
Novakoff, Alan K. '74
NY M Renzi, Leah Foley '80
NY N Davis, James Steven '70
Feldman, Scott '75
MacNeil, Randall Lewis '69
Mann, Michael '77
Pardini, Thomas John '77
Tumminello, Paul Arthur '85
NY Ξ Boyle, Charles J. '76
Costello, Joseph John '70
Defelice, Nicholas James '77
Frawley, Robert James '68
Machuca, Luis Arthur '69
Rodriguez, Ernesto '85
Sanelli, Ronald Nicholas '84
Short, Rosemarie '91
Taylor, Maryanne Barbara '80
Triano, Salvatore John '85
NY O Kadysiewski, Stephen J. '76
Lumish, Stan '78
NY Π Howles, Douglas '76
NY P Lau, Soon '85
Nerses, Annita '89
NC A Clark, Jennifer Anne '79
Doggett, William Ray '86
Helms, Chester Ethane '74
Jensen, Donald Nick '87
Morse, Charles Allan '89
Olds II, John Robert '87
Wicker, Robert Ellis '74
Wynegar, Kathleen M. '86
NC Γ Behnken, Kenneth Charles '67
Leo, Perry Howard '81
Peters, William Thomas '59
NC E Blunk, Thomas Reynolds '92
ND A Crowder, Harry Richard '60
Reifschneider, Paul Henry '80
OH A Bracy, Kevin Norman '93
Cares, William Ronald '63
Diederich, Norman Francis '64
Kownacki, Edward Joseph '67
Moorhead, Kenneth Wayne '50
Richenbacher, Wayne E. '75
Zurilla, Ronald William '61
OH B Bach, Wayne Stephen '72
Bobinger, Robert O. '69
Cook, Kenneth Foster '74
Mayer, Robert Lawrence '69
McCune, Larry Clinton '63
Nilsson, Nils Eric '71
Oliver, Fred William '65
Triplett, William James '76
OH Γ Choyke, Wolfgang Justus '48
Del Tosto Jr., Joseph J. '87
Del Tosto, Judith Mary '87
Engen, Todd Christian '81
Heath, J. Allen '78
Marsolo, Keith Allen '02
Miller, Samuel Howard '61
Mohr, John Glover '63
Price, Ted Walter '59
Shade Jr., Willard Norman '70
Steiner, William Samuel '63
Vermillion, Thomas Ryan '80
Zupancic, Michael Alan '87
OH Δ Ankrom, Linda Steele '79
Hadley, Roger Adams '56
OH E Dirks, Douglas Alan '83
OH Z Enderlen, Jeffrey Robert '80
Levey, Gary E. '74
Sussman, Arthur P. '49
OH H Davie Jr., Robert Nelson '69
Eggers, James Arthur '72
Gilbert, John Ellis '70
Hahn, Danny A. '83
Hartman, Dean H. '99
Menna, Richard Joseph '62
Palazotto, Anthony N. '55
Piske Jr., Andreus August '61
OH Θ Centers, Robert Edward '70
Decker, John William '65
Kamowski, Dennis Daniel '73
Mikalauskas, George A. '86
OH I Walker, David W. '72
OH K Carver, Robert Michael '87
Dudek, Scott Andrew '90
Stimler, William Edward '83
OH Λ Hallochak, Andrew John '77
Oakley, Robert Ray '77
Stiver, Alan Wayne '86
OH M Van Tassel, James H. '57
OK A Bastron, Victor Christian '66
Brown, Leslie Wray '70
Burton, Donald O'Neil '71
Ellis, George Olen '50
Patterson, John L. '85
Swihart Jr., John Donald '59
OK B McConnell, Chuck G. '65
Miller, Michael Joseph '81
OK Γ Dean, Philip Maxwell '74
Hanes, Larry Lewis '76
OR A Kondo, Harry Hiroshi '58
Loughmiller, Bert Edward '64
Miller, Mark Wade '89
OR B Sutton, Carolyn Ann '08
PA A Bakis, Charles Emanuel '81
Donley, Shawn Thomas '71
Edwards, Alfred Belmont '71
Marshall, Steven John '82
Megerle, William Georg '86
Midkiff, Alan Haywood '85
Muller, Eduardo E. '87
Shapiro, Michael Henry '70
Swartwout, John Baxter '73
PA B Bova, Francesco Antonio '05
Bridge, David Lee '71
Ferenci, Jack Edward '75
Hertneky, John A. '79
Irwin, Thomas John '70
Pasko, Thomas Joseph '59
Pickenheim, Timothy R. '90
Wanenchak, Michael J. '69
PA Γ Rouleau, Wilfred Thomas '51
Sack, John Stuart '75
PA Δ Baxley, John Hirst '88
Lang, David R. '85
Long, Tian Ching '95
Nackoney, Ogden G. '63
PA E Cimei, A. Kevin '84
Cottrell, Martin M. '67
Cross, David Wilson '67
Hartman Jr., Harold F. '56
Santo, William John '53
Schroeder, Karl Richard '49
Steel, Henry William '58
PA Z Browne, Joseph Dominic '60
De Maio, Michael '76
Diener Jr., Henry Christian '51
Kirsch, Paul Andrew '75
Okada, Richard Francis '54
Shaffer, David Eugene '78
Wagner, William Andrew '89
PA H Hackman, Timothy Brown '68
PA Θ Addotta, Robert Frank '77
Norris, Clinton Joseph '61
Orsatti, Louis George '66
Pela, Karen Diane '84
Ryan III, Arthur Peter '65
PA I Lorenz, Bryen E. '76
PA Λ Anselm, Gregory Alan '81
Domhoff, Edward Scott '91
Hovanec, Andrew Stephen '58
PR A Archilla, Joaquin '68
Perez, Juan A. '78
Rivera, Fernando Osvaldo '68
RI A Garrett, Scott Lee '57
RI B Chalsen, Michael Joseph '81
James, Charles Franklin '58
Knickle, Harold Norman '62
Kolb, Robert Allen '66
Pavia Jr., Robert J. '92
SC A Brown Jr., Bevan Wood '49
Calcutt, Walter Wade '91
Cox Jr., Jacob H. '03
Hill, James C. '61
McCormac, Jack C. '48
SC Γ Barton Jr., Robert Harley '62
Bolden, Michael Vincent '97
Kelly, Robert Thomas '86
Lucas, William Ray '84
SD A Beck, Carl William '83
Eisenbraun, Daniel Dale '75
Kroetch, Christopher Allen '06
Luchini, Timothy John F. '11
TN A Blazier, Stephen Draper '74
Burka, John Morgan '49
Cates, Phillip Stephen '59
Conway, Tammy Kay '82
Diaz, Amy A. '96
Hutsell, Wilbur Riley '68
Jenkins, Alvin Leigh '61
Kee, Bennie F. '71
Osborne, Bernie Bond '86
Patterson, Grant Turner '66
Rogers, Marvin Dale '70
Sewell, John Ike '54
Taylor, David Richard '69
Warren, Donald Earl '71
Whitehead, John Carson '61
TN B Casson, Leonard Walter '81
Kammerud, John Eric '70
Keaton, Kathryn M. '76
Keaton, Lawrence T. '71
TN Γ Howey, James Edwin '68
Tipps, Richard Douglas '69
TN Δ Luttmann, Mark Joseph '82
Luttmann, Lisa M. '82
TN E Funderburk, Rodger Miles '89
TN Z McGlumphy, Jonathan D. '02
Wilson, Matthew William '00
TX A Behrens, Paul D. '47
Felton, Charles Ronald '73
Foerster, Paul Adolph '57
Huang, Lawrence Peter '81
Kassler, Harlan Larry '91
Kumpf, David Kenneth '70
Melton, Walter Curry '56
Nix Jr., Cecil Anson '57
Wales, Robert Curtis '65
TX B Jain, Ravinder K. '71
Kiesling, Ernst W. '55
Krauss, Kerry Len '72
Palmer, Jim Brown '64
TX Γ Avant, Richard Lee '83
Popplewell, Thomas R. '74
Sandmann Jr., Charles W. '82
Sick Jr., William Norman '58
Williamson, Kent Alan '77
Wolfram Jr., William R. '68
TX Δ Crews, James Alvin '58
Eng, Ronald Wey '71
Miesen Jr., Robert John '87
Murthy, Prahlad N. '92
Vaden III, Frank S. '56
Wornat, Richard Oscar '49
TX E Brown Jr., Thomas Brocks '72
Ford, Samuel '64
Martin, Samuel Ray '83
TX Z Broussard, Lance Armance '97
TX H Benson, Marvin Dale '79
Collins, Clyde Williams '69
Loper, Thomas Lee '81
McBay, Michael Raymond '73
Potvin, Alfred Raoul '64
Tepper, John C. '82
TX Θ Goolsby, Tommy D. W. '84
Klancher, Michael James '80
TX I Carter, Sherry Jeanette '86
TX K Jolley, Lawyer Curtis '79
TX Λ Hinojosa, Juan Jose '84
UT A Gehmlich, Dietrich Karl '53
Jarrell, Reese Patkin '79
Stewart, William Veraene '60
UT B Craig, Donald Dean '82
Hinman, Paul Victor '71
Paxton, Thornton Shirrel '63
Thompson, James Rowley '76
UT Γ Esplin, Robert Barton '04
VT A Goddard, Eric Hapenny '86
VT B Clark, David Thomas '81
VA A Cosby, James Gordon '61
Fountain, Frank S. '52
Jacobs, Susan Ramsey '85
McGhee, Kenneth Hamilton '64
Mizelle, Peter Privott '60
Roesch III, Maurice Albert '78
VA B Brockenbrough, Thomas W. '42
Cassell II, Ray Vaugn '88
Detterman, Robert L. '53
Ernest Jr., Charles Lee '70
Haase, Bruce N., '83
Haase, Eileen Bernadette '83
Meith, Robert M. '57
Ray II, Robert E. L. '74
VA Γ Swats, Charles Frederick '74
VA Δ Bunch Jr., Jennings B. '50
WA A Grant, Patrick William '75
Levin, Marc E. '80
WA B Brower, Michael Rex '70
Hyde, Gary M. '64
Simon, Terry William '68
WV A Deakins, Ralph Richard '58
Easterling, William Samuel '81
Farnsworth, David L. '68
Hargett, Donald Roy '65
King, Staci Renee '96
Schuler, Arthur Kurt '71
WV B Capozzoli, Brent S. '84
Farmer, Harry Clayton '70
WI A Antolovich, Stephen Dale '62
Berman, Neil Sheldon '55
Cleasby, John L. '50
Davis, Scott Paul '78
Detjen, Edson Reinhold '46
Devoe, Michael James '78
Frazier, Clive '66
Goba, John J. '66
Jens, Barry Lee '64
Nesbitt, John David '82
Rozek, John Stanislaus '52
Severson, Roger Eugene '76
WI B Barone, Frank J. '62
Bell Jr., Robert Berhard '61
Fons, Richard John '79
Jilek, Carol Marie '84
Koester, Fred William '59
Kormanik Jr., Nicholas J. '62
Marcouiller, Roger Albert '60
Penlesky, Richard J. '73
Schiedermayer, Ruth A. '81
Sommerville, Martin Glenn '94
Wolf, Thomas Francis '59
WI Γ Griffin, Michael M. '93
Jendrzejek, Gary Steven '75
Merkel, Brian John '81
WI Δ Sullivan, Shawn Francis '02
WI E Hubmann, Martin Thomas '13

FOUNDERS CLUB

AL A Holloway Jr., Coley Myer '94
Jones, Win Eugene '75
Melton, James Bruce '77
Murray, Scott Blansit '69
Rosser, Gregory Kennedy '78
Strickland, John Curtis '55
AL B Bobbitt, Billy Tilford '68
Elmore, Gregory David '97
Franks, Larry Daniel '71
Grider, Kelly Vernon '58
Moyer, Robert E. '65
Pilleteri, Joseph '74
AL Δ Sharp, Gary Allen '93
AZ A Fellner, Kenneth Mark '84
McLennan, Mac Jack '66
Spagon, Patrick D. '68
Whitlock, Charles N. '79
AR A Chastain, J. Dee '59
Magness, Joe Donald '55
CA A Divine, James Robert '61
Florez, Valerie Province '99

