2012 Fellow Reports

Reports of the 2010-11 winners in Tau Beta Pi's 78th Fellowship Program are presented here. They constitute the Fellows' only specific obligation to the Association after their appointment by the Fellowship Board. Their reports were written in April, and the verb tenses may sound wrong when read later. Each of the winners expresses appreciation to advisors and major teachers, to family and helpful friends, and to the Association, donors, and the Fellowship Board for the honor of being named a Tau Beta Pi Fellow.

Of the 35 fellowships awarded a year ago, 17 of the students have been paid cash stipends totaling $170,000. The other 18 did not need the stipend.

Eric M. Anderson, AZ B '10
Fife Fellow No. 139

During my first year in medical school at Stanford, I focused the majority of my time on learning more about a number of basic science topics in the classroom and learning the basics of doctoring through didactic coursework. I have also tried to get the most that I can out of my medical school education and experience a wide range of educational opportunities available through the broader university.

From a research standpoint, I am building upon my background in oncology, genomics, and epidemiology to explore new avenues of medical research that I hope will serve as the basis of my long-term research efforts. I have also had the opportunity to participate in the Stanford Biodesign Program, which allowed me to learn more about medical device design and development along with students from the schools of engineering and business. My team focused on the development of a more effective transesophageal echocardiography system for the diagnosis of valvular cardiac pathologies.

Furthermore, my passion for providing health care to the underserved led me to serve as a volunteer at our Stanford medical student-run Cardinal Free Clinics and as a leader in the Stanford Leadership in Health Disparities program.

During my time in medical school, I have become increasingly interested in improving healthcare quality and cost-effectiveness, and I aim to increase my experience in this area in an effort to improve healthcare efficiency and access to care, especially for the underserved.

Amanda J. Bares, MT A '11
Tau Beta Pi Fellow No. 782

This past year, I began pursuing my Ph.D. at Cornell University in biomedical engineering. I joined the Chris Schaffer lab in early October and began my thesis research alongside the required coursework. The Schaffer lab uses 2-photon microscopy, a nonlinear laser scanning microscopy, to image cells and subcellular structures in living mouse models with the goal of elucidating underlying disease mechanisms. My thesis project will focus on nonlinear optical instrumentation, with the development of new microscope techniques or improvements for biological imaging.

My first year, I began working on the development of a hyperspectral multiphoton microscope. In multiphoton microscopy, cells are genetically labeled with fluorescent proteins, enabling researchers to visualize cell structure and cell proximity to other cells. However, current multiphoton technology is limited to three or four fluorescent labels at a time. The hyperspectral microscope I began developing will enable imaging of six or more fluorescent labels, increasing our capability to investigate complex disease mechanisms involving multiple cells and cell types. Over this first year, I learned about multiphoton microscopy by building a new microscope for lab experiments and began constructing the hyperspectral microscope.

Eric M. Anderson

Amanda J. Bares

Elizabeth M. Beckett

In addition to my research and coursework, I organized and volunteered for multiple outreach events to increase awareness of science, technology, engineering, and math (STEM) opportunities for underprivileged middle school and high school students in the area. I find teaching science incredibly rewarding, and plan to participate in such outreach activities throughout the rest of my graduate career. I plan to combine my interests in research and teaching by joining academia after graduating.

Elizabeth M. Beckett, IN A '11
Tau Beta Pi Fellow No. 783

Increased concerns about global warming have led to renewed interest in nuclear power as a carbon-free source of energy. Recent advances in fast reactor designs will reach higher potential energy utilization, and consequently, higher levels of damage to structural materials. There is very little neutron irradiation data available at the high doses expected to be reached by the next generation of reactors. Neutron irradiations are costly in terms of both time and money at relevant doses.

An alternative method is to simulate neutron irradiation with ion beam irradiation. Ion beam irradiation offers the benefit of decreasing irradiation time by orders of magnitude and are a cost-effective way to examine microstructural evolution from low to high doses (greater than one hundred displacements per atom), while maintain excellent temperature control. Irradiation-induced phenomena of interest include irradiation-induced hardness, radiation-induced segregation, void swelling and dislocation loop and network formation.

My work thus far has focused on examine the phenomenon of void swelling in Fe++ ion-irradiated ferritic-martensitic steel alloys up to very high doses, with and without pre-implanted helium. I recently won a poster competition at the University of Michigan, and look forward to presenting my research at a number of conferences including at The Minerals, Metals and Materials Society Annual Meetings as well as at Microscopy and Microanalysis.

My future career plans include entering academia after I receive my Ph.D., either in nuclear engineering or materials science. I was so thankful and excited to receive the support of the Tau Beta Pi Fellowship, and look forward to continuing my research at the

Anahid A. Behrouzi

Camila Dorin

Timothy M. Douglas

James D. Follum

University of Michigan. My goal when I finish my academic career is to enter academia. I was very fortunate to receive the Tau Beta Pi Fellowship, which is enabling me to realize my dream.

Anahid A. Behrouzi, NC A '11
King Fellow No. 50

The first year of civil engineering studies at the University of Illinois at Urbana-Champaign was both a challenging and exciting chapter in my academic career. In the classroom, I had the opportunity to strengthen my understanding of structural dynamics, analysis, and design as well as venture into new topics like mechanics and finite element modeling. Also, I joined a research team within the University of Illinois Network for Earthquake Engineering Simulation (NEES) facility investigating the behavior of complex reinforced concrete shear walls. This type of structural system is used often in practice to provide lateral stability to buildings in seismic regions. In particular, my role on this project relates to the instrumentation and data acquisition for these large-scale experimental tests.

