HUMBOLDT STATE UNIVERSITY

ASCE Student Chapter American Society of Civil Engineers

ERE MESSENGER

Environmental Resources Engineering

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Creating Your Own Consulting Firm:

One Person's Path

by Michael Love, PE (BS ERE 1996)
Principal Engineer, Michael Love & Associates, Inc., Arcata, California

My brothers and I grew up in California's hot, dry, and smoggy Central Valley, and our parents often took us on long trips to the Sierra Nevadas and the Central Coast. We loved these trips, and I enjoyed playing in the streams, engineering small sand or cobble dams, constructing networks of channels, and learning what did and didn't work until ultimately my small dam would fail. Thirty years later, working as an engineer in the field of natural stream and river systems, I continue to appreciate a day playing at a beach-side creek, as these scaled-down systems provide insight into why streams behave as they do.

Michael Love evaluating fish passage in a fish ladder at Steamboat Falls, North Fork Umpqua River, Douglas County, Oregon.

I started at college in 1990, choosing HSU because of the unique natural and social environment and its emphasis on addressing environmental issues. It was an exciting time, with the rallies and protests of Redwood Summer in full swing and a revolution in the way forests and streams were perceived, both socially and scientifically. After my first semester, I discovered the ERE program and its emphasis on watershed hydrology and river hydraulics. Although I was intimidated by the titles of the courses and stories of students struggling with the workload, I began my six year journey through the ERE program. Looking back, it is clear that the program taught me invaluable critical thinking skills and persistence, and gave me an excellent understanding of hydrology and hydraulics, both conceptually and numerically.

While at HSU I chose to take a course in geomorphology with Professor Bud

continued on page 15

IN THIS ISSUE

FROM THE EDITORS

Hello from the Messenger staff! We hope you enjoy this Spring 2015 edition.

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"Nothing is more dangerous than an idea when it is the only one you have"

Emile (Alain) Chartier
Philosopher
1868-1951

Alumni Profiles

Kevin Hansen, PE

BS ERE 1985
Mechanical Engineer
KRH Engineering
Napa, California

During my time in the ERE program (1981-1985) I had no idea that I would take the path of the last 30 years. As a second career launch (initial training: B.S. Biology, UC Davis), I was excited about the prospect of becoming a solar and renewable technology engineer. I did not have a clear lens for how I would play a role in the field, but I knew that my heart was in it, and I loved math and was fascinated with how the physical world works.

I also did not know how challenged I would be to understand and absorb the coursework. By the time I had completed the program, including the grueling senior thesis, I was exhausted. I was hired before finishing school to work for an industrial HVAC consulting firm, whose principal/owner needed support with patent development and setting up a new office computer system. Shortly after finishing at HSU, I began work with the firm as a project engineer and patent application writer. It quickly became clear that I had been extremely well prepared by the ERE program to take on otherwise daunting challenges, and that my good writing skills were essential.

After five years with the consulting firm and completion of my P.E. licensure in Mechanical Engineering, I went to Costa Rica for two months to take a break and study Spanish. During the next three years, I taught classes in AutoCAD and graphic design at a community college, consulted part-time, completed an MBA, and developed proposals with a group of engineers and scientists for environmental remediation projects in Eastern Europe and the Urals. In early 1994, I started my own consulting business, KRH Engineering.

It was fortuitous to have begun working with clients in the late 1980's on compliance issues regarding state and federal environmental regulations. I became immersed in air quality, wastewater management, hazardous materials, and water quality issues. In the last 15 years, my focus has become risk management program development for anhydrous ammonia refrigeration systems.

I am doing work now that involves a solid understanding of the engineering of refrigeration systems. I write extensively, conduct chemical process hazard analyses, develop teams for program development, have flexible hours, command a respectable service rate, and use my skills in a meaningful and comprehensive way.

I will never be able to adequately thank my professors in the ERE program, especially Peter Lehman, Mike Anderson, and Brad Finney, who taught me to rely on first principles and trust the critical thinking skills they instilled. Though it has been a circuitous career route for me, the invaluable engineering studies at HSU laid the essential building blocks for my success. I expect that each ERE graduate will have a similar realization at some point after graduation that, yes, the ERE program was a very good choice.

Alumni Profiles

Andy Sorter, PE

BS ERE 2004
Principal Engineer
OurEvolution Energy & Engineering
Arcata, California

As an Arcata native, I attended local schools and was blessed with having Tom Allen as my math teacher at Jacoby Creek Elementary. He inspired me by instilling a "can do" approach to math, and his lessons on breaking complicated problems into simpler steps gave me the solid foundation in problem solving that is required by engineers. That said, as a 29-year-old father of two small children when I entered HSU in 1999, it had been a long time since I had taken a math class, so I began with pre-calculus. After a year of getting back into school mode, I was able, albeit with some apprehension, to enter Sci D.

One thing that I often share with professional associates is that I am so pleased and honored to have gone to Humboldt State. Small, intimate classes with direct access to world-class engineering professors that knew me by name is rare in undergraduate education, and I still benefit from these relationships. I remember fondly bringing my toddlers into water quality and thermodynamics labs when we could not find or afford childcare. The understanding that my professors had was amazing. It made me want to work my hardest to show my appreciation. Upon graduation, I was asked what lessons I would impart to students still in the program. Without a doubt, I can still say: get to know your professors, go to office hours, find something about every class that fascinates you, do your homework, and ask as many questions as you have. I found that the program supports and embraces that kind of student.

While attending HSU, I was one of the fortunate undergraduates to land a job at the Schatz Energy Research Center (SERC). While at SERC, Richard Engel (BS ERE 1988) was my direct supervisor for the University-National Park Energy Partnership Program. Richard encouraged my team of two undergraduates to not only look at renewable energy, but to develop an understanding of the overall building energy performance, in order to target the most appropriate technologies to recommend. This was my initial exposure to energy auditing and the huge opportunities that energy efficiency has to offer in residential and commercial buildings. Ultimately, we developed and installed a solar water heating system and targeted energy efficiency improvements for the Redwood Information Center in Orick.