Shohara, Sei '52
Silva, Christopher Patrick '82
CA B Andelin Jr., John Philip '55
Broido, Michael David '70
CA Γ Bullock, K. Maureen '91
Cummings, Alan George '76
CA E Marcy, William Louis '53
Riggert, Eric Floyd '91
CA Z Frederiksen, Ben Joseph '11
CA H Cox, Michael James '12
Gerken, Gary Mark '11
CA Θ Koerber, Matt James '95
Seigman, Paul Andrew '95
CA Λ D'Albora, Emanuel Guy '77
CA M Calia, Kristin Denise '95
Lightcap, William L. '86
CA N Jimenez, Ramon '95
Melton, Richard D. '72
Nguyen, Mai '79
CA P Eberly, Barry Lynn '81
CA ΑΓ Rubick, Jondavid Henry '08
CO A Melvan, Joseph John '76
Smith, Steven Duane '80
CO B Chavez, Greg Thomas '87
Chmelka, Floyd Ardell '59
Gasser, David Allen '77
Primeaux, Paul Rodney '67
CO Γ Conway, Kent Waldo '52
Ton, Scott Marshall '74
CO Δ Gonzalez, Julio Jorge '91
James, Miller Boyd '92
CT A Goldenkoff, Ralph Jordan '49
Peters III, Edward Emil '50
CT B Berson, Bernard Raymond '57
Leheny, Robert Francis '60
Rey, Donald Paul '78
Valerio, Clement V.A. '70
CT Γ Allen, Elizabeth Anne '01
DE A Shade, Patrick Joseph '76
DC A Drew Jr., Vernon Overton '61
Dugger, W. Emmanuel '82
FL A Kiersz, Donna Cecilia '80
Marko, Paul David '81
FL B Holmes, Martin E. '82
FL Γ Helgeson, Robert Clarence '68
Paugh, Wayne Bruce '93
FL Δ Dobbins, Kathy Lynn '93
FL Θ Leon, Felipe Antonio '99
GA A Bartlett, Claude Dale '66
Cleveland, Paul H. '82
Gumm, Milton Sherman '67
Jaklitsch, James Joseph '80
Olive, Charles Michael '70
Simpson, Philip B. '85
ID A Dafoe, Kathryn Michelle '05
IL A Higgins, Daniel Francis '68
Highland, Steven Douglas '68
Hillman III, Arthur B. '67
Reichelt, Karl Lawrence '68
IL B Fenner, Joel Stewart '07
Jones, Harold Chester '49
Nelson, John D. '60
Ziomek, Arkadiusz '10
IL Γ Crane, Morton Jack '45
IL Δ Yerby, Joel Talbert '56
IL E Mueth, Timothy Paul '89
Silich, Bert Allen '79
IL Z Beissert, Brian Helmut '90
IN A Brennan Jr., Paul John '46
Chatto, Kenneth Austin '50
Hughes, Gordon M. '81
Larsen, Hals Norman '65
Lee, Joseph K. '92
Matsumoto, Randall Itsumi '75
McMillion, Robert Arthur '81
Moore, Darrel Daniel '64
Newby, Karl Eugene '82
Trickle, Chris Michael '13
Wagner, Steven John '88
Walker, Neil Renz '69
Wolber, Raymond W. '80
IN B Matsuda, Fujio '49
IN Γ Abot, Rosary Christine T. '11
Geer, Ivan Daniel '94
IN Δ Bolur, Adam Reza '02
Lyons, David William '71
IN E Hasbrouck, Christie Robyn '16
IA A Ackley, Mark W. '72
Blank, William A. '51
Gallagher, Richard F. '59
Hegg, Bob Allen '66
McGuire, Jack Francis '63
Mohr, Richard Lee '67
Nieman, Richard Larry '64
Patrou, John Peter '51
Ryken, Mike Jon '96
Schebler, Michael John '69
Tekippe, George L. '69
Tennant, Jerry Ronald '61
Wheelock, Thomas David '49
IA B Folkers, Craig Alan '92
Luecke, Gerald '50
KS A Barr, Deborah Susan '81
Batchman, Theodore E. '62
Bradley, Richard Leland '59
Hartman, Richard Henry '63
Mahaffy Jr., Lorrence Alger '63
Mercer, Jane Lynn '80
Phillips, Robert Keith '88
Rozich, Frank John '49
KS B Higley, Gerald Dale '66
Shields, Suzanne L. '83
Stuart Jr., James Franklin '67
KS Γ Miller, Laurence F. '64
KY A Cates, Terry Duane '83
Heaberlin, James Leslie '56
KY B Fleischer, Donald Martin '79
Hughes, Earl Christopher '76
Iyun, Tola Omagbemi '02
Moore, Richard William '71
Reynolds, Joseph Carter '48
Tockstein, Carl DeWayne '74
LA A Bergeron Jr., Sam William '56
Eidt Jr., Clarence Martin '56
Evans Jr., Alfred Woodson '51
Fowler, James Bradley '82
Miller Jr., Frank C. '62
Rider Jr., Milton John '65
LA Γ Bryan, Ronald Canter '64
ME A Hackett, John Arthur '59
Theriault, Lucien Joseph '51
MD A Kotrosa Jr., John Eugene '92
Levine, Jeffrey Scott '85
Slack, Albert Jeffrey '76
Witten, Louis '41
MD B Cascio, Horace Eugene '77
Gillum Sr., Michael Joseph '91
McCoy, Charles Michael '68
Siegel, Raymond Henry '51
MD Γ Earp, David Thomas '97
MD E Igwulu, Ifeanyi '07
MA A Boggio, Joseph Edward '58
Cannon, Lewis Stephen '82
Goodhue, William Donald '71
Irwin, Michael Joseph '75
Wye, Roger Edwin '51
MA B Hagerman Jr., Oliver S. '49
Stark, Robert Edward '42
Wandrisco, John Leonard '46
MA Δ Blesso, Thomas Neal '73
Borrebach, Edwin John '50
Curless, Richard Walter '66
Dibeneditto, Joseph Peter '71
Walsh, James Ralph '90
MA E Marzetta, Aldo L. '68
Truxel, George Henry '68
MA Z Tebo, David L. '88
MA Θ Furlong, Kim Marlene '87
Paul, David Dickson '92
MI A Gidner, Richard V. '53
Hills Sr., Richard Ervin '61
Thelen, Stanley Paul '83
Wang, Peggy P C '77
MI B Chekan, Vicki A. '90
Gosling, Christopher David '79
Klima, Frank Joseph '54
Oliver, Bruce Leroy '63
Sauer, Daniel Michael '05
MI Γ Bittman, Thomas Warren '70
Harris, Peter V. '58
Krejci, John Charles '78
Miekka, Richard George '56
Mohr, Dale '56
MI Δ Belprez, Richard David '60
Kamin, William D. '52
Klaes, Leo James '55
Nolan, James Henry '73
Sommerfeld, Jude Thomas '58
Williams, William Brown '55
MI E Miesiak, Stephen Joseph '84
Walton, Gregory Francis '71
Yarne, Victor Carl '68
MI Z Tidrow, Raymond Alvin '65
MI Θ Long, Michael Charles '84
MN A Barrows, Kenneth C. '56
Han, Keesook Julia '91
Johnson, Lowell Gale '69
Marpe, Donald Edward '57
MS A Cinnella, Pasquale '87
Moffett, James K. '84
MO A Lange, Stephen Joseph '85
Malin, Robert Clayton '83
Oberlag, Gerald Allan '66
MO B Baer, Ted Allen '64
Diemer, Charles Eugene '63
Lytle Jr., Glenn Alden '66
Saperstein, Lee Waldo '64
White, Kimberly Elizabeth '94
MO Γ Dreyfus, Edward Donald '60
Favre, Mark Edward '98
Kline, Samuel Aaron '94
Payne, Bradley A. '87
Rittmann, Bruce Edward '74
Weber, Walter Herman '48
MT A Jeffries, William Raine '42
Peck Jr., Delbert Emery '77
NH A Brucker Sr., Paul Bradford '83
Gitschier, Herman Joseph '68
NJ A Amato, Corrado '76
Stein, Gary Richard '67
Wetter, Charles Herman '51
NJ B Hagerman, Janet Susan '82
Kossmann, Richard John '55
Rocca, Jeffrey John '78
NJ Γ Baccoli, John Peter '54
Balma, Peter Michael '75
Becker Jr., George William '66
Della Rovere, Richard '10
Garcia, Liz '66
Hampel, Daniel '53
Kuchner, Robert Andrew '69
Quinn, Michael Francis '63
NM A Dietzman, William Bruce '71
Farmer, Ronald A. '85
Woodward Jr., Clinton B. '84
NY A Dorn, Christopher Hayes '86
Lawson, Derek Michael '09
Spring, Peter Gordon '68
NY B Bernard, Jeffrey Lelan '80
Prykull, Cory James '15
Rice, Ann Rooks '78
Tucci, Patrick Anthony '72
NY Γ Buell, Richard Edward '72
Kellis Jr., Robert Francis '78
Obernesser, M. Edwin '59
Polmann, Donald Jeffrey '79
NY E Ferra, Rob '74
Reber, Raymond Andrew '63
NY Z Ewald, Harry Newcomb '62
Gold, Harris '58
Levine, Howard Stanley '63
Sarcona, Roy Douglas '68
NY H Atzenbeck, Charles Richard '60
Palazzo, Cosimo J. '60
Rubin, David Kenneth '59
NY Θ Adair, James Leonard '83
Periard, James Richard '81
Saviz, Camilla Margaret '87
Scallion, Richard '51
NY I Andrews, Richard Francis '79
Schulman, Richard Jerome '67
Sullivan, Roger Kent '63
NY K Leidig, Carl Frederick '85
NY Λ Binn, Joel Samuel '75
Schirripa, Robert Rocco '70
NY M Bunk, Donald Samuel '55
Charlton, John William '62
NY N Dressing, Thomas George '90
Frame, Barbara '80
Irwin, Christopher Joseph '92
Josefiak, Glenn R. '91
Prosser, Neil M. '81
Roe, Kevin Peter '94
Rosenthal, Jordan Charles '95
NY Ξ Mohan, Marguerite Anne '04
NY O Garcia, Agustin Melquides '80
Santoianni, Dawn Allison '91
NY Π Turner, Clayton Phillip '90
NY P Antes, Vincent Peter '76
Hoffman, Mark Eldon '98
NY T Runkel, Andrew Nivard '09
NC A Baldwin, Bruce Richard '92
Calderone, Matthew Joseph '05
Ellington, Barry Todd '86
Fox, Bruce Martin '76
Hagarty, Edward Patrick '77
Palmer III, Jacob A. '69
Skipper, Lee Roy '82
Skipper, Julie '81
Summerlin, Michael D. '70
NC Γ Lemel, Page Howe '84
Wine, Charles Joseph '59
ND A Gerogeorge, John George '85
OH A Erdelsky, Philip John '66
Lesco, Daniel James '62
Proctor, David George '52
Triznadel, Norman Thomas '60
OH B Bodocsi, Andrew '65
Brunk, John Cortland '80
Guckian, John E. '77
Steiger, Gene Paul '57
Werner, Lawrence William '70
OH Γ Glower, Donald Duane '46
Gruber, Keith Gordon '80
Knicely, David Roger '61
OH Δ Miller, Rodger Kinnear '65
Reese II, Jack R. '91
Shoup, Jerry Franklin '60
OH E Bruey, Alfred Joseph '61
OH Z King, John Joseph '56
OH H Ethridge, Ronald Alan '78
Lloyd, Kenneth Bertram '61
Morrow Jr., Robert B. '63
OH Θ Ewick, David Wayne '80
Trogus, Frank Joseph '69
Trovato, Joseph Anthony '71
OH I Lehnert, Andrew B. '63
Liesner, Kevin Ralph '84
Matsick, Stephen Welsh '73
Ward, Robert Lee '88
Williams, David John '52
OH K Pritchard, Minnie Catherine '55
OH Λ George, Thomas E. '87
Repko, Raymond '77
OK A Andrews, Jennifer Diana '96
OK B Bostick, Robert Neil '00
Camacho, Roger Anthony '82
Strawser, Donald Eugene '71
OK Γ Chastain, James Curtis '07
OR A O'Brien, Robert Merle '56
Pittman, Leonard David '68
PA A Abbot, James Latimer '50
Brown Jr., Ernest Embich '55
Dorkin, Henry Lawrence '70
Fertig, James Henry '71
Godshall, H. Lynn '62
Jonas, Cynthia Joy '82
Minter Jr., Fred '57
Moore, Robert Wilson '53
Schatz, John Anthony '77
Weiss, David Steven '65
PA B Griffin, Andrew Jonathan '99
Hemler, Robert Joseph '70
Livingston, Jason S. '00
McNally, Dianne Jean '85
Thomas, Kathleen Denise '80
PA Γ Miley II, George Hunter '55
PA Δ Clelland, Peter John '63
Silnutzer, Norman Roy '67
Till, Walter Joseph '52
PA E Fennell, William '70
Frabizzio, Michael Anthony '96
Schenck, Arthur Jacob '73
Skvoretz, David Mark '95
Stibitz, Mark Carl '87
PA Z Angiletta, Gerald Vincent '79
Borig, Walter Alexander '49
Brecht, Howard Earle '63
Daly, Thomas Patrick '85
Magee, Michael Patrick '97
Shaffer III, Thomas Hillard '68
PA Θ Hinkle, John Lawrence '60
Salvo, John P. '56
PA I Meixner, Henry Martin '67
PA Λ Christian, Rob Francis '07
Tjader, William Stephen '79
PA M Nicholas, Kathleen Sara '12
PR A Bird, Hector Manuel '79
Rivera, Aurea L. '80
RI B Sirois, Herbert Joseph '71
SC A Cox, Anthony James '83
McMullan, Richard Jeffrey '91
SC B Hendricks, Irvine H. '62
Lesto, Kenneth Reed '58
Litton, John Thomas '84
SC Γ Kiggans, Robert Gene '65
Tyner, Hugh L. '59
SD A Byg, Jerald Norman '72
Mead, S. Edward '62
Mosier, Donald Earl '78
Wiesner, Brady Neil '09
SD B Wright, Mark Martin '82
TN A Jackson, Robert Harris '59
Kaley, John Straud '01
Kennedy, Earl Powell '60
Lambert, Lisa Renee '90
Lambert, William Mark '91
Ottinger III, Aurelious J. '87
Peterson, Randolph Stuart '72
Rochat, Raymond Agenor '57
Smith, Larry Gene '64
Utsman, Forrest Mckae '95
Wunderlich, Walter O. '56
TN B Cummings, Becky G. '76
Lippert, Michael John '86
Spurgeon, Susan Porzelius '65
TN Γ McCormick, Jack Randall '64
Robertson, Franklin Lee '64
Ventrice Jr., Carl Alfred '85
TN E Edlund, Robert Alan '79
TN Z Keck, Christopher Clark '95
TX A Crippen, Robert L. '60
Hodges, Bobby Wayne '53
Irick, John Thomas '59
Moss, Edward R. '64
Persyn, Steve Gus '71
Smith Jr., Horace Vernon '64
Thomas, Kurt Otto '79
Vaverek, Gavin Nicholas '81
TX B Davis Jr., Charles '67
Dunn, Luci Ann '86
Jones, Elizabeth Ann '79
Krieger Jr., Benny Jack '99
Reinking, Greg Franklin '84
TX Γ Cronin, Robert Hillsman '65
Kilgore III, Hardee C. '62
Lange, Elaine Austin '76
Stetter, Walter James '50
TX Δ Bair, Sally Weisenfelder '81
Boatright, Paul A. '70
Casco, Andres Enrique '99
Gibbs, Sam Gavin '54
Knutson, James LeRoy '55
Pardue, Lon Hubert '63
Rothermel, Jeffrey Todd '94
Sherrill, Guy Jackson '64
Szymczak, Edward J. '61
TX E Nieto, Shayler '63
Parmely, Marjorie Anne '75
TX Z Zwillenberg, Gordon David '79
UT A Kephart Jr., John Thatcher '48
UT B Ashby, Delroy '64
Dickson, Lloyd Brent '63
UT Γ Anderson, Matthew O. '93
VT B Melzar, Jonathan Preston '85
VA A Ginn, F. Lester '72
Griffin Jr., Joseph H. '71
Griffith, Douglas Gene '61
Jokl, James Anthony '80
Kennedy, Michael Francis '72
Myers, Griffin Kyle '00
Yao, Yao '10
VA B Collie, Joseph Haslett '50
Hippert Jr., Richard Owen '61
Hoglund, David Eric '87
Saucke, Debra Lynn '81
Spangler, Edward Grant '79
Suleske, Aaron Andrae '68
VA Γ Hartelius, John Taft '80
Pronko, Mark Steven '81
WA A Buck, Arthur Edwin '63
Laakso, Melvin T. '70
WA B Nelson, Bruce Edwin '54
WV A Mallare, Ronald Antone '74
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WI A Farrington, Harold F. '80
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Rockefeller Family & Associates
Rockefeller Financial Services Inc.
Rockwell Collins*
Rogers Corporation
Rolm Corporation
SPX Foundation
Saint-Gobain Corporation Foundation
Schneider Electric/Square D Foundation
Sempra Energy
Shell Oil Company
Silicon Laboratories Inc.
Southern California Gas Company
Southwest Power Pool
St. Jude Medical
Stanley Black & Decker
The Sun Microsystems Found. Inc.
TCF Foundation
T-Mobile
Tellabs Operations Inc.
Texas Instruments Foundation
Textron
Tomkins Gates Fouondation*
Thomson Reuters
The Toro Company Giving Program
Toyota Technical Center, USA Inc.
Transamerica Corporation
TransCanada PipeLines
Tribune Company
Turner Industries, Ltd.
Tyco
TyCom (U.S.) Inc.
UFE Inc.
Unilever U.S. Foundation Inc.
Union Pacific Corporation
United Technologies
The UPS Foundation
Verizon Foundation
Virginia Power/North Carolina Power
W.K. Kellogg Foundation
Wachovia Foundation
Washington Mutual
Waste Management Inc.
We Energies Foundation
Wheelabrator Air Pollution Control Inc.
Williams
Wisconsin Energy Corp. Found. Inc.
Workday, Inc.
WPX Energy
WRC Inc.
Xcel Energy Foundation
XE Corporation
Xilinx
Yarway Corporation
Zeon Chemicals L.P.