Perhaps the most gratifying part of my graduate studies has been the chance to expand upon my commitment to engineering extension and mentoring. This has ranged from providing laboratory tours to visiting faculty, professionals, and prospective students; mentoring undergraduate researchers through the NEES REU program; and assisting with summer engineering camps that expose high school students to structural design.

Recently having completed my M.S. degree thanks to support from ΤΒΠ, I will continue with doctoral studies in civil engineering. In part, my dissertation work will involve developing a data visualization tool to examine experimental data collected from densely instrumented structural test components. Following graduation I hope to work in an innovative engineering design environment. This real-world experience will better equip me in my ultimate goal of teaching structural engineering at the university level and performing research in the seismic behavior of buildings.

Camila Dorin, NY M '11
Fife Fellow No. 140

During the 2011-2012 academic year, I pursued my master's in analogue and digital integrated circuit design at Imperial College London in the department of electrical engineering. It was an intense 12-month program with people from all over the world.

During two semesters I took a number of classes, most courses had projects as a main portion of the syllabus. These required extensive hours of work, but most of the times we worked in groups, which I enjoyed a lot. I had the chance to get to know my classmates and share our ideas about what we were learning. There was a continuous flow of opinions and it was always a lot of fun.

From May to mid-September I worked on my thesis, which was on implantable optical biotelemetry. During this period, I setup an experiment in an anechoic chamber in the Biomedical Institute, where I performed different tests using porcine skin to reproduce transmission of near infrared light by human skin. Although challenging, I learned a lot from working independently on this project.

During the weekends I explored London and its surroundings. I had the chance to live with my sister, which was a unique and very enjoyable experience.

After completing the degree, I spent a semester at the Technion in Israel and recently came back from backpacking Southeast Asia. At the moment, I'm looking for hardware design jobs, preferably in companies developing medical devices.

Timothy M. Douglas, CO A '11
Lynnworth Fellow No. 3

During the 2011-12 academic year, I completed my master's degree in electrical engineering from the Colorado School of Mines (CSM), where I focused on digital control systems and signal processing as applied to high power transmission systems. I also completed my undergraduate studies at CSM in the previous four years, during which I was inducted into the Colorado Alpha chapter of Tau Beta Pi.

My involvement in this chapter of the organization, including serving as its president during the 2010-11 academic year, strengthened my understanding of and respect for the engineering discipline through establishing contacts and discovering career paths on a national scale. This enhanced my experiences during graduate school, and supplemented the starting of my career as an electrical engineer with Lockheed Martin Mission Systems and Training (MST) in Owego, New York.

My first year of assignments involved supporting the internationally recognized F-35 Joint Strike Fighter (JSF) program. I am currently enrolled in the corporation's Engineering Leadership and Development Program (ELDP), which focuses on maintaining a pipeline of technically, ethically, and functionally competent engineers to fulfill the increasing need of engineering leadership positions. My previous experiences as president of the CO A chapter, as well as my graduate schooling made possible through a ΤΒΠ Fellowship, have enhanced my career endeavors and value added to Lockheed Martin as an ELDP participant.

Upon completion of my current job assignments and continued studies as part of the ELDP in 2015, I plan to strive for a technical leadership role in electrical hardware, power, or radio frequency engineering within Lockheed Martin.

James D. Follum, WY A '10
Lynnworth Fellow No. 4

My year as a ΤΒΠ Fellow has been an eventful year. I have been pursuing my masters in Engineering Management at the American University of Beirut with a focus in industrial management. I have been taking classes as of last summer, and have recently started my thesis. I am working with a research group on downstream applications of oil and gas expected in the eastern Mediterranean. I have one more semester of classes and another year of research to go. I expect to graduate in Spring 2012 at the latest. Upon graduation, I plan to move into the strategic consulting sector that is thriving in the Middle East area. That will be the best combination of my chemical engineering and engineering management backgrounds.

The greatest accomplishment during my fellowship year is the amount of awareness and exposure I have brought ΤΒΠ in my new school. The fellowship has been quite an honorable title to hold. There is no pleasure compared to explaining to colleagues what ΤΒΠ is. Through my presence at AUB, I am raising awareness to start a charter that could evolve into ΤΒΠ's first international chapter. Perhaps this idea will see light before I graduate.

Shekhar K. Gadkaree

Matthew T. Grant

Albert Hsia

Alisha V. John

Shekhar K. Gadkaree, NY K '10
Fife Fellow No. 141

During my Tau Beta Pi Fellowship year, I completed my first year of medical school at Johns Hopkins School of Medicine. I was introduced to a variety of fields and spent a majority of my time in the classroom while exploring extracurricular opportunities in medical advocacy, refugee health care, and mobile health technology applications.

I was able to develop my interest in mobile health technology and examine how the recent explosion in mobile technology use could be coupled to health care initiatives involving healthy lifestyle interventions. One in particular that I was involved in was an exercise and diet program that was dependent on mobile health technology as platform. In the summer, I worked on a neurosurgery project involving the pre-operative, peri-operative, and post-operative characteristics of brain tumors that affect patient outcome.