After graduation, I left SERC for a more traditional engineering job, with my sights set on a professional engineer's stamp. I spent a year at SHN Engineers and Geologists, where I completed a large wastewater flow study for the City of Eureka. After the year in Eureka, we moved to Seattle. Thanks in large part to Professor Emertus Bob Gearheart, I was able to land a job at Ridolfi, Inc., a wonderful firm of environmental engineers and scientists. Ridolfi's main clients consist of Native American tribes in the Pacific Northwest and Alaska. During my three years at Ridolfi, I was involved in environmental cleanups at former military bases on Tribal lands in Alaska, Washington, Oregon, Idaho and California, as well as fish habitat restoration and monitoring projects at sites along the shores of Puget Sound. Ridolfi also kept my passion for energy alive by allowing me to work on Strategic Energy Plans for many of our Tribal clients.

In 2008 my family decided it was time to return home to Humboldt, and I was fortunate to land at Winzler and Kelly (now GHD), home to many of the best and brightest ERE grads that I was humbled to work with. After a year with W&K and finally obtaining my PE license, I decided to branch out on my own and fully embrace my passion for energy by founding OurEvolution Energy & Engineering.

Now, in its sixth year, OurEvolution is a firm that specializes in conducting energy assessments, and energy efficiency and renewable energy design for large commercial facilities. We also offer more traditional civil engineering work, including stormwater and solid waste management, site development and water/wastewater. Our clients include Native American governments, U.S. Forest Service, National Parks, local schools and municipalities, and private businesses. We are currently working on projects at Gist Hall and Founders Hall on the HSU campus, with our good friends and fellow ERE alumni at kW Engineering.

I have been very fortunate with the people I met through school and in the professional workplace. These relationships are key to my success and the enjoyment that I have in my work. I often tell clients that I may not have the skill to develop a trip to Mars on my own, but given enough time I can put together a team that can! This is not an overstatement. Try lots of things, find something that you're passionate about, and don't look back.

Alumni Profiles

Charles Roecklein, PE

BS ERE 1981
City Engineer
Eureka, California

"Forks in the road." We all reach them. The paths we choose become the background of our lives. Back in the late 70's I decided to leave the work-a-day pathway and head back to college. That fork was an easy choice, and Humboldt State was the place for me, with its green forests, wild rivers and the Natural Resources (NR) program. But NR was impacted back then, so I needed to choose another major for admittance. Hey, this Environmental Resources Engineering major would be close to NR from a science perspective, right? And, once I was admitted and enrolled in classes, I could easily switch back to NR anytime. Four years later, I graduated with an ERE degree, and the pathway back to NR was never travelled or even seriously considered.

Like many HSU grads, I wanted to stay in the area and start my career. That was one path. The other was the opportunity I had to move to Portland and start a job with the federal government. After several fruitless months of searching locally I was all set to move north. Then, an offer to start with a Eureka consulting firm showed up at the last minute. I decided to stay and work in the private sector, and that was really a double fork in the road—geographic area and work sector (private vs public)—that has shaped my career and experience as an engineer.

Consulting engineering is one of those white-collar industries that brings significant economic benefit to the local area through export of services to the outside, and it serves the needs in the local market. It creates good jobs, allowing professionals to stay in the area to pursue their careers and to set roots. Much of the technical and engineering workforce in our area has been supplied by HSU and ERE, with a significant positive impact.

My engineering teeth were cut with a Eureka-based firm where seasoned engineering mentors showed me how to apply the educational skills we developed as ERE students. The workload was largely related to water resource development and wastewater treatment and disposal. The training and experience helped me obtain my PE license in California. Those early years also taught me the importance of client service.

By the time another fork in the road presented itself in the form of an opportunity with a larger Eureka-based consulting firm, I was managing my own projects, interacting with clients and regulatory agencies, and preparing proposals. The larger firm offered more variety and larger projects, most related to water and wastewater. It was during this tenure that I had the good fortune to manage a team that planned, designed, and oversaw construction of a new wastewater treatment plant from the ground up. It was more typical to work on upgrades to existing plants.

Another fork came in the form of a third Eureka-based consulting firm. Yes, more water and wastewater, but also an industrial project: the new PG&E power plant in King Salmon. This was by far the largest single project I have been involved with, and it gave me a chance to branch into something a little different.

My most recent career fork appeared a couple of years ago; an opportunity to work in the public sector with the City of Eureka. Remember that fork after graduation to the private sector? Now, I had a second chance to serve the public and experience the different aspects of working as an engineer that were offered by the public sectors. The differences are many, but for me, the most significant is that representatives of the city are "owners" of the engineered products that are designed and constructed with city funds, and city employees continue to operate and maintain the infrastructure after construction is complete. That is not a typical role in the private sector.

ERE students, I wish you every good fortune as you travel along your road and its forks. Make the best of the opportunities that come along, and enjoy a rewarding career. I thoroughly enjoyed my experience in the ERE Program. It was extremely rewarding and challenging at the same time. I always felt like there was a family of like-minded students and caring faculty to help along the way. Ω

"All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident."

Arthur Schopenhauer
Philosopher
(1788-1860)

Engineers Without Borders:

Enhancing Your Personal and Professional Life

by Brett Vivyan (BS ERE 2011)
Staff Engineer, GHD, Eureka, California
President, EWB North Coast Professional Chapter
http://www.ewb-usa.org

There is no shortage of volunteer opportunities that present themselves on campus, at work, and in your community. You can choose to get involved and give back in a myriad of ways. As an engineer, you have the opportunity to design and build the systems and infrastructure that society uses every day to be safe, healthy, and productive. However, between work and your personal life, spare time doesn't always come easy. You must be selective in how you choose to allocate your time outside of work and play.