Oregon Delta Installed

Chapter Installation
Charter members of Oregon Delta gather with Tau Beta Pi alumni and guests.

Oregon Delta was installed as a Tau Beta Pi Chapter at the Oregon Institute of Technology (OIT) on April 14, 2018. Councillor George Youssef was the official installing deputy of the Society's 254th collegiate chapter, assisted by Executive Director Curtis D. Gomulinski and District 14 Director Ian J. Frank.

The 2017 Convention granted a chapter to Epsilon Eta Sigma, represented in Dearborn, MI, by Gwendoline Jones, president, and Sean W. St. Clair, Ph.D., P.E., *UT Γ'88*, chief advisor.

The College Union on the campus was the site of the formal ceremonies of initiation and chapter installation, witnessed by Brian Bemis, *OR A'18*, Sheryl L. Franklin, *FL A'81*, and Jeffrey S. Zola, *NY Δ'91*. The initiation team included: David C. Drown, Ph.D., *ID A'67*; Gwendoline Jones, *OR B'19*; Eve M. Klopf, Ph.D., *TX Δ'02*; Roger V.F. Lindgren, Ph.D., P.E., *OR B'05*; Nagi G. Naganathan, Ph.D., *OH Z'78*; Alexander M. Porter, *CA Y'14*; Matthew D. Sleep, Ph.D., *MS B'04*; Sean E. Sloan, *IL A'89*; and Sean St. Clair; and the three Association Officials listed above. Thirty-six undergraduates, twenty-one alumni, and one eminent engineer (identified on the facing page) comprise the charter members.

Immediately after the formal initiation, the new members were constituted a new chapter in the ceremony of installation conducted by Councillor Youssef. The ceremony included the formal election and installation of the chapter's charter officers and advisors.

A banquet followed the installation ceremony where Councillor Youssef, Executive Director Gomulinski, and District 14 Director Frank welcomed the members of the newest chapter on behalf of the Association and encouraged them to remain active while students and as alumni. OIT President Naganathan and Chief Advisor St. Clair spoke on the history of bringing Tau Beta Pi to OIT and congratulated the new members for their diligent work.

Charter Presentation
Curtis D. Gomulinski, George Youssef, Gwendoline Jones, Nagi G. Naganathan, and Sean W. St. Clair (left to right)

Initiates

Students, back row: Matthew Burke, Jesse Alves, Peter Bucuvalas, Austin Deanhardt, Joshua Adams, Jaryd Atkins, Gregory Collins and Trevor Davis. Front row: Christopher Brown, Nicole Buck, Jessica Dela Cruz, Bailey Bixler, Annabel Grohs, Gwendoline Jones, Natasha Karan, Thomas Carroll, Brayden Jones, Kayla Dehoop and David Kirkendall.

Initiates

Alumni, back row: Amy Lockwood, Steven Reed, Ryan Kelly, Elizabeth Sheehy and Brion Scott. Front row: Joshua Hall, Alexander Huettis, Loren Jessen, Andrew Moser, Jared Jones and Yoshua Gombo.

Initiates

Students, back row: Conner Skudlarek, Christopher Wheatly, Lander Nordal, Baker McDonald, Andrew Weber, Tyler Van Meter, Trevor Lundsten, Anna Steademan and Arlette Valencia. Front row: Jessica York, Jordan Preston, Morgan Masley, Elliott Weinberg, Kynan Nordal, Joslyn Stansfield, Kaleb Kline, Kami Kutsunai and Ashlei Morgan.

Initiates

Alumni and Eminent Engineer, back row: Mohamed Alhosani, Peter Hartman, Eminent Engineer Charles Riley, Tamara Emard and Meriele Kwok. Front row: Miranda Barrus, Jennifer Berdyugin, Jamie Bond, Kenneth Cannady-Shultz, Jacob Freeman and Krista Galloway.

Initiation Team

Top row: Sean St. Clair, Rodger Lindgren, George Youssef, Sean Sloan, Curtis Gomulinski and David Drown. Front row: Matthew Sleep, Ian Frank, Gwendoline Jones, Nagi Naganathan, Alexander Porter and Eve Klopf.

First Officers

Back row, officers, from left to right, Morgan Masley (Treasurer), Gwendoline Jones (President), Jessica Dela Cruz (Recording Secretary), Annabel Grohs (Corresponding Secretary), and Nicole Buck (Vice President); Front row, Advisors, left to right, Sean St Clair, Matthew Sleep, Rodger Lindgren, and Eve Klopf.

Oregon Institute of Technology

For 70 years, Oregon Institute of Technology, "Oregon Tech," has focused on changing lives by preparing students to meet the engineering, technology, innovation and management needs of business, industry, and healthcare. Staff believe in giving students a rigorous, practical education while applying cutting-edge concepts for real-world solutions.

They take pride in their mission to deliver technology education; continually partner with industry leaders to ensure that programs and classes lead in adapting to new developments and preparing students for the workforce.

This practical focus gives students a competitive edge: Some 95 percent are either employed, or enrolled in graduate school, within six months of graduation with an average starting salary of $56,000 per year. Graduates garner the highest starting salaries in Oregon and among the highest in the nation. Dedicated professors provide personalized attention and are genuinely invested in their students' learning. A total enrollment of about 5,500 allows for an intimate campus environment distinguished by small classes and a student-to-faculty ratio of 20:1.

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities, and individual programs are also accredited by the appropriate professional organizations. Today, it offers more than 55 bachelor of science and master's degree programs in engineering, technology, health technologies, management, communication, and the applied sciences. These include programs offered in Klamath Falls (Southern Oregon) and Portland-Metro; a growing number of bachelor degrees and degree-completion programs offered through the online campus; a bachelor's in dental hygiene delivered in Salem at Chemeketa Community College; and bachelor's and master's degrees in Seattle for Boeing employees.

Amazing Opportunities

The applied approach to teaching, blending theory and practice, is the main reason graduates and alumni are so avidly recruited by industry. Students have amazing opportunities to apply what they learn in lab-based classes, clinics, externships, internships, and workplaces. Faculty and staff with relevant business, industrial, or clinical experience reinforce this practical focus in the classroom. And in every program, an interdisciplinary core underscores major studies, broadening students' understanding of the world and teaching them to communicate effectively, solve problems, and think for themselves. This student-focused approach to teaching and learning engages students in professional practice throughout their studies.

In every program, major studies are under-

PHOTOS: (clockwise from top left): The Klamath Falls campus; sunset over solar panels at the campus (Klamath Falls is called Oregpn's "City of Sunshine"); an outdoor class beneath the sun; and a class from the civil engineering course.

scored by a general-education core that broadens students' understanding of the world and teaches them to communicate effectively, solve problems, and think for themselves. Oregon Tech is best known for its traditional engineering and technological core, but new degree options (and surprising twists on old ones) are remarkably multi-dimensional. A geomatics student might use GIS technology to survey an archeological excavation, or a mechanical engineering student may complete a cross-disciplinary application in sustainability.

Oregon Tech offers individual undergraduate and graduate degrees, along with a freshman-to-master's civil engineering degree program—the first such program in the Pacific Northwest.

Students enjoy a close relationship with full-time faculty who are also licensed professionals with many years of practical experience. Course offerings promote education in theory relevant to their technical areas, engineering design, and principles of sustainable development.

Solid Background

Early in the curriculum, elements of the creative design process are introduced as students complete first-year design projects. While most freshman and sophomore courses are intended to provide a solid background in mathematics, communications, sciences, and engineering mechanics, certain courses provide additional concepts and methodologies supporting more advanced topics and professional practice. As juniors, students develop a broad engineering base with core courses in various fields. In the fourth year, students complete an intensive design project which includes technical communications elements.

Throughout the fourth and fifth years, co-terminal (BS/MS) degree-seeking civil engineering students work on their selected program of graduate-level coursework, and selection and completion of their graduate project. For other majors, the individual master of science in engineering is a multidisciplinary program designed as a highly customizable and modular degree, which enables students to choose coursework from multiple disciplines to design specialties typically not available for an engineering MS. The flexibility ensures a relevant, up-to-date education, and the ability to meet urgent industry needs in multidisciplinary fields. The program is designed to provide maximum flexibility while maintaining academic rigor.