I am now in my third year of medical school where I am rotating through various specialties in the hospital. In terms of my future plans, I have decided to pursue a combination of clinical and academic medicine and will decide on a field in the upcoming year. I am very grateful to ΤΒΠ as an organization for supporting me throughout my undergraduate and professional education. Through this support, I have identified a number of medical specialties that already rely on engineering technology as the answer to medical problems and will continue to pursue these areas as potential fields of study in the future.

Matthew T. Grant, OK Γ '11
Fife Fellow No. 142

After earning a B.S. in chemical engineering with minors in Economics and Spanish from Oklahoma State University, I completed a year-long master's in bioscience enterprise at the University of Cambridge. My experience has been life changing, and this opportunity would not have been possible without the support and generosity of ΤΒΠ.

My class was comprised of twenty-five students from sixteen countries, expanding my learning well beyond the classroom. Since my studies focused on global healthcare and entrepreneurship, the international perspective was immensely valuable.

For my dissertation I researched the clinical decision making, reimbursement pathways, and market data for a medical device known as the Cytosponge. The device will be used to screen and to assist in the diagnosis of several gastroenterological disorders. My work outlined a launch strategy to introduce the device into a few European nations, while also exploring additional development criteria to encourage adoption by physicians.

My course covered many topics that combined my background in engineering and my future career as a physician. I know that my year in Cambridge will prove immeasurably useful for my professional and personal development. For this, I cannot fully express my gratitude to ΤΒΠ. Now that I have completed my M.Phil., I will begin my medical education at Baylor College of Medicine in July 2012.

Albert Hsia, AZ B '11
Fife Fellow No. 143

Albert Hsia obtained his master's degree in biomedical engineering from Arizona State University in May 2012. His research involved developing an algorithm to improve the capabilities for artificial fingers on robotic and prosthetic hands to detect directional slip when a user is grabbing onto an object. Because his project involved both computational and statistical knowledge, Albert took courses ranging from data mining and design of experiments to neural engineering and image processing.

As a Tau Beta Pi fellow, Albert also maintained an active role in the Arizona Beta chapter of Tau Beta Pi, providing administrative advice and guidance for the new officers. During his fellowship year, Albert also passed his Fundamentals of Engineering Exam, and was EIT certified in the State of Arizona.

Albert is currently attending medical school at Midwestern University and will begin his second year this coming August. He is involved at both local and national levels in promoting affordable healthcare as well the need for more primary care physicians in the nation.

He is currently involved in developing a novel method to diagnose early-onset Alzheimer's disease at the Neuroenergetics Laboratory. With a strong background in engineering, he has become a valuable asset in designing the device and understanding the technical procedures involved in medical device development.

Alisha V. John, MI E '11
Tau Beta Pi Fellow No. 784

During my year as a Tau Beta Pi Fellow, I began graduate studies at the University of Michigan in the program in biomedical sciences. Throughout my first year as a Ph.D. student, I expanded my knowledge in biology, with an emphasis on genetics, through research rotations and coursework.

The first of my research rotations was with Dr. Julie Douglas in the human genetics department. In the Douglas Lab, I explored the relationship between mammographic breast density, circulating levels of different hormones/proteins, and genetic variations in the genes that encode those hormones/proteins. Since increased mammographic breast density is a strong risk factor for breast cancer, the ultimate goal of this project was to better understand the genetics influencing breast density and thus, breast cancer risk. Next, I rotated with Dr. Sally Camper, also in the human genetics department. In the Camper Lab, I contributed to a project aimed to identify factors that play a role in thyroid-stimulating hormone production and, therefore, proper pituitary/endocrine development and function.

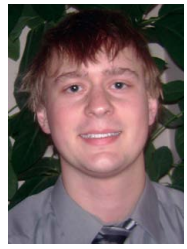
To conclude my fellowship year, I rotated in and subsequently joined the lab of Dr. Patricia Wittkopp in the department of molecular, cellular, and developmental biology. Since that time, I have been investigating the relationship between evolutionary changes in gene expression and phenotypic diversity. Gene expression refers to when, where, and how much of a particular gene product is produced. Consequently, changes in gene expression can impact gene function and lead to the production of different phenotypes, or observable characteristics. Ultimately, my Ph.D. research aims to better understand how different genotypes produce different phenotypes, which is a fundamental goal in biology.

Despite transitioning from engineering to biology, my training as an engineer continues to serve me well throughout my endeavors. I am thankful not only for my engineering education, but also for the life and professional lessons learned through my involvement with ΤΒΠ. Representing ΤΒΠ throughout my fellowship year was an honor and a privilege. Thank you for the opportunity to represent such a wonderful organization.

Jennifer A. Johnson

Matthew C. Johnson

Pamela E. Jreij



Andrew J. Komendat

Jennifer A. Johnson, SC A '11
Spencer Fellow No. 56

Due to the tremendous political, economical, and environmental pressures under which the transportation sector currently operates, much national effort is being expended to intelligent mobility technologies to meet ever-increasing U.S. transportation demands. My graduate research involved integrating Electric Vehicles into Connected Vehicle technologies in which vehicles and infrastructure units communicate with one another in real-time for supporting improved efficiency, mobility and safety. Specifically, my project encompassed the necessity of developing and implementing high-performance communication and computational tools, where vehicles, infrastructure agents and electric grid/charging infrastructure are communicating and processing data in real-time for creating truly sustainable communities.