I was asked to join Engineers Without Borders (EWB) by a friend of mine. I was looking for a way to donate time and professional skills to a good cause, so EWB appealed to me. I wanted to help improve people's lives and see places I'd never seen before. Friends, co-workers, and peers were involved in the organization, so I decided to give it a try and see what would happen. What I didn't anticipate is how much knowledge and experience I would gain through my involvement.

This is the second in a series of five articles about the student clubs associated with ERE.

Up next: RESU

Internat'l and Domestic Programs

EWB members regularly collaborate with international and domestic community partners to design and build sustainable engineering projects.

Members of the HSU Student and North Coast Professional EWB Chapters in Campoapa, Nicaragua to assess various water projects.

These projects provide students and professionals with the opportunity to see the common everyday challenges that communities experience around the world. I always appreciate seeing the ingenuity and level of effort it takes to operate and maintain systems that we take for granted in our own community.

I love to travel. Whether it's down the street to a place I've never been or across unfamiliar continents and landscapes, there's a great deal of personal growth that comes from being a stranger in a strange land. EWB provides members with the opportunity to connect with people and places around the world, promoting a mutually enriching experience for the project team and host community.

Through EWB, local professional and student chapter members have visited sites throughout Humboldt County and internationally to discuss, evaluate, and design solutions to problems involving a lack of water access and distribution, water quality, and sanitary facilities. Solutions varying in complexity and cost have been developed to provide the most appropriate solution for the community.

Partnerships

EWB programs are five year partnerships between the community and the EWB chapter. Members are able to develop lasting professional relationships and friendships with community members and other professionals. Host families often share their homes with EWB members travelling abroad, and professionals share their insight into

continued on page 7

Brazilian Student Experience at HSU

by Ellen Aparecida Nascimento Molina, Senior Student
Environmental and Urban Engineering, Universidade Federal do ABC
São Paulo, Brazil

I am an international student from Brazil in an exchange program called the Brazil Scientific Mobility Program (BSMP). This program provides scholarships to undergraduate students who study at universities in the United States. This initiative is administered by the Institute of International Education (IIE) and is sponsored by the CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), an educational organization in Brazil. The IIE is also the organization that decides where in the U.S. a Brazilian student will study.

Currently, there are about 60 Brazilians studying their majors at HSU. In addition to engineering, which represents around 50% of the total Brazilian population here, oceanography, biology and forestry are also studied. We're the first group of Brazilians studying at HSU under this program. We come from different regions of Brazil and have very different backgrounds. BSMP will continue to send students to the USA, and HSU, over the next few years.

I'm from São Paulo, the biggest city in Brazil. It has a population of about 11 million, and work and play go 24/7. So, you can imagine my shock when I first arrived in Arcata. Beyond the cultural differences and norms, living in a small city was completely new to me. I was used to a chaotic atmosphere where the crowd and noise stimulated me. I went from a warm black and white city with more buildings than the eye could see to a brisk landscape bursting with color.

When I arrived at HSU in March of 2014, I barely spoke English, and I spent five months learning it at the HSU International English Language Institute. Since my first day here, learning the language has been my biggest challenge. Communication is essential, and it's frustrating when you're not able to express your ideas! I started taking classes in my major, engineering, here last fall. This Spring 2015 semester is my second and, unfortunately, my last at HSU. If I were in Brazil, I would have already graduated. However, this exchange program was my life dream, and I was sure that studying abroad would be worth my time.

In Brazil, my major is Urban and Environmental Engineering, which in the U.S. is more similar to civil engineering. I was hoping to work with that focus before coming here. When I first looked at the classes offered here I was kind of disappointed because I had already taken all the mandatory engineering classes. There appeared to be no classes that would add to my learning. How wrong I was!

At HSU I have had classes with inspiring professors who have changed my mind completely. The professors in Brazil don't have the same contact and concern with their students as here. I've had so many challenges that have helped me learn and apply my skills in real projects, with total support from my professors. The design classes here are just what I need to improve and secure my knowledge. Although communication keeps being a problem, I have total support from my professors and colleagues. The students here are friendly and welcoming, too, and they are always open to help and work together. Also, the cozy atmosphere, the security, the clean air, and the contact with nature in Humboldt County helped me to quickly adapt in this completely different place. Studying here has offered me new activities and interests for both my personal and professional life. I have met new people from different backgrounds that I'm sure will be lifelong friends. There has been no better place to study than here.

The teaching methodology here is very different from what I was used to in

Ellen Aparecido constructing trails in Treatment Wetland 1 at the Arcata Wastewater Treatment Plant to gain access for data collection.

Brazil. Here, Brazilian students often complain about the amount of homework we have at U.S. universities. In Brazil, the usual evaluation method is based on two big tests during the semester. Even in senior classes, projects and homework don't have much impact on our grades. The teaching methodology here forces us to learn in a distinctly new way. In the beginning it was a shock for us, but applying our knowledge every day has changed our minds about this approach to learning.

In addition to academic quality, another positive point about studying at HSU is the great physical infrastructure. The students here are encouraged to develop their skills through access to labs and technologies. In Brazil, we don't have free access. Although stepping outside of my comfort zone was not easy, nothing would likely help me grow and learn more than this opportunity.

Here at HSU I am enriching my technical knowledge and personal life in many different ways, and widening my horizons. The opportunity to live and study abroad has opened my mind to new experiences and possibilities. I have discovered myself by increasing my understanding of a new culture. In my country I thought I knew what I'd like to do for work and where I wanted to live. Here, my mind has opened to a variety of new possibilities and pathways.

This semester, beyond taking great classes, I'm doing a project with ERE Professors Bob Gearheart and Eileen Cashman at the Arcata Marsh that is related to vegetation management in the Treatment Wetland. This represents a completely new and exciting experience of field work. I'm also looking for an internship in the U.S. to gain more experience.