Construction is currently underway for Oregon Tech's new Center of Excellence in Engineering and Technology (CEET) building. A $42 million project, CEET is not just a new building on the Klamath Falls campus, it is an eco-system that will help to chart a new trajectory in technology and business, innovation and entrepreneurship. The project will be home to expanded interdisciplinary space, providing a model of learning that creates an interactive workspace of classrooms, maker spaces, labs, and offices.

Oregon Tech has a solid foundation of assets that take it forward, including a record number of degrees awarded over the past year; a successful accreditation review that reinforced its strengths; outstanding rankings for online and other programs; and continued high marks from external reviewers of the value that in-demand degrees provide to graduates, and to the industries and organizations that hire them.

CHAPTER ETERNAL

The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in The Bent. *You may email or write the Editor for additional facts (if available) concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Association members, with appropriate details, including date of death and full name. You may report the death of a member by sending an email to chapter.eternal@tbp.org.*

Sigma Tau **Peters, Leo Charles,** July 20, 2014.
AL A '50 **Hartsfield, William Wylie,** June 2, 2014.
'53 **Kirwin, Francis George,** no details.
'62 **Askew, William Crews,** March 25, 2017.
AL B '44 **Koven, William,** March 17, 2008.
'49 **Grimes, Charles Kenneth,** January 24, 2008.
'62 **Asquith, Donald Sidney,** February 8, 2018.
'84 **Willemoes, Peter Michael,** January 3, 2015.
AL E '60 **Hamid, Michael,** December 18, 2017.
AZ A '39 **Demer, Louis Joseph,** February 4, 2018.
AR A '53 **Peeler, Frank Curtis,** August 4, 2017.
'55 **Russell Jr., Reuben Elmira,** February 24, 2018.
CA A '43 **Ellis Jr., John Winthrop,** April 2, 2011.
'44 **Fulkerson, Edward Floyd,** December 23, 2017.
'49 **Miller, William F.,** September 27, 2017.
'50 **Rinnert, Heinz Rudi,** August 11, 2015.
'60 **Davis, Mark John,** February 23, 2016.
'62 **Wade, Wallace O.,** December 2, 2016.
CA B '42 **Sabersky, Rolf Heinrich,** October 24, 2016.
CA Γ '49 **Walker, John Noah,** February 16, 2018.
'50 **Andrews, Harry Walter,** March 21, 2015.
'50 **Casler Jr., Earle Townsend,** April 13, 2017.
'80 **Okimoto, Norman Noboru,** October 6, 2017.
CA Δ '51 **Holcombe, Richard Plum,** April 11, 2015.
'63 **Tulberg Sr., Ellsworth E.,** March 2, 2018.
CA E '40 **Rosenstein, Allen Bertram,** February 25, 2018.
'49 **Kemper, John Dustin,** April 25, 2018.
'56 **Cisco, Richard Lee,** November 5, 2014.
'59 **Shabaik, Aly Hossni,** no details.
'76 **Katz, Sharlene,** November 17, 2017.
'18 **Sagdiev, Dair,** February 26, 2018.
CA Θ '43 **Mostafa, Gamal M.,** April 4, 2011.
'61 **Das, Mihir Kumar,** December 3, 2012.
CO A '52 **Wendeborn, Richard Donald,** March 18, 2018.
CO B '42 **Emigh, Charles Robert,** July 31, 2016.
'49 **Ellison Jr., Walton Darrell,** December 28, 2006.
'49 **Krehbiel, Karl Kermit,** March 5, 2003.
CT A '45 **White Jr., Erskine Norman,** July 28, 2013.
'49 **Culver, John Fowler,** September 19, 2003.
'49 **Mihalisin, John Raymond,** October 26, 2004.
'49 **Sussky Sr., Mantz Clinton,** December 27, 1988.
CT B '47 **Winn Jr., Frederick Thomas,** November 7, 1988.
'50 **Allen, Arthur Frederick,** May 27, 2012.
'65 **Meitzler, Grant,** January 22, 2018.
DC Γ '50 **Hanrahan, Donald Joseph,** December 29, 2014.
FL A '49 **Holt, Duncan Mckay,** March 8, 2014.
'55 **Ruth, Byron Edward,** September 29, 2016.
'66 **Holsonback, James Lee,** no details.
GA A '42 **Crowell, Chester Arthur,** April 22, 2014.
'43 **McLeod, Charles Alexander,** March 29, 2004.
'46 **Ozanne, William,** September 27, 2014.
'47 **Jordan Jr., George Washington,** December 31, 2016.
'48 **Basch Jr., Harold Barnett,** October 19, 2017.
'48 **Bresnahan Jr., James J.,** April 11, 2014.
'48 **Smith III, Joseph Newton,** November 5, 2008.
'52 **Kuniansky, Max,** September 11, 2015.
'60 **Hallock, David Duncan,** March 7, 2012.
'64 **Brown, Charles Thomas,** February 15, 2018.
'66 **Simmons Jr., Chester Williams,** no details.
'70 **Smith, Chadwick Perrin,** January 25, 2016.
IL A '43 **Bell, John Albert,** March 21, 2014.
'43 **Shedd, Milton Campbell,** January 26, 2017.
'49 **Dellert Jr., George T.,** July 6, 2002.
'59 **De Pauw, James Francis,** no details.
'68 **Berns, Thomas B.,** February 19, 2018.
'85 **Heckathorn, William Gary,** no details.
IL B '44 **Thompson, Arnold John,** February 6, 2018.
IL Γ '38 **Wolff, Jerome Benjamin,** August 26, 2016.
'50 **Cleaveland, Richard Grant,** February 26, 2018.
IL Z '88 **Zaszczurynski, Paul Joseph,** December 30, 2017.
IN A '36 **Cahill, Robert John,** November 14, 2011.
'41 **Grise, Warren Kenneth,** May 24, 2002.
'42 **Stahl, Laddie L.,** November 25, 2015.
'44 **Smith, John Louis,** no details.
'45 **Martin, Betty Jeanne,** February 20, 2018.
'48 **Mast, Plessa Edward,** February 19, 2016.
'49 **Clarke, Roderick William,** February 8, 2017.
'49 **Gaul, James Richard,** no details.
'50 **Fleming, Robert Bentley,** October 1, 2016.
'52 **Savino, Joseph Michael,** no details.
'52 **Willhoff Sr., Thomas Lee,** February 1, 2018.
'56 **Ogden, Don James,** no details.
'57 **Lopina, Robert Ferguson,** May 13, 2017.
'57 **Masenten, Wesley Kent,** December 11, 2017.
'72 **Kingery, James Edward,** January 10, 2018.
IN B '44 **Rose, Willis Earl,** February 27, 2018.
'62 **Terry, Fred Herbert,** no details.
IN Γ '96 **Sebesta, Andrew Michael,** January 30, 2012.
IN E '52 **Bligh, Joseph Arnold,** July 27, 2015.
IA A '39 **Scott, William Findlay,** February 8, 2018.
'41 **Hulsbos, Cornie Leonard,** January 22, 2018.
'42 **Hodgin, Wilson J.,** December 20, 2008.
'43 **Woolston, Lionel L.,** January 17, 2005.
'58 **Zingg, Roy James,** January 30, 2018.
IA B '58 **Andersen, Dewey Richard,** April 21, 2018.
'63 **Armaly, Bassem F.,** January 6, 2015.
'68 **Gregory, Gary Stanley,** April 10, 2018.
'68 **Holly Jr., Forrest Merton,** May 22, 2017.
KS A '40 **Rethman, Vincent Carl,** June 18, 2015.
'44 **Johnson, Ronald Kent,** October 30, 2017.
'48 **Eash, Dalton,** February 16, 2014.
'71 **Herzmark, Leonard Erwin,** February 19, 2018.
KY A '48 **Mahan, Fred Milton,** November 15, 2015.
KY B '51 **Dahlem, Bernard Asman,** March 6, 2018.
LA A '43 **Pfefferle, Urban Julien,** no details.
'49 **Gandy, Harvey Martin,** August 23, 2002.
'74 **Jones, Richard Merrill,** February 18, 2007.
LA B '44 **Hassinger Jr., James Edgar,** July 24, 2015.
'49 **Goldstein Jr., Moise Herbert,** April 9, 2015.
'49 **Vliet, Daniel Hendricks,** August 11, 2017.
'79 **Mehrabadi, Morteza M.,** March 13, 2018.
LA Δ '41 **Metcalfe, Tom Brooks,** June 3, 2016.
ME A '37 **Berry Sr., Richard Nathaniel,** January 31, 2018.
'49 **Land, Robert Herman,** October 6, 1999.
'70 **Lord, Victor Richard,** August 27, 2017.
'82 **Renaud, John Eldon,** March 18, 2011.
MD A '38 **Chesley Jr., John William,** no details.
'41 **Bennett, John Lowell,** November 10, 2011.
'49 **Kephart, Donald Clark,** April 26, 2006.
'49 **Kusterer, Edward Thomas,** April 4, 2011.
'49 **Mathews, LeRoy Brent,** March 4, 2015.
'49 **Stull Jr., Keefer Stanley,** October 1, 2015.
'49 **Wareheim Jr., Elmer Nelson,** November 5, 2015.
'50 **Pfarr Jr., Walter Leo,** June 8, 2016.