At the conclusion of my graduate year, I am proud to say that I graduated with a M.S. degree in civil engineering from Clemson University. Throughout the year, I also had the unique opportunity of presenting my research at the Institute of Transportation Engineers (ITE) Southern District and Transportation Research Board annual meetings and was published in the Transportation Research Part C: Emerging Technologies journal. In addition, I served as the President of Clemson ITE, co-founded South Carolina's first Intelligent Transportation Society chapter, and assistant coached the varsity girl's basketball team at Daniel High School.

Some of my most notable achievements throughout graduate school were graduating from the ENO Transportation Leadership Development Conference in Washington, D.C., joining the Alpha Epsilon Lambda Graduate School Honor Society, and receiving the Alma Bennett Leadership Award from Omicron Delta Kappa and the Martin Luther King Jr. Excellence in Service Award. Currently, I am working for Kimley-Horn & Associates, Inc. in their Atlanta, GA, office as a traffic analyst. I am very grateful for the support of Tau Beta Pi and the financial assistance provided to me in order to help me reach my goals of becoming a civil engineering professional. Thank you!

Matthew C. Johnson, TX Δ '11
Tau Beta Pi Fellow No. 785

During the past year, I have been working towards my Ph.D. in electrical engineering at Texas A&M University. In addition to taking a full course load and completing the department qualifier exam, I also began research in my focus area of electric machine design and motor drives and coauthored and presented a paper at an IEEE technical conference. Specifically, my work involves the analysis and design of magnetic gears and magnetic gear integrated motors. Magnetic gears accomplish the exact same fundamental task as mechanical gears, scaling up and down the input and output torques and speeds, but they do so without any physical contact between the moving components. Instead of achieving the gearing action by the physical interaction between teeth as mechanical gears do, magnetic gears perform the same function through the modulated interaction between the flux generated by permanent magnets on the input and output rotors. This contactless operation gives magnetic gears several advantages over their traditional counterparts, including reduced maintenance and operating noise as well as increased reliability. These characteristics combine to make this a promising technology for use in a plethora of applications ranging from wind turbines to electric vehicles and modernized electric naval vessels.

I would like to thank Tau Beta Pi for the opportunity it has helped to provide me through this fellowship. Upon completing my Ph.D., I hope to become a professor in the same field so that I can continue to conduct research as well as help teach and develop the next generation of engineers.

Pamela E. Jreij, CA AB '11
Williams Fellow No. 32

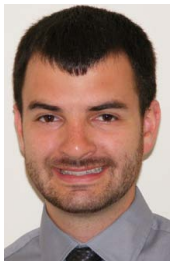
During the 2011-2012 fellowship year, I initiated my doctoral studies in the joint graduate group in bioengineering at UC Berkeley and UCSF. My main focus has been to fulfill major class requirements in addition to undertaking three research rotations. While the classes I have taken shaped my interest in the cellular biomechanics field, the rotations were a great means of exploring various research projects in biomechanics. From clinical to basic science research, my first rotation consisted of a clinical study of subtrochanteric femur fracture through a locked intramedullary nail. During my second rotation, I investigated the dynamics of cell spreading on patterned and non-patterned surfaces. I finally explored, in my third rotation, the effects of compressive forces on the malignancy state of glioblastoma multiforme. The end of my fellowship year was marked by my commitment to my thesis lab.

I have also been involved in multiple mentoring and teaching activities that have been very valuable to my graduate training. As a graduate assistant for an undergraduate summer research program, I had the opportunity to mentor undergraduate students and provide research guidance and advice as they prepare to start their own graduate path. I am very grateful for the financial, academic and professional support that the TBΠ Fellowship has provided.

Andrew J. Komendat, NY Π '11
Stark Fellow No. 34

I'm proud to say Tau Beta Pi played a significant role in the completion of my master's of science degree in mechanical engineering from the Rochester Institute of Technology. In my graduate studies and thesis, I focused on the controls and dynamics of aircraft in flight. My research, in coordination with the incredibly knowledgeable professor Dr. Agamemnon Crassidis, was directed at determination of the center of gravity of an aircraft solely using traditional measurement sensors. Consideration was given to measurement accuracy and noise, common available sensors and locations, and varying vehicle dynamic conditions. The uniqueness of the algorithm developed lies in the removal of dependence on aerodynamic models and steady level flight conditions for center of gravity estimation. The technology stands to provide an improvement to both the commercial and military industries for added safety in aircraft loading conditions, accuracy for model based and autopilot flight control systems, and relaxation of conservative airframe fatigue calculations increasing airframe life.

I've now moved on to apply my knowledge in the engineering field, working for The Boeing Company in Huntington Beach, CA. There I provide controls and other engineering support for underwater vehicles. I'm incredibly grateful for the opportunity Tau Beta Pi provided me through the scholarship program. The society has given me incredibly meaningful career and leadership skills, relationships, and values, and it goes without saying I would not be where I am today without the guidance and generosity of many associated with TBΠ and the Stark family. I look forward to the many adventures and challenges that lie ahead in the engineering field.