I will return to Brazil after my internship in August, and complete my engineering degree in Fall 2015. After this rewarding experience, I encourage everyone to study abroad. The benefits are immeasurable, and I am sure they will last be forever. Ω

Engineers Without Bourders

Continued from page 5

solving everyday problems. Invitations to community events and inclusion of the community in EWB fundraisers further enhance a lasting partnership.

Members connect via conference calls with the community as projects move through the design process and implementation. Community members often attend EWB meetings to share additional information and needs for the projects. Students and professionals are often invited to help with simple construction and landscaping projects within the community as needed.

Community-Driven Development

The EWB model uses a community-driven approach. Community members identify a problem or need for a project, and EWB works with them to assess the problem. Community and EWB members work together to develop alternatives, design and implement solutions, and monitor the success of the project. The goal of EWB projects is to provide the community with lasting solutions that can be operated, maintained, and owned by the community. It's often easy to simply charge ahead with your project, blind to the long-term goals and vision of the community. Regular collaboration with, and input from, the community provide EWB members with a better understanding of the community's priorities, and helps the project team implement what is best for the community.

Professional Development

In my daily work, there is a core group of people I generally work with on projects. We pursue projects that fit within our areas of expertise and services provided by our employers. The initiation of an EWB community program requires us to reach out across departments and employers to assemble a project team. Our project teams have included engineering students, professionals and retirees with expertise in water, wastewater, structural, and electrical engineering.

The project team structure allows members to take advantage of roles and opportunities not usually presented to them. The EWB process allows leaders to emerge to manage and execute the development of technical documents, give presentations, communicate with the national organization, coordinate with the community, organize fundraisers, apply for grants, and more.

EWB provides an extensive technical resource library of documents and webinars on their website that provide insight into appropriate technology. Support is provided to chapters through regular phone calls to communicate updates from the national organization and provide an opportunity for chapters in the region to share and discuss current projects and efforts.

Networking

Student and professional chapters across the United States have several opportunities to meet throughout the year at national and regional conferences, as well as local mixers. These events give members the opportunity to collaborate, network, and share best practices. Our chapter has been fortunate to send members abroad with other project teams to assist with language interpretation and technical expertise, share fundraising ideas, present travel and design experiences, and explore teaming opportunities for future projects.

My involvement in EWB has helped to enrich my personal and professional life. Visiting and connecting with neighboring communities has been a highlight of my experience. The staff and community members have been inspiring with their ingenuity and drive to solve problems in systems that I took for granted. Being active in EWB has allowed me to accept new roles and explore new skill sets in management, fundraising, grant writing, and public speaking. My experience in EWB has supported my growth as an individual and as a professional in the engineering field. Ω

Zen and the Art of Engineering

. . . in other words, find a balance

by Terrence K. Williams Jr. (BS ERE 2004)
ERE Lecturer, and
Consultant, Efficient Drivetrains Inc.

I am dad; I am a motorcycle enthusiast; I am a mechanic; I am an engineer; I am a teacher; and I am a student. Two of my best teachers have been alive for fewer than 3000 days; obviously, I'm talking about my kids. If you ask them about me, they will tell you I'm a ninja, or that I conquer universes in my spare time. It's really nice to be somebody's hero; it's also kind of overwhelming at times.

I was a student in the Philosophy and Fine Arts programs at HSU when I decided to take Calculus I in summer school. I was of the opinion that anything worth doing was worth doing right, so I took Calculus for Physics and Engineering for the rigor. That experience completely changed my life. I hadn't been bored in my classes before taking calculus (there was always plenty to do), but neither was I particularly challenged. One day of class during the summer session was the equivalent of a week of lectures, replete with a week's worth of homework due at 8am the following day. If that weren't challenging enough, add Jeff Haag to the mix! The following fall I went to talk with ERE's Mike Anderson, and I changed my major to engineering. I used to tell people that it was the only major offered at HSU that contained the word engine (remember: I'm a mechanic).

After graduating from HSU in 2004, and fast forwarding a few more years than I'd like to admit, I earned an M.S. in Mechanical and Aerospace Engineering at UC Davis. I also joined with some of my cohorts and our advising professor to form a hybrid vehicle development firm, Efficient Drivetrains Inc. (EDI) (http://www.efficientdrivetrains.com/). We had an incredibly dynamic business leader who was the former CEO of SanDisk; a legal team that presided over thousands of patents collectively; and a patent portfolio that contained technology for hybrid vehicles, transmissions, control systems, and engines (remember why I was an engineering student in the first place). My name is listed on a few of those patents. We were a technology startup with business roots in the Silicon Valley, and I was the Engineer in charge of research and development. In other words, I was doing automotive research engineering. I had made it!

Working for a startup is more work than you can ever imagine. Your title may be Director of Research and Development, but you still have to design the parts, the electronics, and the software; you still have to machine the parts and weld, bolt, or solder them together; you still have to write the proposals, visit the clients, and give the presentations; you still have to sweep the floor and take out the trash. You may be the only employee in your department, so everything is your job. We had a lot of really great projects between 2005 and 2009, and just as I was the first employee, I was also the last (for a while).

I was in need of a paycheck (remember: I'm a dad), and I went to work for NORCHEM Corp, a wastewater product company in Los Angeles doing mechanical, electrical, and software design and integration. My skills were being utilized, but my heart wasn't in it. I need to have work that I love, or live in a place that I love, and NORCHEM and Los Angeles were neither of these. So, I began pounding the proverbial pavement (internet), and I landed a job at Winzler and Kelley (now GHD) in Eureka. It may not have been automotive development, but it was engineering, and I love Humboldt County! Winzler and Kelley had fewer than 400 employees, which seemed big to me, but they had small company ethics. The founder worked in an office down the hall from me and the CEO took me out to lunch when he came to town.