MD B '43 **Funke Jr., Richard Harrison,** December 30, 2016.
'49 **Conlyn, Robert Marshall,** April 10, 2007.
'49 **Gorub, Joseph C.,** March 14, 1997.
'50 **Brannan, Robert Russel,** December 12, 2017.
'64 **Bowes, Robert Hayden,** February 8, 2018.
'67 **Smith, Richard Bryant,** March 28, 2018.
'70 **Paulhus Jr., Norman Gerard,** August 25, 2017.
MA A '53 **Deboer, Frederick,** March 19, 2018.
'57 **Lekas, Thomas,** March 26, 2018.
MA B '41 **Pickard, James Kade,** November 25, 2008.
'42 **Peek Jr., Sanford Christopher,** March 26, 2018.
'44 **Harris, Holton Edwin,** April 4, 2016.
'47 **Goldstein, Stanley James,** February 12, 2008.
'48 **Campbell, Mark Ervin,** May 9, 2013.
'48 **Kami, Michael J.,** January 31, 2017.
'52 **Morth, Raymond Harry,** January 27, 2013.
'53 **Wolf, Carl Fritz Walker,** January 17, 2018.
'54 **Gray, Paul Edward,** September 18, 2017.
'56 **Skavdahl, Richard Earl,** July 15, 2014.
'65 **Beaudoin, Bernard Joseph,** September 14, 2017.
'78 **Kare, Jordin T.,** July 19, 2017.
'84 **Winkelman, Linda France Aline,** December 28, 2017.
MA E '44 **Resnick, Hyman,** September 9, 2014.
'49 **Reiser Sr., Matthew J.,** no details.
'55 **Hogan, William Timothy,** June 28, 2017.
MA Z '62 **Konsevich, Francis Xavier,** February 15, 2018.
'76 **Smith, Barry Francis,** August 17, 2017.
MI A '36 **Schneider, Leonard Gustav,** November 28, 2015.
'38 **Austin, John Henderson,** December 22, 2015.
'43 **Oehler, Leroy Theodore,** December 20, 2017.
'44 **Beecher, William Howard,** September 4, 2015.
'48 **Vissing, Guy Spencer,** September 12, 2014.
'49 **Sawatzki, Howard Robert,** March 23, 2018.
'49 **Welling, Donald L.,** November 17, 2015.
'51 **Miller, Kenneth Gale,** February 9, 2018.
'52 **Brazee, Ross Deline,** February 24, 2018.
'54 **McClaughry, Richard Swift,** March 21, 2018.
'59 **Quackenbush, Harold Eugene,** April 30, 2013.
'72 **Sperber, William Eric,** April 26, 2016.
MI B '40 **Rost, Robert Winston,** no details.
'42 **Walker Jr., Fred Mallett,** July 16, 2008.
'44 **Swenson Jr., George Warner,** February 22, 2017.
'52 **Winegar, Donald Merwin,** December 30, 2012.
'71 **Amaya, Alejandro,** February 15, 2018.
MI Γ '48 **Floor, Arthur Paul,** September 1, 2014.
'49 **Chaffee, Robert H.,** October 23, 2013.
'58 **Masnari, Nino Antonio,** May 19, 2018.
'59 **Ver Schure, Marvin Dale,** October 10, 2017.
'64 **Ratterman Jr., Lawrence Fred,** January 18, 2014.
MI Δ '50 **Schneider, Louis Francis,** August 15, 2017.
'51 **Galloway, Edward Elmer,** March 22, 2011.
'52 **Langlois, Darwin James,** April 21, 2018.
MI E '54 **Sanders, John Eaton Stanley,** April 24, 2018.
'56 **Lewizky, Jury,** March 22, 2017.
MI Z '47 **Van Wieren, Ewald Timon,** June 7, 2001.
MN A '50 **Howe, Richard James,** March 20, 2018.
MS A '43 **York Jr., Frank Snyder,** June 22, 2009.
'48 **Haynes, Dewey Clifton,** March 21, 2012.
'49 **Ellis, Henry Grey,** August 25, 2007.
'49 **Langston, John Coryelle,** November 11, 2009.
'49 **Robley Jr., Ray Cheshire,** April 29, 2010.
'69 **Coleman, Hugh Wayne,** May 15, 2018.
'84 **Hill, Veronica Leigh,** October 28, 2016.
MO A '49 **Ellis, James Newton,** July 8, 2003.
'51 **Pepple, Robert Lee,** July 24, 2017.
'60 **Pugh Sr., John Stanley,** April 10, 2018.
'65 **Scott, Norman Allen,** January 28, 2017.
MO B '41 **Hacker, Alden Gerock,** December 27, 2017.
'50 **Helwig, Arthur Woods,** December 9, 2017.
'50 **Scales, Stanley Robert,** May 2, 2015.
'79 **Lockington, Steven Michael,** September 9, 2017.
MO Γ '42 **Schreiner, Kenneth Eugene,** December 29, 2017.
'49 **Smith Jr., Fred Henry,** April 25, 2018.
'50 **Turley Jr., Clarence Milton,** February 21, 2018.
'56 **Paynter, Alan Lloyd,** no details.
'65 **Williamson, Ronald Arthur,** May 6, 2018.
MT A '49 **Lunday, Philip Alfred,** September 22, 2011.
NH A '49 **Grossman, Richard Paul,** June 22, 2010.
NJ A '45 **Wittke, Edward William,** June 11, 2016.
'46 **Tuttle, Raymond George,** October 3, 2008.
'47 **Canevari, Gerard Paul,** December 14, 2012.
'55 **Cozzarelli, Francis Anthony,** January 25, 2018.
'71 **Hollingshead, Edward William,** January 23, 2016.
NJ B '49 **Barta, Joseph James,** December 16, 2006.
'49 **Kaczynski, Raymond Francis,** May 17, 1999.
NJ Γ '41 **Mendelsohn, Hindley Reeves,** no details.
'44 **Spialter, Millard Leon,** February 27, 2012.
'46 **Carluccio, Joseph,** November 1, 2015.
'47 **D'Alessandro Jr., Alfonso R.,** May 31, 2015.
'47 **Hemmel, William Paul,** October 5, 2005.
'47 **Pasquale, Carl J.,** January 4, 2015.
'48 **Altoz, Frank E.,** September 14, 2017.
'48 **Godwin, William Raymond,** June 17, 2017.
'48 **Miller, Edward,** August 24, 2017.
'49 **Lisovicz, Edward Joseph,** May 5, 2014.
'50 **Hollander, Leonard,** June 4, 2010.
'50 **Kleissler Jr., Edwin Albert,** November 27, 2017.
'51 **Hartmann, John Charles,** November 29, 2010.
'68 **Frankel, Andrew Joel,** January 11, 2017.
'73 **Sasso, William Leonard,** May 2, 2017.
NJ Δ '47 **Vendeland, Robert N.,** December 18, 2015.
NM B '50 **Stief, Robert D.,** January 6, 2018.
NY B '45 **Morabito, Bruno Paul,** October 12, 2015.
'50 **Rausa, Gerald Joseph,** November 29, 2007.
'51 **Domian, Henry Albert,** June 25, 2016.
'59 **Loveland, John Robert,** May 18, 2018.
NY Γ '39 **Miller, Jay Warren,** August 29, 2017.
'50 **Lester, Howard Leroy,** April 16, 2007.
'51 **Bassett Jr., Preston Rogers,** March 11, 2018.
'53 **Derby Jr., James Lawrence,** December 7, 2012.
'56 **Jordan, Byron Waver,** June 7, 2009.
'59 **Cavett, Robert Harley,** no details.
'72 **Tuttle, Dennis George,** May 7, 2018.
'78 **Donnelly, Elizabeth Hudson,** August 25, 2016.
NY Δ '44 **Van-Sweringen Jr., Raymond A.,** October 13, 2015.
'49 **Ellison, James Whitley,** May 10, 2001.
'54 **Schneider, John Forsman,** February 7, 2018.
'58 **Kneen, Phillip Hall,** May 30, 2017.
NY E '44 **Shaffer, Bernard W.,** November 1, 2017.
'47 **Powers, Hale,** December 1, 2000.
'56 **Hoekstra Jr., Robert,** December 28, 2017.
NY Z '45 **Katz, Peter,** July 18, 2007.
'51 **Wolf, Herbert Otto,** April 5, 2016.
'64 **Flaherty, Joseph Edward,** March 28, 2018.
NY H '49 **Glassman, Sanford Harold,** March 24, 2018.
'50 **Blank, Julius,** September 17, 2011.
'50 **Rimland, Marvin,** June 24, 2017.
NY Θ '44 **Cohrs, Werner Charles,** February 20, 2018.
'46 **Aswad, William N.,** August 13, 2015.
'51 **Neumann, Robert William,** August 31, 2003.
'51 **Rennie, Foster Wilson,** April 10, 2014.
'54 **Woomer, Warren James,** January 21, 2018.
NY I '49 **Lawrence, Maxwell Joseph,** August 31, 2003.
NY K '44 **Cannon Jr., Robert Hamilton,** August 15, 2017.
NY Λ '48 **Deichert, Robert William,** March 1, 2018.
NY Ξ '61 **Maxim, Leslie Daniel,** May 18, 2018.
NC A '49 **Corriher Jr., Henry Archibald,** March 30, 2017.
NC Γ '44 **Dackis, William Charles,** November 1, 2016.
'49 **Baily, Alfred Ewing,** May 25, 2006.
NC Δ '75 **Deese, Rickey Jefferson,** November 26, 2017.
ND A '53 **Mitchell, Byron James,** July 1, 2017.
'54 **Quanbeck, Kermit Luther,** November 26, 2016.

OH Α '44 **Ostrach, Simon,** October 2, 2017.
'53 **Field, Herbert C.,** February 14, 2018.
'60 **Watts, John Clifford,** May 14, 2018.
OH Β '41 **Katz, Simon D.,** November 12, 1999.
'44 **Roberts Jr., William Harrison,** March 23, 2003.
'52 **Giovanetti, Albert,** January 31, 2018.
'65 **Zimmerman, Thomas Anthony,** February 14, 2018.
OH Γ '44 **Lucal, Harold Martin,** August 4, 2004.
'45 **Robison, Arch George,** January 21, 2018.
'47 **Bushnell, Robert Hempstead,** January 28, 2018.
'52 **Ramser, Robert Allen,** March 21, 2018.
'54 **Thacker, Charles Cooper,** July 2, 2005.
OH Δ '52 **Beardmore, John William,** December 6, 2008.
'55 **Dinos, Nicholas,** December 18, 2017.
OH Ε '53 **Rogers, William Michael,** February 22, 2018.
OH Ζ '41 **Koo, Benjamin,** March 1, 2018.
'43 **Weaver, Ernest W.,** March 5, 2018.
'52 **Ewing Jr., Donald James,** March 9, 2018.
OH Η '60 **Rivir, Richard Byram,** May 3, 2018.
OH Ι '59 **Morrison, Robert Leroy,** August 2, 2017.
OK Α '42 **Ellis Jr., Grover,** December 22, 2005.
'53 **Gibbs, Richard Russell,** February 18, 2018.
'61 **Reese, Charles Dean,** April 26, 2012.
'62 **Lee, Arlin,** March 25, 2018.
'11 **Dorrough, Kristopher Shawn,** March 22, 2016.
OR Α '44 **Weiss, Edwin Victor,** August 15, 2007.
'51 **Holbeck, Herbert John,** May 15, 2016.
'79 **Eden, James Douglas,** October 22, 2016.
'87 **Bochsler, Douglas James,** March 24, 2014.
PA Α '43 **Berg, Philip James,** June 17, 2015.
'47 **Abeel Jr., Alan Chichester,** December 28, 2004.
'85 **Errickson, Richard Keith,** February 16, 2018.
PA Β '42 **Lio, Salvadore P.,** May 4, 2011.
'47 **Robinson, Donald Rice,** September 6, 2017.
'48 **Smethers Jr., Rollo Gordon,** January 26, 1986.
PA Γ '40 **Minton Jr., Hugh Chapman,** March 21, 2016.
'48 **Dellepiane, Jorge Luis,** no details.
'48 **Matthews, George B.,** February 11, 2007.
'52 **Jordan, Angel G.,** August 4, 2017.
PA Δ '44 **Glassgold, I. Leon,** May 31, 2005.
'64 **Jeffers, Robert George,** April 30, 2018.
PA Ε '57 **Scoular, Robert Wilson,** February 26, 2006.
'83 **Goetz, David Allen,** April 13, 2007.
PA Ζ '48 **Collins, Harley L.,** December 12, 2017.
'54 **Weiss, Arnold Andre,** May 17, 2008.
'55 **Lawley, Alan,** October 17, 2017.
PA Η '47 **Sykes, Robert Foulkes,** May 6, 2018.
'49 **Furman, Lloyd Wellington,** September 26, 2005.
'49 **Maloney, Joseph Marcus,** May 12, 1994.
'59 **McLaughlin, Thomas Calvin,** March 10, 2017.
PA Θ '47 **Pula, Thaddeus Joseph,** December 5, 2006.
PA Ι '41 **Stuverude, Howard Norman,** March 24, 2015.
'68 **Bouse, David Layman,** September 12, 2016.
PA Κ '51 **Lloyd, Alan Stanley,** November 22, 2016.
RI Α '47 **Parker, John G.,** October 9, 2005.
'53 **Dawley, Richard Alan,** January 26, 2018.
SC Β '53 **Bahnmuller, Arthur Stone,** May 11, 2018.
SC Γ '46 **Schulke Jr., Herbert A.,** May 14, 2014.
SD Β '48 **Moe, Dennis L.,** April 19, 1998.
'55 **Edwards, James O.,** June 10, 2016.
TN Α '49 **Crick, Allen Pollard,** October 24, 2017.
'49 **Harris, Cecil Craig,** August 6, 2007.
'49 **Milloway, John T.,** March 4, 2001.
'55 **Guthrie Jr., Paul Vincent,** February 6, 2018.
'57 **Burdette, Edwin Gordon,** May 18, 2018.
'63 **Munsey, James Richard,** February 4, 2018.
TN Β '47 **Lamb, Eugene,** March 11, 2018.
'49 **Dahnke, Walter Roland,** December 31, 2002.
'58 **Gillum, James Edward,** May 2, 2018.
'64 **Houlder, Robert Lewis,** December 27, 2014.
TX Α '37 **Granville, Maurice Frederick,** May 14, 2018.
'41 **Amstead, Billy Howard,** November 10, 2016.
'42 **Rase, Howard Frederick,** May 6, 2014.
'43 **Wong, Soon Yuck,** June 9, 2002.
'45 **Rubinett, Jarrell David,** March 29, 2014.
'46 **Steadman, Homer Douglas,** February 12, 2018.
'48 **Martin, Wallace Wiley,** January 25, 2018.
'49 **Burkett, William Joseph,** June 26, 2017.
'53 **Wilson, Wynant Stone,** February 27, 2018.
'76 **Winkley, Thomas Robert,** October 17, 2016.
TX Β '49 **Butler, Ray,** September 10, 2010.
'49 **Dezelle, James Ray,** March 18, 2001.
'49 **Hale, Isom H.,** April 30, 1998.
'49 **Vanbebber, John Gregory,** July 12, 2010.
'50 **Winn, J. Spencer,** no details.
'52 **Spencer, Thomas Melvin,** March 31, 2018.
'62 **Davis, Jon Lee,** July 11, 2016.
'81 **Rummel, Thomas Ernest,** June 15, 2017.
TX Γ '49 **Workman, Thomas Edward,** November 8, 2013.
'71 **Pipes, David Meggs,** January 3, 2018.
TX Δ '38 **Osborn, Oliver,** March 28, 2018.
'43 **Baen, Spencer Roe,** May 30, 2014.
'48 **Calcote, Lee Roy,** September 17, 2010.
'49 **Carlton, Richard James,** no details.
'49 **Lester, John Albert,** August 17, 1996.
'49 **Ravesies, Paul,** no details.
'50 **Berglund, Kenneth Leo,** March 1, 1996.
'50 **Hoyler, Wilburne F.,** January 15, 1992.
'50 **Rikard, Donald Allen,** August 24, 2012.
'51 **Galloway, Wilbur Davis,** April 25, 2007.
'56 **Cox Jr., Fred Butler,** August 21, 2014.
'56 **Moser, John Henry,** February 5, 2018.
'57 **Durbin, Leonel Damien,** February 23, 2018.
'60 **Baker, Donald Lee,** March 3, 2018.
'72 **Lockard, Marcus James,** April 13, 2018.
'84 **Harkness, David Gray,** June 20, 2017.
UT Α '50 **Felkner, Moffet Eugene,** March 5, 2018.
VT Β '41 **Hallam, Robert Moore,** February 1, 2010.
VA Α '44 **Catlin, Avery,** January 15, 2011.
'46 **Lawless, Kenneth Robert,** August 24, 2007.
'47 **Gianniny, Omer Allan,** August 31, 2012.
'49 **Hughes, Arthur Dadmun,** January 29, 2018.
'50 **Fair, Robert Richard,** February 9, 2018.
'50 **Iachetta, F. Anthony,** June 24, 2013.
'56 **Hickson, James Sinkler,** May 7, 2018.
'74 **Beckner, William Douglas,** May 26, 2015.
VA Β '43 **Petty, William Lee,** July 15, 2016.
'44 **Jones, James Beverly,** May 17, 2017.
'47 **Zweig, Benson,** April 26, 2007.
'49 **Ellis, James Thomas,** October 8, 1984.
'49 **Louthan, John Dudley,** March 30, 2003.
'49 **Shelor, Donald Monroe,** April 9, 2001.
'50 **Butts Jr., Bennie James,** November 24, 2006.
WA Α '42 **Horwood, Edgar Miller,** August 18, 1985.
'48 **French, William R.,** March 22, 2018.
'48 **Olleman, Roger Dean,** October 7, 2017.
'50 **Berglund, Roger Owen,** January 7, 1994.
'52 **Ellis, Samuel Soloman,** no details.
'58 **Windell, John Criss,** June 25, 2015.
'59 **Darnell, Gregory Loren,** June 2, 2017.
'85 **Diambri, John William,** November 2, 2017.
WA Β '50 **Brammer, James Robert,** August 19, 2007.
'79 **Rieck, Curtis Alan,** May 18, 2016.
WV Α '51 **Johnson Jr., William Grey,** May 18, 2018.
'75 **Glass, David Richard,** January 17, 2018.
'76 **Kittredge, Nelson Eric,** April 22, 2014.
WI Α '37 **Risser, Gerald Jenson,** May 14, 2008.
WI Β '45 **Saline, Lindon Edgar,** November 24, 2017.
'48 **McConnell, Howard Marion,** August 2, 2017.
'49 **Panning, Martin Henry,** February 2, 2018.
'52 **Rolfes, Paul Ewald,** June 27, 2015.
'55 **Wolak, James Joseph,** April 14, 2018.
'58 **Pickl, Thomas John,** January 25, 2018.
WY Α '78 **Harrington, Roger William,** June 10, 2013