Michael D. Krak

Laruen H. Logan

Kelli M. Luginbuhl

Katherine F. Maass

Michael D. Krak, OH I '11
Fife Fellow No. 144

I am currently a Ph.D. student in the mechanical engineering department at The Ohio State University. I joined the Acoustics and Dynamics Laboratory during my first year. The research and education of the lab focuses on machine dynamics, acoustics and vibrations, nonlinear dynamics and signal processing.
The key application of the research is automotive noise, vibration and harshness (NVH) control. My research work has been dedicated to developing controlled experiments that are used to investigate the transient time domain behavior of nonlinear features found in automotive drivetrains. These nonlinear features include clearances, impact damping, hysteretic damping, and multi-stage stiffness.

My course work has been very enjoyable and enlightening. Following my research interests, I have taken courses in linear and nonlinear dynamics, discrete and continuous vibrations, system dynamics, acoustics, and digital signal processing. To fulfill my course requirement, I must complete three more courses. I plan to take two automotive NVH courses and a nonlinear differential equations course. Outside of my course work, I have found that my peers have been very helpful in my education. I have been very fortunate to find a lab that fulfills my interests and offers collaboration with great students.

After my graduate work, I plan to seek a career in the NVH community, though I have not yet decided on a particular application area. I have also considered a career in academia, but that would most likely follow a few years of industry experience.

Lauren H. Logan, OH Δ '10
Centennial Fellow No. 26

During the past two years, I completed an MS degree in ecological sciences and engineering (ESE) at Purdue University. My research focused on wetlands and the connections between hydrology, ecology, policy and public perception. During my first year, I worked with an interdisciplinary team on a book chapter detailing the link between wetlands and food security. I served as first author for this project. I was selected by my department as a senator for the Purdue graduate student government. I also co-chaired the ESE annual symposium, with the 2012 theme focusing on urbanization and attended the Ohio River Basin Consortium for Research and Education Symposium at Ohio University (my alma mater).

Last spring, I presented my work at the Purdue interdisciplinary graduate program spring gala and was chosen to receive an Interdisciplinary Excellence Award. Local middle school kids learned about wetlands when I presented at Purdue's Next Generation Scholars event. I served as a TBP graduate advisor for IN-A and chaired an event entitled Choosing Your Path for grad student appreciation week. I spent my last summer in Lafayette working with K-12 students at Purdue's Women in Engineering led engineering based activities at summer camps. My time at Purdue was rewarding as I gained a better sense of where I want to focus my Ph.D. research and how I wish to combine my skills in engineering, science and policy.

I am now in the energy-water-environment sustainability program at the Univ. of Illinois at Urbana-Champaign in the environmental engineering department. For my research, I plan to focus on power plant water usage/efficiency and its relationship to aquatic ecosystem degradation. I plan to use my work as a tool to discuss changes in energy generation with policy makers at the local and regional scale. My research is funded by the National Science Foundation as well as through 4 prestigious fellowships from UIUC. I am excited to continue interdisciplinary work and my course list already reflects this. My grand goal is to become a university professor; teaching engineering students how to work with and think like scientists to solve energy and sustainability issues. We have to start changing today if we want to experience a better tomorrow.

Kelli M. Luginbuhl, CO Δ '11
Sigma Tau Fellow No. 38

Since being named a Tau Beta Pi Fellow in 2011, I have made significant progress in my research goals at Duke University. I am working to develop and better understand sustained delivery of a peptide drug from subcutaneously injected depots. The long-term vision of this project is to revolutionize treatment and quality of life for type 2 diabetics by engineering a system only needing injected once monthly. The system I am developing exploits an engineered biopolymer with tunable temperature sensitivity based on size and amino acid composition. The soluble injection transitions upon exposure to body temperature, acting to prolong drug release. My abstracts summarizing this work were selected in 2012 and 2013 for podium talks at the annual Biomedical Engineering Society Meetings.

Apart from research, I have been involved in leadership, teaching, and mentoring roles. As an executive member of the Engineering Graduate Student Council, I have organized social events and volunteering days. I was also on a committee developing a new certificate enhancement program designed to expose students to potential career paths. Finally, I have been dedicated to Durham's Women and Math Mentoring program, fostering relationships with 8th grade girls and garnering interest in STEM fields.

Katherine F. Maass, TX A '11
Tau Beta Pi Fellow No. 786

Katie is finishing her second year of the chemical engineering Ph.D. program at the Massachusetts Institute of Technology. She works in the Wittrup lab, which focuses on protein engineering for the discovery and development of biopharmaceuticals.

Katie's thesis project will focus on characterization of design criteria and underlying principles governing Antibody Drug Conjugates (ADCs) as cancer therapeutics. ADCs consist of an antibody which targets antigens characteristic of tumor cells and a cytotoxic drug (often a small molecule) covalently bonded together. The antibody targeting improves toxicity by reducing the effect of treatment on normal, healthy cells. Internalization of the ADC into a tumor cell causes the cleavage of drug from the antibody and then release and action of the cytotoxic drug.
The combined strengths of the antibody targeting and cytotoxicity of the drug make ADCs a promising anti-tumor agent. The initial focus of this project will be to characterize the kinetic principles as ADCs go through the various steps of uptake into the tumor cell in order to develop design principles for optimal ADC design.

In addition to classes and research, Katie has continued volunteering in outreach and mentoring, being involved in student organizations on campus, and has joined the MIT Cycling team and Triathlon team.