Continued on page 11

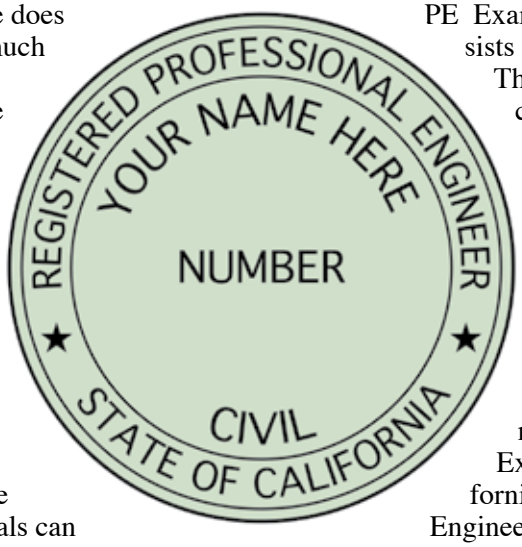
Number 77 land speed racing motorcycle on the Bonneville salt in 2013 after a rainstorm. Owner: John Yeats; Sponsors: S&S Cycles Inc. and others.

Civil Engineering Licensure in California

An Overview

by Tyler Duncan (BS ERE 2010)
Project Engineer, GHD, Eureka, California

The Professional Engineering Exam (PE Exam) is the last step to becoming licensed as a Professional Engineer. There are many benefits to becoming a licensed PE. While the type of work an employee does may not change much after becoming licensed, licensure means that the State has given you the authority to stamp and sign engineering documents to certify that they have been reviewed by a qualified engineer and are ready for construction. Once licensed, individuals can act on their own authority to certify engineering documents, and they can also open their own consulting engineering practice. Only licensed engineers are allowed to use certain titles, such as "Civil Engineer," "Mechanical Engineer," and "Consulting Engineer." Licensure also often comes with a substantial pay raise in both the private and public sectors.



California offers twelve engineering license types, including Civil, Mechanical, Electrical, and Chemical. Nearly all ERE students go into the ERE program to become "Environmental Engineers," but California does not offer licensure in this field. Most ERE graduates have chosen licensure in Civil Engineering, although a few with renewable energy backgrounds have chosen Mechanical Engineering. The remainder of this article focuses on California licensure in Civil Engineering, and in particular, on the last step to becoming a licensed Civil Engineer, which is to pass the Civil PE Exam.

What is referred to as the "Civil PE Exam" actually consists of four exams: The National Council of Examiners for Engineering and Surveying (NCEES) National Exam, California Civil Seismic Principles Exam, California Civil Engineering Surveying Exam, and California Professional Engineers State Laws and Board Rules Exam.

To take the PE Exam, applicants must meet several eligibility requirements. There are different ways to become eligible, but the following is the route most ERE students would likely take. Graduation from the ERE program will meet one of the requirements: completion of a four-year accredited engineering program. The second requirement is that you have passed the Fundamentals of Engineering (FE) Exam, and the third is that you have worked full-time for a minimum of two years under a licensed professional engineer. Eligible work experience time starts after graduation, so work while in school won't count.

Once you have met the three requirements, you must complete and submit the application package, which consists of the following five items:

1. A sealed transcript from the university where you earned your degree.
2. A minimum of four letters of recommendation from licensed professional engineers you have worked under, with each letter signed and sealed with the professional engineer's stamp.
3. A check to pay for registration fees.
4. Two self-addressed, stamped post cards which will be sent when the application is received and when the application is accepted (optional, but recommended).
5. A completed State Laws and Board Rules Exam.

These exams are expensive, so save up your money before applying! Currently, registration for all exams is $450, plus examination fees are $350 for the NCEES National Exam, and $60 each for the Seismic and Survey exams. This makes a grand total of $920. Fortunately, employers are often willing to reimburse some or all of these fees.

The State Laws and Board Rules Exam is a take-home exam which can be downloaded from the Board for Professional Engineers and Land Surveyors website, and is typically completed and submitted with the PE Exam application. This exam has 25 questions, and as the name suggests, is focused on state laws and board rules, and includes some engineering ethics questions as well. All information needed to pass this exam can be found on the State Board website.

The NCEES National Exam must be taken at a designated state exam location. It is similar in structure to the NCEES Fundamentals of Engineering (FE) Exam. The first section, known as the "breadth section," is four hours long and covers a wide range of engineering principles, including several that most ERE students have likely not encountered, such as required vehicular stopping distances and vertical curve calculations. The second section, known as the "depth section,"

continued on page 14

Grad School or a Job ?

After ERE, What's Next ?

by Simeon Haynes (BS ERE 2014)
Air Resources Technician, California Air Resources Board, Sacramento, CA

Some people told me I should get work experience after graduating from HSU, while others said I should keep going and get a Master's Degree. I said, why not do both? So, in the Fall of 2013 I made a list of graduate schools, with my main criteria being that it had to be in California (so I could be near friends and family), it had to have an Environmental Engineering Master's program with a Wastewater emphasis, and it had to be in or around an area that has engineering job opportunities (preferably with a government agency).

It came down to CSU-Sacramento and CSU-Long Beach. My ERE professors encouraged me to visit the two schools before applying, and I set that up during Thanksgiving Break of 2013. Even though CSU-Long Beach is only a few miles from my parents' house, CSU-Sacramento (CSUS) was a better fit for me, especially because I really liked the professors. In addition, CSUS is very affordable, it is geared toward working engineering students (with classes at 7:30 AM and 6 PM), it is oriented more toward teaching and working rather than research (what I was looking for), there are no labs for the classes, and many of the exams are take-home. Finally, Sacramento has a downtown "in city" feel, but I can be in the foothills of the Sierras in 30 minutes.

Now I had a school, but I still needed a job. Thankfully, Sacramento is the government-agency hub of California, plus there are many consulting firms in the area. I spent winter break of 2013 and much of the Spring of 2014 looking for jobs there. Some of the resources I used to help find a job include the HSU Career Center, CSUS professors, and basic internet searches. I landed a summer job with the Office of Water Programs at CSUS doing research-based work, but I was still not satisfied, so I kept looking.