TELL US THE TALE...WIN A T-SHIRT!

SEND US your best captions for this gem from Tau Beta Pi's photo archives. If yours is judged one of the best, we will send you a TBΠ t-shirt of your choice!

The photo, right, which appeared on the cover of the Summer 1979 issue of *The Bent*, shows students at the University of Alabama's Engineering Open House reacting to an experiment conducted by Alabama Gamma President Joseph J. Hanby, *AL Γ '79*.

Submit your entries to *pat@tbp.org*, or mail them to HQ by Monday, August 13, 2018.

The Spring Caption Contest photo, far right, which appeared in the Winter 1974 issue of *The Bent*, shows delegates at the 1973 Convention queued up to register for their rooms at the Flagler Inn in Gainesville, Florida.

The judges deliberated over 27 captions by 16 readers.

The first place caption, sent by Yi-Hsien Doo, *MI Z '81*, is: "Alexa, help me with my luggage!"

Two captions tied for second place:

"I'm mentally stable but my baggage has baggage." from Dante A. Masnada, *CA Z '75*, and

"Why does my reservation information say "8 students to a room"?" by David W. Kortebein, *IL A '85*.

Third place, again by David Kortebein is "I hope in the future they figure out a way to keep all suitcases from looking alike!"

The above members are previous winners, so we will send a shirt to James C. Hedtke, *MN A '69*, for his fourth place entry: "Mumbled by the person in blonde hair (third from check-in): "We're all engineers and no one has figured out how to put wheels on these things??!!"

Thanks again to all of you who have participated in the contests and for sharing your special brand of engineering humor!

Tau Beta Pi Day 2018

For a third consecutive year, recent graduates and some other members were asked to be part of an online Pi Day Challenge to make a gift between 2/24/2018-3/17 2018. Participants could receive a membership card and insignia items while at the same time supporting their chapter in a chance to win $100 toward a 2019 Pi Day activity. Those donating 10 Pi ($31.42) received a membership card, those contributing 20 Pi ($62.83) or greater received both a membership card and a Pi Day t-shirt or license plate frame, and those with gifts of 30 Pi ($94.25) and above received the three items. All members donating 20 Pi or greater were also eligible to enter a drawing for two $50 gift cards.

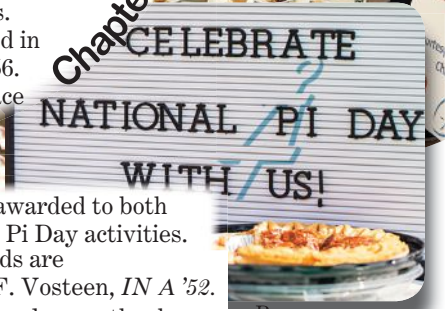
There were 98 Tau Bate participants in the Challenge, 81 of whom received a membership card. Some 78 received Pi Day t-shirts and 49 received license plate frames.

The total gross amount raised in the Challenge was $7,601.56.

There was a tie for first place among the chapters, so $100 will be awarded to both NY Gamma and TX Eta for their 2019 Pi Day activities.

The winners of the gift cards are Dorothy H. Harris, *GA B '05*, and Louis F. Vosteen, *IN A '52*.

Congratulations to all of the winners and many thanks for supporting Tau Beta Pi and Pi Day in 2018!



Brain Ticklers

RESULTS FROM WINTER

Perfect

*Bohdan, Timothy E.	IN	Γ	'85
*Couillard, J. Gregory	IL	A	'89
*Eanes, Robert Sterling	TX	Γ	'67
Gerken, Gary M.	CA	H	'11
Griggs Jr., James L.	OH	A	'56
*Gulian, Franklin J.	DE	A	'83
Gulian, Joseph D.	Son of member		
*Novak, Connor W.	Son of member		
*Richards, John R.	NJ	B	'76
*Slegel, Timothy J.	PA	A	'80
Strong, Michael D.	PA	A	'84
*Van Wyk, Rogell	IN	A	'59

Other

Alexander, Jay A.	IL	Γ	'86
Aron, Gert	IA	B	'58
Chatcavage, Edward F.	PA	B	'80
Heske III, Theodore	PA	A	'86
Jordan, R. Jeffrey	OK	Γ	'00
Kimsey, David B.	AL	A	'71
Kramer, J. David R.	PA	Δ	'57
Lalinsky, Mark A.	MI	Γ	'77
Marks, Lawrence B.	NY	I	'81
Marks, Benjamin	Son of member		
Marrone, James I.	IN	A	'61
Mettler, Kelly M.	CA	Δ	'10
*Norris, Thomas G.	OK	A	'56
Rao, Sandesh S.	MI	B	'17
Riedesel, Jeremy M.	OH	B	'96
*Schmidt, V. Hugo	WA	B	'51
Schweitzer, Robert W.	NY	Z	'52
Sigillito, Vincent G.	MD	B	'58
Skorina, Frank K.	NY	M	'83
Vargas, Christina M.	FL	Δ	'07
*Voellinger, Edward J.	Non-member		

* Denotes correct bonus solution

WINTER REVIEW

The winter column saw opposite extremes on the difficulty spectrum. Problem #2, the logic problem involving toy makers, was decidedly the easiest. Not only did it have the most submissions of any problem, all answers received were correct. The double bonus about school mascots was somewhat orthogonal to the spirit of our traditional brain ticklers.

This was evident in the results with very few submissions and no correct answers. Poor Joe Miner! The bonus problem about blackjack odds was the second-most difficult—about 2/3 submitters with meticulous bookkeeping skills arrived at the correct solution.

SPRING ANSWERS

1 The five 9-digit numbers are: **656,356,768; 714,924,299; 688,747,536; 999,777,999; and 345,588,888.** The 5^{th} root of a 9-digit number must lie between 40 and 63. On a spreadsheet, calculate the 5^{th} powers over this range. Now, eliminate all numbers that contain a 0, two 1's, or three 2's. This leaves only 656,356,768, 714,924,299, and 992,436,543, and only the 1^{st} and 2^{nd} of these between them contain all the digits 1 through 9. The 4^{th} root of a 9-digit number must lie between 100 and 178. Calculate the 4^{th} powers over this range, and use the same elimination criteria. This leaves 688,747,536 as the only possibility for the 3^{rd} number. Examination of the first three numbers shows that there are several possibilities for only two different digits; choices are: four 7's, five 8's; four 7's, five 9's; and three 7's, six 9's. Of the several possibilities, only 999,777,999 is divisible by 33 and 111. This leaves 345,588,888 for the 5^{th} number.

2 The probability of getting a bridge hand with no aces or face cards and exactly two 2's, three 3's, and four 4's is **99/246,511,475.** The number of ways to get two 2's is C(4, 2) = 6, where C(i, j) is the number of combinations of i objects taken j at a time. The number of ways of getting three 3's is C(4, 3) = 4, and the number of ways to get four 4's is C(4, 4) = 1. Finally, since they can only have face values of 5 through 10, the number of ways to get the other four cards in the hand is C(24, 4) = 10,626. The number of different bridge hands is C(52, 13) = 635,013,559,600. Therefore, the probability of getting a hand such as indicated above is P = 6(4)(1)(10,626)/635,013,559,600 =99/246,511,475=0.000000401604, or approximately once in every two-and-a-half-million hands.

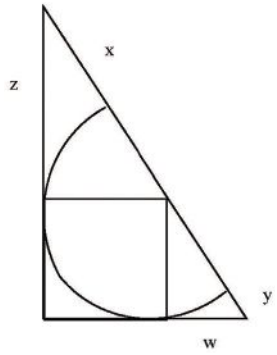
3 The ten item codes are the powers of 3 from 0 to 9: **1, 3, 9, 27, 81, 243, 729, 2187, 6561,** and **19683.** There are exactly 3^{10} possible orders, and this coding scheme produces a unique number for every possible order, from 0 to 3^{10}-1. To get the order number, the waitperson merely adds the codes for all the items ordered. (If two of an item are ordered, the code is added twice.) When an order is received in the kitchen, the chef converts the base 10 order into a base 3 number, a string consisting of 0's, 1's, and 2's, left padded with 0's to form a 10-*trit* (ternary digit) representation. Starting at the unit's trit and continuing through all 10 trits, the chef provides 0, 1, or 2 of the corresponding menu item. In general, if there are k items which can be ordered up to n times, the item codes are $(n+1)^{i-1}$ for i=1 to k.

4 A minimum of **seven pegs** is needed to transfer eighteen discs from the initial peg to another peg in less than 1 minute in the Super-Tower of Hanoi puzzle. A little thought will show that, if there are n empty pegs, n discs can be moved from the initial peg to another peg. Just distribute one disc onto each empty peg and then reassemble the discs in order on the peg with the largest disc; this takes $2n$–1 moves. This leaves n–1 empty pegs, so the procedure can be repeated with one fewer disc, that is, n–1 discs can be moved in $2n$–3 moves. Continuing in this way, d=$n(n+1)/2$ discs can be stored on n pegs. If n=5, then d=15, but we want to move 18 discs, so we need 6 pegs in addition to the original peg. With 6 pegs, 6 discs can be stored on P_1, 5 on P_2, 4 on P_3, and 2 on P_4. This takes 11+9+7+3=30 moves to store the discs. Then, it takes the same number of moves to rebuild the tower plus one move to transfer the largest disc, but this is a total of 61 moves (61 seconds) and we only have a minute. However, we can reduce the number of moves by 2 if, instead of moving 2 discs to P_4, we move 1 to P_4 and 1 to P_5. This only requires 4 moves instead of 6, a gain of two moves, for a total

of 59 moves, just under a minute. With 7 pegs, just before the largest disc is moved, the discs will be distributed as shown in the table. The total number of moves required will be 11+9+7+1+1+1+1+1+7+9+11=59. The transfer could be completed with fewer than 7 pegs, but it would require more than 1 minute.

Peg	0	1	2	3	4	5	6
Discs	18	1-6	7-11	12-15	16	17	--

5 The maximum and minimum lengths of the hypotenuse are **442 cm** and **350 cm,** respectively. The following discussion refers to the diagram.