Chandra A. Macauley

Joy L. Marsalla

Ehimwenma Nosakhare

Katrin Passlack

Chandra A. Macauley, MT A '11
Tau Beta Pi Fellow No. 787

In September 2011, I joined Professor Carlos Levi's group at the University of California, Santa Barbara (UCSB). Prof.. Levi is recognized as an expert in microstructure evolution of structural materials, and working with him has allowed me to further explore my passion for high temperature materials. Although my transition from my undergraduate studies in chemical engineering to my graduate studies in materials science was challenging, I have thrived in the collaborative environment of the UCSB materials department.

During my year as a TBΠ Fellow I performed high temperature ceramics research, enrolled in several classes, attended the High Temperature Coating Workshop, and completed a 13-week internship in the ceramics engineering laboratory at GE's Global Research Center in Niskayuna, NY.

My research has focused on investigating new, higher-temperature thermal barrier coatings (TBCs), which are the ceramic coatings that enable high operating temperatures in jet engines and power generation turbines. Higher operating temperatures increase the efficiency of gas turbines, which lowers fuel consumption and reduces emissions. There is thus significant incentive to increase the operating temperatures of gas turbines.
However, the most commonly used TBC composition is inherently limited to reach the prospective goals of technology, motivating my research of new compositions with improved capabilities.

I have yet to decide if I will work in industry or academia after earning my degree. Prof. Levi understands the personal and professional development that results from spending at least three months during a Ph.D. program in industry as well as in another academic lab and encourages such experiences. By the time that I earn my doctorate I will have the knowledge and tools I need to make an impact in my chosen field.

Joy L. Marsalla, AZ B '11
Fife Fellow No. 145

Throughout the 2011-2012 academic year, I attended Arizona State University where I completed the final year of my "4+1" master's degree program in environmental engineering. As an undergraduate in ASU's School of Sustainable Engineering and the Built Environment, I completed research in water treatment design, water infrastructure, as well as in sustainability. This academic work and my interest in nature, the environment and sustainable living, inspired me to continue my education in environmental engineering. During my master's studies, I completed courses which focused on water treatment, engineering ethics, and even environmental biotechnology.

I sincerely appreciate the support this fellowship offered to help me complete educational goals as it allowed me to reach for my personal and professional aspirations. Community involvement is very important to me, and throughout my graduate studies, I was able to volunteer my time to local organizations to support math and science education. Teaching children about my passion for engineering and the environment allows them to learn and have fun with a young professional, and teaches me to remain innovative and hopeful for the future.

Professionally, I was able to extend my internship at Intel Corp. from summer 2011 throughout the academic year. At Intel, I worked on many real-world projects where I could analyze air pollutants, review water treatment systems, and apply U.S. environmental regulations.

After graduation in May 2012, I accepted a full-time position, where I have a unique opportunity to support Intel's technology development as well as defining and fulfilling the company's environmental goals. Thank you, Tau Beta Pi, for your dedication and support of my education and those of other future engineers.

Ehimwenma Nosakhare, DC A '11
Tau Beta Pi Fellow No. 788

In September 2011, I became an M.S./Ph.D. student in the department of electrical engineering and computer science at the Massachusetts Institute of Technology (MIT). I initially wanted to focus my research on the design of analog integrated circuits (IC), but after using my first semester to explore the diverse research areas that MIT has to offer, I changed research directions. My current research is in the area of biomedical signal processing and mathematical modeling of physiological systems, primarily the cardiovascular system. I spent my first year learning the required physiology and signal processing background and my first project was on spectral analysis of heart rate variability. The goal of the project was to quantify the modulation of the autonomic nervous system by looking at heart rate time series data extracted from electrocardiograms (ECG). This project evolved into my soon-to-be concluded master's thesis work where I am currently looking at other time series data obtained from the ECG, not just heart rate. My Ph.D. project is going to be an extension of my master's thesis. I will continue to work on developing algorithms that will be able to detect brain injury in pediatric patients by harnessing the wealth of information the ECG provides. The hope is that by adding simple algorithms to current ECG machines, the ECG will become an alternative method of brain injury detection.

This research project has opened me up to interests in the area of medical diagnostics and health care technology especially as it affects developing countries. I look forward to taking global health classes and learning more about healthcare delivery and medical technology. Ultimately, I will like to be at the forefront of making healthcare technology more affordable and readily available to developing countries in Africa.

Katrin Guillen (Passlack), AZ B '11
Fife Fellow No. 146

As a Ph.D. candidate in the Harrison Protein Engineering Lab at the University of Oklahoma, now in her 3rd year, Kat's work focuses on developing protein directed enzyme prodrug therapies (ProDEPT) and improving the applicability of existing systems for the treatment of metastatic prostate and pancreatic cancer.

ProDEPT utilizes targeted fusion proteins containing an enzyme that converts relatively harmless drug precursors to potent anticancer drugs only in the immediate vicinity of the tumor and the tumor vasculature. This approach enables to localized delivery of potent chemotherapeutics without systemic side effects and does not discriminate between primary tumors and their metastases, thereby enabling treatment when surgical resection is no longer an option or high degrees of metastases are present.

So far her work has resulted in two posters as well as a talk at the annual BMES conference as well as a first place poster at Oklahoma's Graduate Student Research Day.