A few weeks later I saw an ad for a position with the California Air Resources Board (CARB) in their Zero Emissions Vehicle (ZEV) Department. I had previous experience as a summer intern doing air quality work in Colorado, and my favorite hobby was working on cars. In addition, the position was part-time (30 hours per week), and they would support me being a part-time graduate student. I emailed the person in charge of the hiring process and asked questions about the position. All of my questions were answered, and I applied.

A week after graduating from HSU I got a phone call from CARB asking if I could come to their Sacramento headquarters for an interview. I agreed, but before the interview I researched CARB and the ZEV department, and brushed up on my air quality facts. After the interview, I hopped on the road and started to drive back to L.A. On the way down I got a call from my future boss saying I was one of the top candidates, and they offered me a position as an Air Resources Technician, and I happily accepted. My job hunt was done!

During my first semester, in addition to working 30-33 hours per week, I took courses at CSUS in Wastewater Treatment and Probability and Statistics. Work was easier than graduate school, and graduate school courses were easier than ERE courses. The ERE program did an outstanding job of preparing me for the challenges of work and graduate school.

My job is more like fun than "work." Initially, I spent a lot of my time learning about all the ZEVs on the market and all the ZEV regulations and incentives programs, working with other engineers on projects, and learning how electric and hydrogen fuel cell cars work and how the recharging/refueling process is performed. In ad-

Simeon Haynes preparing to recharge a BMW I3 Battery Electric Vehicle.

dition to having the opportunity to test drive new ZEVs like the Kia Soul EV and Toyota fuel cell, I also get to test ride electric motorcycles!

There is a bit of satisfaction in knowing at the end of the day that I am helping to clean up California's air by getting more clean cars on the roads. I did have the opportunity to apply for their full time engineering position working 40 hours per week, but I found working 30 hours per week with six units of graduate engineering class is a good balance for me. This schedule gives me great flexibility and free time on the weekends to enjoy beautiful motorcycle rides in the hills.

Since I am going to school part time, I plan on finishing my MS degree in 2.5 years. After that, I will either take a full-time engineering position here in Sacramento, or transfer to CARB's El Monte office. There is a push to generate hydrogen-refueling gas from renewable sources, such as the biogas from an anaerobic digester at a wastewater treatment plant. Since I will have a Master's Degree specializing in Wastewater Engineering, plus almost three years of work experience with hydrogen infrastructure and cars, I would love to work in that field. I also plan on obtaining my PE license.

My advice to ERE students is to be completely open-minded! You never know where you are going to end up, so let your education and interest guide you. Based on my own experience, I offer the following suggestions to ERE students and graduates: do not be afraid to talk to people, learn as much as you can (more education rarely closes opportunities), get your EIT, know Microsoft Office like the back of your hand, and dress professionally. Also, while you are an undergraduate, get as many different types of internships as you can so you will be able to apply for different types of jobs. The internship I had dealing with air quality in Colorado really helped me get this job with CARB, and now that I am at CARB, it is easy to navigate to different departments and locations within the agency.

Finally, thank you to my ERE professors! Many of my ERE peers and I agree that you do an outstanding job preparing us for the real world. Ω

Zen and the Art of Engineering
Continued from page 8

Winzler and Kelley merged with GHD, a multinational corporation with more than 10,000 employees, and the primary business center is in Australia. Needless to say, the CEO didn't even know I existed. There is nothing wrong with corporate engineering, but it's not for me. So, when the opportunity arose for me to leave the company, I jumped.

Fortunately for me, EDI's business and legal teams had kept at it after closing in 2009, and they ultimately won a legal battle with Toyota over their hybrid drive system. This resulted in an out-of-court settlement in favor of EDI that provided them with the capital to restart research and development projects, apply for new patents, and re-hire an engineering staff. As a result, they retained me as a consultant.

At the same time, I received a message from ERE's Eileen Cashman saying that the ERE department had classes that needed teaching while some faculty went on sabbatical. One of my early engineering dreams was to teach in the ERE department, and one of the reasons I went to grad school was to make that option open to me. So, I took Eileen up on her offer and started teaching Computational Methods I.

Teaching at HSU is a wonderfully rewarding experience, especially teaching new engineering students. They are full of energy and ideas, have passion and wide-open minds, and aren't jaded from years of working in the trenches. They chose engineering, so most of them are motivated.

Teaching FORTRAN and linear algebra is interesting. I am really good at both FORTRAN and linear algebra, and I've used both extensively in my career. For example, right after I graduated from HSU I worked for NOAA at Woodley Island for a while. We developed a forecasting tool that indicates the sea-state at the Humboldt Bay Harbor Entrance (http://www.wrh.noaa.gov/eka/swan/). A lot of that work was done in FORTRAN, and the product is still available for public consumption.

But teaching at HSU isn't all I do. I've had a passion for automotive technology since I can remember, and vehicles of the two-wheeled variety have always held a place very close to my heart. In my 'spare time' I build custom motorcycles. One of these is a purpose-built motorcycle for land speed racing, and we race every fall on the Bonneville Salt Flats. Land speed racing isn't purely a hobby, because it has led to some other very interesting projects, but in and of itself it doesn't pay my bills.

I wear several hats for the race team. Engine configuration optimization, transmission specialist, electronic fuel injection, and control system specialist are some of the roles I've filled. Our motorcycle has been clocked at over 200 mph, and this fall we expect to set a new land speed record for our class (3000-APS-PG). The "3000" means that our engine is larger than 2000 cc and smaller than 3000 cc. "APS" indicates that the motorcycle is a purpose-built machine that is partially streamlined. "PG" refers to the engine and the fuel, in our case pushrod gasoline.