First, note that the radius of the semicircle is 120 cm. The large triangle contains two smaller triangles which are similar to the large triangle and to each other. Call the upper triangle A and the lower triangle B. Applying the Pythagorean Theorem to A gives $z^2 + 120^2 = (x + 120)^2$. Solving for x gives $x = \sqrt{(z^2 + 120^2)} - 120$. Similarly, for B, $y = \sqrt{(w^2 + 120^2)} - 120$. We need to find integral values for w and z such that $(w^2 + 120^2)$ and $(z^2 + 120^2)$ are perfect squares. Since A and B are similar triangles, we have $z/120 = 120/w$, or $w = 120^2/z$. That is, z is a factor of 120^2, but $120^2 = 2^6 3^2 5^2$, which has 7(3)(3) = 63 factors. Thus, there are only 63 possible values for z, and once we have z, we also have x, y, and w. It is a relatively simple matter to check all these possibilities on a spreadsheet, which yields the following results, in cm.

z	50	64	90	160	225	288
x	10	16	30	80	135	192
w	288	225	160	90	64	50
y	192	135	80	30	16	10
Hyp.	442	391	350	350	391	442

Thus, the maximum length of the hypotenuse is 442 cm, and the minimum length is 350 cm.

Bonus. The gravitational acceleration acting on a person standing at the center of the base would be **24.8 m/s²** and acting on a person at the apex, it would be **2.75 m/s².** We first calculate the center of mass of the cone. Consider a cone with its apex at the origin of a Cartesian coordinate system and its axis lying on the z axis. The x and y components obviously lie on the axis of the cone, so all that is needed is the z component. The equation for the center of mass is $z_{cm} = (1/M)\int z\,dm$, where M is the total mass of the cone, and dm is the mass of a thin slice of the cone perpendicular to the cone's main axis. Now, by similar triangles, $r/z = R/H$, where R is the radius of the cone's base, H is the distance from the apex to the middle of the base, and r and z are the radius and distance from the origin of a thin slice of the cone. Now, $dm = \sigma\pi r^2 dz = \sigma\pi(R/H)^2 z^2 dz$, where σ is the density of the cone. $M = \int dm = \sigma\pi(R/H)^2 \int_0^H z^2 dz = \sigma\pi(R/H)^2[z^3/3]_0^H = \sigma\pi(R/H)^2(H^3/3) = \sigma\pi R^2 H/3$. Now, $z_{cm} = (1/M)\int dm = (\sigma\pi(R/H)^2/M) \int_0^H z^3 dz = (\sigma\pi/M)(R/H)^2(H^4/4) = (3\sigma\pi/\sigma\pi R^2 H)(R/H)^2(H^4/4) = 3H/4$. Thus, the apex is 3/4 the height of the cone from the center of mass. Now, $F = mg_o = GMm/R^2$, so $g_o = GM/R^2$, where $G = 6.673\times10^{-11}$ m³/kg-s². The volume of the earth $V_e = (4\pi/3)R_e^3 = V_c = (\pi/3)R_c^2 H_c = (2\pi/3)R_c^3$, so $R_c^3 = 2R_e^3$ or $R_c = 1.26R_e = 1.26(6{,}370{,}000) = 8{,}026{,}200$ m. $V_c = 2\pi(8{,}026{,}200)^3/3 = 1.0827\times10^{21}$ m³ and $M_c = 5{,}518V_c = 5.9743\times10^{24}$ kg. A person on the apex is 3/4 of the height of the conical planet from the center of mass. Therefore, $g_o = (6.673\times10^{-11}\ m^3/kg\text{-}s^2)(5.9754\times10^{24}\ kg)/(0.75x2\times8.0262\times10^6\ m)^2 = 2.75\ m/s^2$. For someone at the middle of the base, $g_o = (6.673\times10^{11}\ m^3/kg\text{-}s^2)(5.9754\times10^{24}\ kg)/(0.25\times2\times8.0262\times10^6\ m)^2 = 24.75\ m/s^2$.

Double Bonus HOWIE + FRED + CHUCK + JEFF = JUDGE translates to **380ab + 61b5 + 73472 + cb66 = c459b** in base 13. Or, 103400 + 13499 + 207287 + 28307 = 352493 in base 10.

NEW SUMMER PROBLEMS

1 A man and his daughter make a 64 km trip with their saddle horse which travels 16 km per hour but can carry only one person at a time. The man walks at the rate of 6 km per hour and the daughter at the rate of 8 km per hour. The trip is made in the following manner. The two start out at the same place and time with one walking and the other riding. After the rider has gone a certain distance, the rider dismounts, ties the horse, and immediately starts walking ahead. When the walker comes up to the horse, the walker mounts and rides forward another certain distance, whereupon they dismount, and the above process is repeated. The two reach the halfway point at the same time, at which point they take a half-hour break to feed the horse. They then proceed in the same manner as in the first half of the journey. At what time does the pair arrive at their destination if they start at 6 a.m.?

—*Ingenious Mathematical Problems and Methods* by L. A. Graham

2 If a decimal integer ends in a particular digit, repeated enough times, the hexadecimal representation of the number will end with either 1 or 3 repeated hex digits. For example, a decimal number ending in a string of 1's will produce a hexadecimal number ending in the repeated digits "1C7," and a decimal number ending in a string of 6's will produce a hexadecimal number ending with the repeated digit "A" (A stands for the value 10). How long is the smallest decimal integer consisting entirely of 6's which has a hexadecimal representation that ends with a string of 25 consecutive A's?

—Franklin J. Gulian, *DE A '83*

3 Twice the larger of two numbers is three more than five times the smaller and the sum of four times the larger and three times the

smaller is 71. What are the numbers?

—*Mean Girls*, 2004

4 Mary stood beside a large pile of turnips (fewer than 20,150), which she was to distribute evenly among the people in the group in front of her. Since it was unlikely that the number of turnips would divide evenly among the people, she was given permission to add or subtract turnips to produce an even division to the nearest integral value. A quick division of the number of turnips by the number of people gave an answer between 99 and 100, but closer to 99. However, realizing that everyone would prefer 100 turnips to 99, she decided to do the calculations a different way. First, she assumed everyone would get 99 turnips, so she divided the number of turnips by 99. Then, she assumed everyone would get 100 turnips, so she divided the number of turnips by 100 and found that this gave an answer closer to the actual number of people than the division by 99, so she added some turnips to the pile and gave everyone 100 turnips. How many people were there and how many turnips were in the original pile?

—Keith Austin in *New Scientist*

5 My uncle's ritual for dressing each morning except Sunday includes a trip to the sock drawer, where he (1) picks out three socks at random, then (2) wears any matching pair and returns the odd sock to the drawer or (3) if he has no matching pair, returns the three socks to the drawer and repeats steps (1) and (3) until he completes step (2). The drawer starts with 16 socks each Monday morning (eight blue, six black, two brown) and ends up with four socks each Saturday evening. On which day of the week is he least likely to get a pair from the first three socks chosen? On average, which day of the week requires the greatest number of times that my uncle grabs three socks from the drawer?

—Richard Hess, *CA B '62,* in *The Mathemagician and Pied Puzzler*

Bonus Suppose you are given four non-standard but otherwise fair, dice: one blue, one green, one red, and one white. For simplicity, assume that the four dice have the numbers 1 through 24 on their faces. After a long sequence of rolling pairs of these dice, you conclude the following: When rolled simultaneously, two thirds of the time the blue die shows a higher value than the green die. When rolled simultaneously, two thirds of the time the green die shows a higher value than the red die. When rolled simultaneously, two thirds of the time the red die shows a higher value than the white die. Now, if the blue and white dies are rolled simultaneously, what is the least probability P that the blue die will show a higher value than the white die on a given roll? For such P, give an example of the distribution of the numbers 1 through 24 on the four die.

—Puzzle Corner by Allan Gottlieb in *Technology Review*

Double Bonus The game of Sprouts, invented by J.H. Conway and M.S. Patterson, is a pencil and paper game played as follows. Any number of points are placed on the paper, and the players take turns connecting two of the points. Each move consists of two parts: (a) drawing a line between two points or looping back to the starting point and (b) placing a new point on the line anywhere except at an endpoint. There are three rules: (1) a line cannot cross itself or any other line; (2) a line cannot pass through an existing point but must start and end on existing points (can be the same point); and (3) no point can have more than three lines that start or end on it. The player who cannot make a move loses. A little thought will show that the game must always end. In how many different configurations can a two-point game end? Isomorphic transformations, such as order of play, rotations, and reflections are not different games.

—*The World Book of Math Power*

Postal mail your answers to any or all of the Summer Brain Ticklers to **Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697** or email to *BrainTicklers@tbp.org* as plain text only. The method of solution is not necessary, and the Double Bonus is not graded. Where possible, the judges consider exact answers to be preferable to approximations. The cutoff date for entries to the Summer column is the appearance of the Fall *Bent* in mid-September (the electronic version is distributed a few days earlier). We welcome any interesting problems that might be suitable for the column. HQ will forward your entries to the judges who are **H.G. McIlvried III,** *PA Γ '53;* **F.J. Tydeman,** *CA Δ '73;* **J.R. Stribling,** *CA Δ '92*, and the columnist for this issue,

J. C. Rasbold, *OH A '83*

General Revision to the Constitution and Bylaws Ratified

The 2017 Convention approved a general revision to the Constitution and Bylaws of Tau Beta Pi and sent it to the chapters for ratification. In accord with the Association's amending procedure, with 289 chapters (246 collegiate and 43 alumni) eligible to vote, 217 or more affirmative chapter votes are required to ratify an amendment, and 73 or more negative votes would defeat it.

Headquarters received 190 valid ballots by the voting deadline of April 1, 2018 (plus 6 invalid for lack of a chapter quorum). An additional 9 ballots (plus 2 invalid) were received after the deadline prior to the Executive Council meeting. The Council acted on April 28 and voted on behalf of those chapters submitting an invalid or not ballot. The proposed general revision was therefore ratified and is in effect.

Amendment

1. Adopt the general revision of the Constitution and Bylaws.
(All Constitution Articles and Bylaws were amended)

Outcome

1. Unresolved by chapter vote; 188 affirmative, 11 negative. Ratified by Council vote for invalid and missing chapters.

That "What Now?" Moment For New Grads

Alumnus Ron Ames, Maryland Beta '69, responded to a ΤΒΠ plea for help and went to speak to some students. He had a pleasant surprise and reckons other alumni could have a similar experience.

It has been 50 years since my initiation into Tau Beta Pi at Maryland Beta, and I remember holding my aerospace engineering degree and asking, "What now?"

I received a survey last fall from our Headquarters asking if I would be willing to help in some way. This time my questions was, "Why not?" After a few emails, it was decided that I would make myself available to speak to chapters in Florida, where I have retired.

It occurred to me that some students about to graduate in engineering might be asking the same "what now" question. My professional career was certainly atypical and only indirectly related to my undergraduate education: U.S. Air Force meteorologist, M.S. in business, management consultant, Fortune 500 corporate executive, and principal in my own consulting firm. Perhaps I could speak about the many varied opportunities for engineering graduates beyond traditional engineering.

The Florida Alpha and Gamma Chapters of ΤΒΠ invited me to speak. I spoke to both chapters about the unlimited opportunities available to honors graduates in engineering focusing on three concepts:

- *Engineering is today's true liberal education. The arts and sciences have claimed that mantle for years, but I do not believe that anything prepares one for the challenges of today's world like engineering. Students cannot survive without learning to think creatively and solve complex problems analytically. Some may say that my professional career wasted my engineering education, but I feel the opposite is true. I used my engineering training every single day and to the considerable advantage it provided.*

- *As a recent graduate, it is virtually impossible to predict where one's career path will lead. Looking back, I could never have anticipated my career. My message was to be open to all opportunities no matter how unique they may first appear.*

- *Effective written and oral communication is an essential element to any career path. To prepare, my advice to all students is to take courses in business writing and public speaking and learn to be an effective communicator.*

Personally, I would like to challenge my fellow alumni to consider making yourself available to speak to chapters. I predict that you will find the experience highly rewarding, as I did. Also, I would like to thank the FL Alpha (UF) and FL Gamma (USF) chapters for allowing me to share in their chapter in a special way. As is often the case, I am sure I gained more than I gave. I was impressed by the quality, intellect, and ambition of the students I met. I came away with the feeling that our future world may well be in better hands than I thought.

- The new president of FL A, Kelsey Stadnikia, *FL A '19*, sent this note to Mr. Ames after hearing his presentation:

"What a wonderful treat it was to have you come to UF yesterday and share your story/wisdom. I was initiated last semester, Fall 2017, so I recently received my first issue of *The Bent*. I was most inspired by the section in the back, "Alumni Notes". I was reading about all of these incredible people, and I was thinking about how fantastic it would be to have a ΤΒΠ alumni come speak each semester. Thank you so much for reaching out to us here at UF. You were a wonderful inspiration, and I know I will remember your speech for years and years to come.

"I hope your presence last night sparks a new tradition in our chapter. I would love to continue to be inspired by ΤΒΠ alum."

Please contact Tricia Gomulinski, Director of Alumni Affairs at *tricia@tbp.org* if you are interested in speaking to our students.

"THE BEST PEOPLE" ENGINEERING JOB BOARD

Through a partnership with JobTarget, Tau Beta Pi is proud to offer a job board for students and alumni. Members can post resumes, browse over 5,400 engineering jobs, faculty positions, and internships, and employers may browse resumes. New opportunities are posted on our home page daily and a full list of openings are available by visiting *www.tbp.org/memb/jobBoard.cfm*.