Currently, Kat is working to develop a de novo ProDEPT system that is both more potent and fully human to address any potential immunogenicity

Nathan G.F. Reaver

Teneil K. Ryno

Alexander Salazar

Cynthia R. Sung

encountered during translation to clinic, with the aim of achieving complete tumor regression in immune competent models before graduating in December of 2014.

Kat is married to Jon Guillen, an ME and Air Force pilot, and will seek employment as a staff scientist or pursue engineering outreach full-time depending on where Jon's next assignment takes them.

Being a Tau Beta Pi Fellow has allowed her to excel academically/scientifically by providing the flexibility necessary to pursue a Ph.D. while being an Air Force spouse, and she is very grateful for the opportunity and the support.

Nathan G.F. Reaver, OH Z '11
Fife Fellow No. 147

My year as a Tau Beta Pi Fellow was an eventful one. I have been pursuing my M.S. in bioengineering at the University of Toledo in Toledo, OH. My thesis work consists of developing aptamers for use in SPR biosensors to detect glycated blood proteins. These sensors could be used to improve care for diabetics. Other projects I have worked on in my research lab are molecular imprinted polymers, non-invasive glucose detection methods, and photometric techniques for plasmonic sensors. I will be finishing this work and graduating in August 2013.

I have been involved in other areas besides my lab and thesis work. I helped teach several undergraduate bioengineering lab courses, was a founding member of the UT Student Green Fund on campus, a UT delegate to the Ohio Governor's Energy Summit, and as a member of Building Ohio's Sustainable Energy Future, I worked on developing a harvestable nutrient collector system to economically combat harmful algal blooms in Lake Erie.

At the end of the 2012 academic year, I became an NSF GK-12 Fellow, and worked closely with a Toledo area high school teacher to enrich the science curriculum. We taught scientific concepts through projects involving students in the study of the impact the school's wind turbine has on bird and bat populations, and in the design of a CUBEsat space mission to study algal blooms in the Great Lakes.

I have a wide range of interests and I appreciate ΤΒΠ for supporting my endeavors. My future plans include working on the algal bloom study CUBEsat mission, if it is selected by NASA to be funded, and pursuing a Ph.D. in ecological engineering.

Teneil K. Dollarhide (Ryno), SD A '11
Fife Fellow No. 148

Teneil completed her master's degree in materials science and engineering from South Dakota School of Mines and Technology in May 2012. During her time at SDSM&T, Teneil researched various methods of quantifying the expect life span of lead-free solder systems.

While in college, Teneil was involved with several organizations. She held the office of vice president for Engineers and Scientists Abroad (ESA) and Materials Advantage. ESA was an organization seeking to assist communities in developing nations with engineering challenges, whether the struggles were related to water quality, energy generation, or infrastructure. Materials Advantage was a materials society that encouraged building relationships with younger college students interested in metallurgical/materials engineering and getting students exposed to various specializations within materials science.

She also was heavily involved with Intervarsity Christian Fellowship, which allowed her to volunteer with several non-profit organizations throughout the community. After graduation, she pursued a career in materials engineering specific to corrosion prevention, failure analysis, and risk-based inspection within the petro-chemical industry. She has continued involvement in the ASME national organization, in order to remain aware of developments in technology and to gain knowledge of industrial standards.

Alexander Salazar, NJ Γ '11
Matthews Fellow No. 14

This past year I started my graduate studies at Princeton University. In addition to the Tau Beta Pi Fellowship, I was awarded the Princeton President's Fellowship. During my first year of graduate study, I have taken required course work in structures, mechanics and materials. I have also been an assistant in instruction for courses and I began research for my master's thesis.

My thesis project will focus on a parametric analysis of outrigger systems for tall building design. Outrigger systems have become commonplace in the construction of skyscrapers for the last several decades. This innovation was a revolutionary efficient solution to mitigate undesirable lateral displacements and floor accelerations caused by wind loads on slender and tall structures. Even with a discernible increase in the use of outrigger systems, the specific effects of individual parameters of outrigger systems in the control of wind drift have not been extensively studied in the technical literature. Therefore, my thesis will focus on the effects that three outrigger system parameters have on the reduction of lateral displacement at the top floor of a building structure: effect of belt truss and outrigger location, effect of core design, and effect of perimeter column design.

After I finish my degree next year, I hope to find employment in a structural engineering position that allows me to gain design experience while working towards my professional licensure. I am extremely grateful to Tau Beta Pi for their support!

Cynthia R. Sung, TX Γ '11
Tau Beta Pi Fellow No. 789

I joined the department of electrical engineering and computer science at the Massachusetts Institute of Technology in September 2011 and have since been working towards a master's degree with my advisor, Prof. Daniela Rus.

I have been investigating decentralized task allocation in multi-robot systems, specifically how historical data about where tasks have been located and where vehicles have travelled can be used to generate smarter assignments. We believe that our algorithms will create greater efficiency not only in large robotic systems, but also in human-centric systems such as urban transportation networks and package delivery services. So far, we have developed trajectory clustering algorithms that allow us to compress GPS traces, match people and vehicles according to their movement, and predict what activities people and vehicles are engaged in.