Engineering means something different to everybody. I'm an environmentalist and I am passionate about automotive technology. You have to do what you love and strike a balance. Whatever you do, do it the best that you are able. Ω

ERE Design Electives
How Do You Choose?

by Heidi Otten, ERE Junior and ERE Messenger Student Editor

The ERE Program requires students to take three engineering design electives. These courses must be selected from the sixteen courses listed in Table 1. See the HSU Catalog for course descriptions and prerequisites.

Typically, four design electives covering a range of topics are offered each semester. Which design elective will be offered depends on student demand, when the course was last offered, and the availability of qualified instructors. For example, ENGR 434 has not been offered since 2009 because of a lack of qualified faculty.

Below is the basic plan we try to follow (no guarantees) for offering design electives if we have qualified instructors.

• Offer ENGR 451 every semester.

• Offer either ENGR 418 or ENGR 448 at least once each year. Students should NOT take both courses, but rather pick one of the two.

• Offer one energy design elective every semester. These courses rotate: ENGR 471, ENGR 473, ENGR 475, and ENGR 477.

• Offer each of the following seven courses once every two years: ENGR 421, ENGR 434, ENGR 435, ENGR 441, ENGR 443, ENGR 445, and ENGR 455.

New design elective topics are offered as ENGR 481 until we can assign a more permanent number. We also use this number when a visiting faculty member teaches a special topic.

We offer ENGR 498 for students who want to work independently on a project under the direction of a willing and available ERE faculty member. Permission of the instructor is required.

Below, advice about choosing your three ERE design electives is offered by two senior engineers with the authority to hire, two recent ERE graduates, and two ERE faculty members.

Tracie Billington, PE
BS ERE 1985
Chief, Financial Assistance Branch
Department of Water Resources
Div of Integrated Regional Water Mgt
Sacramento, CA

When applying for a position, having classes relevant to that position, and being able to show that you possess the required knowledge, skills, and abilities (KSAs) for the position are relevant to the hiring decision. A breadth of experience may broaden your ability to be hired for a position that is more general in nature, but may hamper your ability to demonstrate the KSAs for a specialized position. That said, you should look at education as the beginning of a career path that could last 30+ years, so your selection of any particular course may not be critical to your overall career.

One specific topic or a single course or project would generally not drive a hiring decision. I recommend that students base their decision primarily on their own interest, but also be realistic regarding which paths might be hiring in the near future and in the location where they wish to settle.

Steven Allen, PE
BS ERE 1996
Principal Engineer
GHD
Eureka, CA

I have had the pleasure of working with many ERE graduates, and I've seen them take on many different types of jobs. That diversity in professional options is one of the things that drew me to the program.

Table 1. ERE Design Electives

Number	Name
418	Applied Hydraulics
421	Advanced Numerical Methods
434	Air Quality Management
435	Solid Waste Management
441	Hydrology II
443	Groundwater Systems
445	Water Resources Planning and Management
448	River Hydraulics
451	Water and Wastewater Treatment
455	Engineered Natural Treatment Systems
471	Thermodynamics and Energy Systems II
473	Building Energy Analysis
475	Renewable Energy Power Systems
477	Solar Thermal Engineering
481	Special Topics with Engineering Design
498	Directed Design Project

As part of my management duties, I participate in the interview and hiring process. Sometimes specific design electives are discussed, but they are generally not the focus of the interview or final hiring decision. The design electives are a part of the overall story of an individual. If the job opening were very specific to a segment of engineering where the student had taken a lot of design electives, then that would be more important. Generally, it is more important for a student to be engaged in school and life than to take a particular class or two. Follow your passion with regard to the types of design electives, clubs, and community activities you get involved in. As a potential employer, my firm is interested in smart, passionate, dependable people who are good communicators. The ERE program offers a lot of great classes, and what you get out of them depends on how you engage in them.

Brenda Howell
BS ERE 2011
Staff Engineer
SHN Engineers & Geologists
Eureka, CA

I think employers do look at design electives, and you will definitely want to put the projects from those classes on your resume. Employers are interested in the skills you gain in those classes, but they also want to know where your interests lie. Your choice of electives and projects should demonstrate both. When I was hired for my current position, my supervisor said the design electives I took did make a difference. My design electives correlated well with the work done at SHN.

Since many employers focus on one area, I recommend choosing classes specific to one area of interest. More important than the specific classes you chose, however, are the critical thinking and writing skills you gain from all your classes. Of all the graduates I know, no two of us do the same work (not even those in the same office). Wherever you end up, you will need to research technical documents, solve unfamiliar problems, and continue learning.

Zack Chandler
BS ERE 2012, MS ES-ERE 2013
Water Resource Control Engineer
Regional Water Quality Control Board, Central Valley Region 5(R)I
Redding, CA
(With input from Elizabeth Johnson and Jessica Chandler)

Having a background in a specific discipline or several related disciplines (e.g. wastewater and groundwater) is helpful when applying for a job in a specialized occupation. However, there are plenty of job opportunities available for someone that has an interest in a variety of design electives. Even if you are not qualified for an advertised position, many companies or agencies will train a prospective employee who is willing to adapt to a particular position.

Each class has value in the workplace, but that value really depends on your final profession. Some useful work skills I learned at HSU are writing for a technical audience and expanding my ability to independently educate myself. Most of the ERE courses with design content provided me with good exposure to the design process and client interaction, which are useful in my everyday communications with individuals. My performance in the workplace was strengthened by being able to identify terms used in the design electives, and being able to determine engineering-based approaches to problems.

It is more beneficial to take classes that are personally interesting than to take classes solely to focus on a particular discipline. While at HSU I completed three design electives and was able to expand my skill set in several areas based on my own interests. If you take design electives in only one specific subject area, opportunities in other areas might be difficult, but not impossible, to attain. Taking several design electives that appeal to your interests allows for diversity in potential job opportunities. A variety of design electives also helps you find a personally enjoyable job, which can in turn provide incentive to "get up in the morning and go to work."