California Alpha

Srinivasan Seshan, Ph.D., '89, has has appointed head of the computer science department at Carnegie Mellon University's school of computer science, the school's oldest and largest department. Seshan joined the CSD faculty in 2000 after five years as a staff member at IBM's T.J. Watson Research Center. His research focuses on improving the design, performance and security of computer networks.

California Beta

Ilya Fushman, Ph.D., '03, has been appointed as general partner and managing member at venture capital firm Kleiner Perkins Caufield & Byers. He was previously a general partner at Index Ventures, after being one of the first 75 employees at Dropbox where, according to a news release, he "helped to build and run the company's business and corporate development functions."

Florida Beta

Shihab S. Asfour, Ph..D., '73, the associate dean for academics at the University of Miami's college of engineering, has been appointed dean of faculty affairs. He served as chair of the department of industrial engineering from 1999 until 2007. In addition to his appointment in industrial engineering, he is professor in the biomedical engineering and the orthopedics and rehabilitation departments. He pioneered the application of ergonomics and biomechanics in the electric utility industry.

John R. Hall, P.E., '74, has been awarded the Norm Augustine Award by the American Association of Engineering Societies. The award recognizes an engineeer who has demonstrated the capacity for communicating the excitement and wonder of engineering. For 40 years, Hall has worked to inspire engineers to educate children about engineering, and for over a decade he has lobbied for integration of engineering into the K–12 curriculum. Hall is president of Ludovici & Orange Consulting Engineers in Coral Gables, FL.

Illinois Alpha

Richard E. Zelenka, Esq., J.D., P.E., '87, has launched Critical Path IP Law, a Denver-based firm providing a business-focused, technically-sound approach to intellectual property protection. Managing member Zelenka has 20 years' experience with innovation and business earned as a former Boeing executive and NASA research engineer prior to practicing law. His legal expertise includes drafting and prosecution of over a hundred patent applications.

Michigan Alpha

Kavitha Arunachalam, Ph.D., '05, is now an associate professor in the department of engineering design at the Indian Institute of Technology Madras, Chennai. Her research interests include biomedical device instrumentation and control, radio frequency and microwave antenna design, and electromagnetic thermal therapy techniques, with non-destructive material evaluation.

Minnesota Beta

Catherine Daoust, '18, has been named the 2017-18 Western Collegiate Hockey Association's Outstanding Student-Athlete of the Year. The University of Minnesota, Duluth women's hockey senior defenseman and Quebec native owns a 4.0 cumulative GPA while majoring in mechanical engineering. This past season, Daoust posted a career-best 13 points on three goals and 10 assists in 35 games. She was also named a WCHA Scholar Athlete for the third time in her tenure at UMD, as well as a WCHA All-Academic Team member for a third-straight year. She plans to pursue a master's in aerospace engineering.

Missouri Alpha

Jay A. Puckett, Ph.D., '78, director of the school of architectural engineering and construction at the University of Nebraska-Lincoln, has received the Wyoming Eminent Engineer award for 2018. He is a long-term educator, researcher and administrator who has served the University of Wyoming in varying capacities, ranging from assistant

professor through associate dean, from 1983-2015, before starting his current post in 2015.

New York Alpha

William M. Russo, '82, and wife Julia announce the birth of their daughter Annalisa May Russo, on January 30, 2018 in Taipei, Taiwan. Russo is founder & CEO of Automobility Limited, a strategy and investment advisory firm focused on helping clients create the future of mobility. He has lived and worked in China for 14 years, and currently resides with his wife and family in Shanghai.

Oklahoma Alpha

Shawn M. Schneider, '06, has won the 2018 Department of the Navy award for technical excellence at a test and evaluation facility or range. He is an engineer at Naval Surface Warfare Center Dahlgren Division and was honored for his extraordinary contributions to the test and evaluation community in the area of multi-input-multi-output (MIMO) vibration test profiles.

Oregon Alpha

Sarmad A. Rihani, P.E., '77, has received the W. Gene Corley Award from the American Society of Civil Engineers (ASCE) and the Structural Engineering Institute (SEI). This is awarded annually to an individual for their efforts to advance and distinguish structural engineering as a profession. Rihani has served SEI on numerous committees, the board of governors, and as the 2011-13 president. Now retired, he specialized during his 36-year career in the structural analysis and design of steel framing systems for commercial, office, and industrial buildings.

Pennsylvania Delta

Noah A. Ready-Campbell, '10, is co-founder and CEO of Built Robotics, a startup that's developing technology to allow bulldozers, excavators and other construction vehicles to operate themselves. He said the aim was to use automation technology to make construction safer, faster and cheaper. *The Associated Press* said the firm was part of a wave of automation transforming the construction industry, which had lagged behind other sectors in technological innovation.

Pennsylvania Theta

Charles J. Catania Jr., P.E., '89, has been chosen as the 2018 engineer of the year by the Delaware County Chapter of the Pennsylvania Society of Professional Engineers. He is project manager for Catania Engineering Associates, Inc., which he joined after earning his bachelor's degree in civil engineering. In addition, Catania serves as club president to the local Ridley United Soccer Club.

Tennessee Alpha

Jamie B. Coble, Ph.D., '05, has been named the University of Tennessee engineering college's first Southern Company Faculty Fellow in recognition of her work as an assistant professor of nuclear engineering. The college and the major energy generating company partnered to create the fellowship. Southern Company COO Kim S. Greene, *Alabama Gamma '90,* had this to say about Dr. Coble, "(she) is an outstanding educator who has earned several honors as a result of her work to improve nuclear reactors."

Tennessee Beta

Robert M. Hackett, Ph.D, P.E., '60, has published the second edition of *Hyperelasticity Primer* (Springer International Publishing AG 2018). The new edition includes topical coverage of the mechanics of biological soft tissue. Hackett retired as civil engineering department chair at Ole Miss in 1999. He and his wife Patricia live in Brentwood, TN.

Paula E. Harris, '82, is executive vice president and chief marketing officer for Barge Design Solutions, Inc., an architecture and engineering firm based in Nashville, TN. She was recently selected as one of WilliamsonBusiness.Com's 100 Leading Women 2018. In addition, Harris is a graduate of Leadership Franklin and has served as executive director since 2012 in a volunteer capacity.

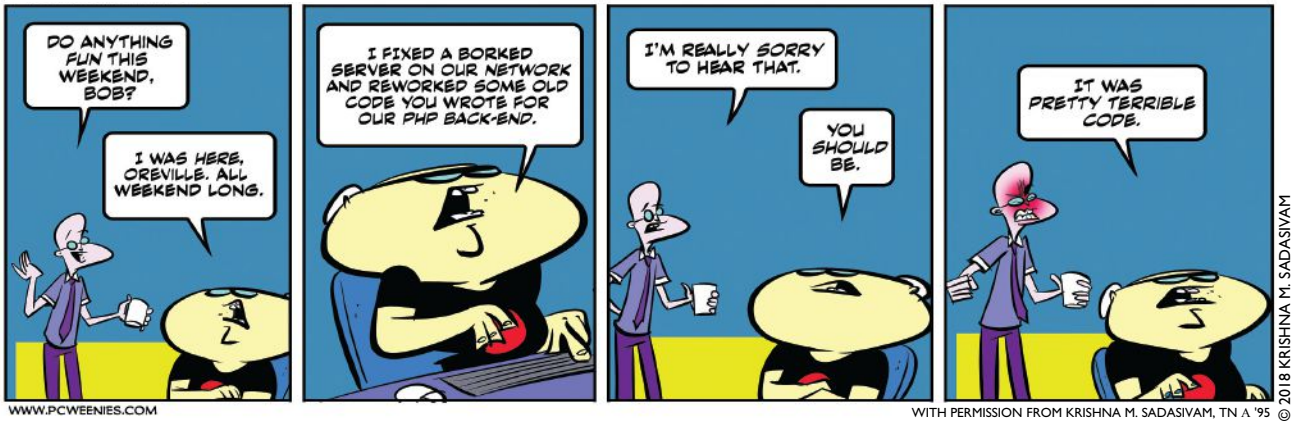
Wisconsin Alpha

Thomas J. Legare, '89, has joined Intelisys as a solutions engineer on its national team. Legare most recently held leadership positions with Windstream, including manager of sales engineering and senior network design specialist. Previously, he served as a sales executive with AT&T for 16 years.

Write Your Own Note!

Your fellow Tau Bates are interested in news about you. Send items about civic activities, honors won, weddings, births, promotions, changes in address, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to *alumnote@tbp.org*. Material for publication must be received for the **Spring** issue by February 1, **Summer** issue by May 1, **Fall** issue by August 1, and **Winter** issue by November 1. Include name, address, chapter, class year, and email address or phone number. Thank you!

The PC Weenies



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WHO STOLE THE ORDER FORM?

You may have noticed that the insignia order form is missing from the bottom of this page. In order to give members the best service possible, we have launched a new online store to make ordering insignia a smoother experience.

This new, modern interface allows Tau Beta Pi to:

•Provide beneficial discounts on items such as T-shirts and coffee mugs so members may purchase them at the lowest costs possible.

•Offer the new products (with many coming this year) that members desire.

•Act as a central source for supplies needed for collegiate and alumni activities.

•Keep better track of orders to ensure customer satisfaction.

We invite you to visit the new store at *www.tbp.org/store* to get your gear and show pride in your membership!

Member Benefits

SEE COMPLETE LIST at *tbp.org/memb/benefits.cfm*

- **GEICO**—additional discounts on automobile insurance.
- **LinkedIn**—join 27,100 members in our official group for professional networking and career discussions (search: Tau Beta Pi Engineering Honor Society).
- **Local Hospitality**—access to a worldwide inventory of hotels at exclusively discounted rates.
- **TBP4Life**—a private community mobile app and web platform for mentoring & networking opportunities [tbp.vineup.com/].
- **SIRVA Home Benefits**—discounts on real estate, mortgages, and moving services.
- **PPI**—discounts on professional licensing exam review materials (FE/EIT, PE, LEED, & more).
- **TBP Job Board**—post a resume online and browse through hundreds of engineering jobs at top companies.

HQ POSTSCRIPT

Executive Director Curt Gomulinski, left, and Andrey Karnauch following the Tennessee Alpha initiation ceremony and banquet.

Andrey joins TBΠ and Headquarters

There is a new member of Tau Beta Pi among the HQ staff! Andrey P. Karnauch, part-time systems program associate, was initiated by Tennessee Alpha on April 12. A senior at the University of Tennessee, Andrey is studying computer science with a minor in cyber security.

He hails from Chattanooga, TN, where his family, including five siblings, have lived for 11 years. His parents escaped religious persecution in Communist-era Ukraine to the US more than 30 years ago.

Andrey will continue working part-time while he pursues a master's degree in computer science.

A good cook, he also enjoys working out at the gym and playing computer video games. Summer plans include climbing Half Dome in Yosemite National Park and backpacking in Grand Teton National Park.

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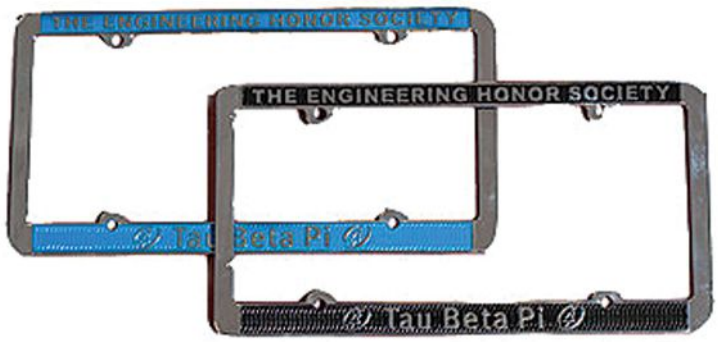

Teamwork Can Take You Out of This World...

Tau Beta Pi The Engineering Honor Society

ABOARD SPACE SHUTTLE *COLUMBIA,* STS-109 Mission Commander Capt. Scott D. Altman, USN, *IL A '81,* helps Mission Specialist Michael J. Massimino, Ph.D., *NY A '84,* with suit-donning prior to Mike's spacewalk during the Hubble Space Telescope's fourth servicing mission. Astronauts Massimino and James H. Newman went on to install the new Advanced Camera for Surveys (ACS) on Hubble. Some 70 Tau Bates have worked together as astronauts since the inception of the space program, and many more have served in the space agency and contractor teams that trained the astronauts, built their unique tools, put them into orbit, kept them there, and brought them safely home. *(Photo: NASA)*

Tau Beta Pi's Engineering Futures Program teaches students the special skills needed to create and run such effective teams, like resolving interpersonal problems, conducting effective meetings, and presenting results to stakeholders. Your chapter can schedule an Engineering Futures session by visiting *www.tbp.org/ef.*

Learn to share your ideas and create tomorrow.

TBΠ Engineering Futures

...make the difference