I have also completed the course requirements for an M.S. degree. My future plans include continuing my studies and earning a Ph.D. I am incredibly grateful to Tau Beta Pi for their support.
MIT center for continuous manufacturing, with the goal to develop flexible continuous processes that can replace traditional batch processing in the pharmaceutical industry. While the goal of the center is to apply the technologies developed for pharmaceutical-production, the project I chose was closely related to fundamental understanding of crystal nucleation (the first step in crystallization).

Meredith A. Stella

Raguez Taha

Abigail R. Wooldridge

Xuyang Zhang

The goal of my project is to manufacture functionalized surfaces with nano-scale patterns that can help accelerate crystallization process and allow control of crystal formation. I think it is a very interesting project with great potential in fundamental understanding and practical application. Right now I am spending the majority of my time on mastering experimental techniques and designing my future experiments. I will keep the ΤΒΠ spirit of *integrity and excellence in engineering* close to heart as I progress along my career.

Meredith A. Clarke (Stella), IL B '09
Fife Fellow No. 149

During this past year as a Tau Beta Pi Fellow, I attended the University of Washington in pursuit of my master's degree in structural engineering. My time there has been immensely challenging but also, perhaps, one of the most rewarding academic experiences I've had. I started out taking coursework to better prepare me for employment in the Seattle area. My main focus was to study the effects of earthquake loads on structures and how to better design buildings to withstand these loads, which is a topic of great importance for our city. During the spring quarter, I was appointed a TA position for an entry-level engineering course and found that I truly enjoyed teaching. Since then, I have begun exploring the possibility of pursuing a Ph.D. and a future in academia.

With this goal in mind, I recently started working on research projects in our structural engineering lab. One project explores how steel braced frames designed prior to a major code overhaul in the early '90s perform under earthquake loads. The results of these tests will help determine the best options for seismic retrofit of older buildings. A second project I've helped on looks at the performance of concrete filled steel tubes, a composite structural member that maximizes the inherent benefits of both structural materials. My time working in the lab has given me a greater understanding and appreciation of my field. Whether I decide to pursue a Ph.D. or seek employment upon completion of my master's, I will most definitely value the education I obtained in both the classroom and lab this past year.

Raguez Taha, IL Z '11
Fife Fellow No. 150

I began my graduate career enrolled in a professional master's program in structural engineering at Illinois Institute of Technology. After attending the Structures Congress 2012, I became more interested in pursuing research.

Shortly after the conference, I was approached by my professor about a research opportunity in the area of structural reliability, which I immediately accepted. The research will be an investigation of the correlation between probability and possibility approaches in structural reliability analysis.

I will finish my M.S. in civil engineering in December, after which I will spend some time working in the industry. After gaining some technical experience, I would like to come back to academia to pursue a Ph.D. and eventually become a professor.

Because of the generosity of Tau Beta Pi and constant encouragement from passionate professors, I have been given a great opportunity to continue my education. I hope with the degree I earn, I will be able to make important contributions to the field of structural engineering.

Abigail R. Wooldridge, KY B '11
Fife Fellow No. 152

During the past year Abigail has been attending the University of Louisville in Kentucky to obtain a master's in industrial engineering. Her current research, including her thesis, focuses on developing tools to facilitate the evaluation of physician-nurse teams in primary care clinics.

Working with a research group based in the Center for Ergonomics at the University of Louisville, in collaboration with the Center for Productivity and Quality Improvement at the University of Wisconsin–Madison, a task analysis list and evidence-based simulations have been developed to begin analyzing clinic workflows with the aim of improving patient care and clinic efficiency.

An immediate area of interest is using the simulations to analyze the impact electronic medical records have on physician and nurse workflows. An unusual aspect of this research is that it combines operations research techniques with mixed methods research techniques traditionally based in human factors; this combination, while nonconventional, produces robust research results with interesting implications.

Beginning in June of this year, Abigail will be attending the University of Wisconsin–Madison, pursing a doctoral degree in industrial engineering with a focus on healthcare engineering. She hopes to continue to be involved with research involving primary care for her dissertation, as well as continuing as a collaborator on the extensions of the described, current research project.

Upon completion of her doctorate, she plans to pursue a career as a tenure-track faculty member in an industrial engineering department. She would like to thank ΤΒΠ and its donors for their generous support of her education and research efforts.

Xuyang Zhang, OH B '11
Fife Fellow No. 153

I was studying toward my master's degree in mechanical engineering from the dept. of mechanical engineering at Stanford University during my year of the ΤΒΠ Fellowship. My experience has been very rewarding, and I feel incredibly fortunate to have received a ΤΒΠ Fellowship to help me toward my academic goals.

I joined Micro Structures & Sensors Lab during my first year and my research was in the area of micro electro mechanical systems (MEMS), leveraging silicon microfabrication techniques to create micro-devices that include ultra-stable timing references and high performance sensors. I helped create a temperature and pressure controlled test chambers to perform high accuracy measurement and calibration for capacitive pressure sensors. Additionally, I have gained much more knowledge about the analysis, design, and construction of mechatronic systems. My knowledge of mechantronics has grown exponentially since I start designing and building automation systems, and I found myself fascinated by the process. Therefore, during the next few quarters I started focusing more on mechatronics and automation systems. I start designing small robotic platforms, writing embedded software to control the system, and building fully functional prototypes.

I have just finished my graduate degree requirement and will start working full-time as a product design engineer. I am looking forward to using the knowledge I learned and creating products that people will love.