Brad Finney
BS ERE 1976
ERE Professor

When it comes to choosing design electives, remember that you need to graduate. Therefore, it will be necessary to choose between a few classes that are offered during the two or three semesters you are ready to take them. Our department does not have the resources to offer every course in the time frame you may like. It is also important to remember that you chose to come to HSU ERE for a reason, perhaps because of particular courses that are offered here. I find that students often get in such a rush to graduate that they do not have time to enjoy the classes that they came here for. So I advise you to maybe consider slowing down a little and taking an additional semester so you can enjoy those classes. One more semester isn't that big of a deal when you will be working for 40 years.

In the end, none of the classes you take will hurt. There seems to be more pressure recently in the engineering field to have continuing education, whether it is a graduate degree or only a few select classes. Therefore, if you do not have the chance to take a class here, you will most likely have the chance to take a similar class somewhere else later.

Some students know where their interests lie, and for those students there is no harm in taking classes related only to that interest. But if you are unsure of what you are most interested in, take a range of classes to help discover what you really want to do with your career.

You should also consider the instructor that is teaching the design elective. As you move through the program you

will take a class from almost all of the faculty. You should consider taking design electives from instructors you know you learn well from.

Dr. Dave Vernon
ERE Assistant Professor

When you are deciding which design electives to take, ask yourself what you are really interested in and what kind of job you want after graduation. If you know exactly what you want to do, it would be good to take two or even all three of your design electives pertaining to that topic. But, if you are not sure, it is always good to broaden your base. After all, this is an undergraduate degree. You will continue to learn the rest of your life, and there will be opportunities later to take more classes either here or at other schools.

When you have an environmental engineering degree it is generally expected that you know about water resources and wastewater. Therefore, it would be a good idea to take a course in one of these areas even if your primary interest is energy resources. Ω

Civil Engineering Licensure
Continued from page 9

is also four hours long, and goes into more detail in a particular area of the examinee's choosing. Most prospective licensed engineers with an ERE background will likely choose the Water Resources and Environmental Control Systems topic for this section, as it is probably the closest to their education in the ERE program. However, applicants may find that other depth section exams are better suited for them, depending on their career experience. For example, an engineer who works for Caltrans might choose to take the "Traffic Exam" for their depth session. Any and all reference materials are allowed for this exam, so on examination day, examinees typically bring several books with them, with some applicants filling entire library carts with textbooks, building codes, practice exam materials, and other information. I highly recommend purchasing the Civil Engineering Reference Manual by Lindeburg. It contains most of the equations, tables, and other information likely to be on the exam. This book is also a good reference manual, and can be found tabbed and worn on the shelves of many practicing engineers.

The California Civil Seismic Principles Exam is specific to California, and is required due to the prevalence of seismic activity within the state. Many environmental engineers have more difficulty passing this exam than the others, because the material is typically not covered in classes required for environmental engineering degrees. The exam covers principles required for site analysis and design of buildings to withstand forces from seismic activity. Becoming familiar with and knowing how to use the California Building Code and ASCE/SEI 7-10 are key to passing the exam. As with the other exams, examinees are allowed to bring any reference materials they choose into the testing room. The State contracts with a company called Prometric to administer this exam, and examinees take the exam at Prometric Testing Centers located throughout and outside of the US. This exam is 2.5 hours in duration.

The California Civil Engineering Surveying Exam is also specific to California. It covers basic surveying techniques, calculations, and units specific to the field of surveying. While ERE students will likely not have specifically encountered many of the formulas and surveying methods in their classes, many of the calculations are relatively intuitive and easy to understand compared to some of the material presented in other exams. This exam is also administered through Prometric and can be taken at many locations. It is 2.5 hours in duration.

The NCEES National Exam must be taken on the date determined by the Board. The other exams must be taken within the more or less one-month window allowed by the board, and they are scheduled through the Prometric website.

As with many exams, the key to passing these exams is knowing the material and being ready to take them as efficiently as possible. We all have our own study and exam-taking strategies, and some people need to study more or less than others. For this series of exams, as with the FE Exam, the study strategy that is effective for many engineers is to become familiar with the material and then work lots and lots of problems. For test day, the strategy I hear the most (and which I have personally found to work the best) is to skip over the harder or more time-intensive problems and work the easier problems first, and go back and work the harder problems later. That is, pick the low-hanging fruit first.

For most current ERE students these exams are at least a couple of years away, but it's good to have a feel for what lies ahead. It is a long road to becoming a professional engineer, but it is well worth the effort.

On a personal note, I recently passed the NCEES National (Civil) and California Civil Engineering Surveying Exams, and I am scheduled to take the California Civil Seismic Exam in late April 2015. Hopefully, soon after you read this, I will be able to put "PE" after my name!

Resources:

Calif Board for Prof Engineers, Land Surveyors, and Geologists
Applicant Info: *http://www.bpelsg.ca.gov/applicants/exam.shtml*
Exam Info: *http://www.bpelsg.ca.gov/applicants/exam.shtml*

National Council of Examiners for Engineering and Surveying
http://ncees.org/

Prometric
https://www.prometric.com Ω

Creating Consulting Firm

continued from front page

Burke of the Geology Department. It was a defining course in my education. What I learned vastly expanded the way I see and interpret landforms and the natural processes that form them. It has made me a better engineer by improving my understanding of how natural systems respond to changes or disturbance.

During my senior year I completed my Senior Project, focusing on long-term suspended sediment and turbidity trends in the Mad River. Dr. Margaret Lang was my advisor. While working on the project, I reached out to many professionals in watershed sciences, including Dr. Bill Trush at HSU and Michael Furniss at the Watershed Analysis (WA) Center, who later became a mentor. Although I struggled with finishing the project, the process connected me with outstanding people who strongly influenced the direction my professional career took.

When I graduated in 1996, I decided to stay in the area even though the job market was weak. While living in a tiny cabin in Fieldbrook and washing dishes at The Eatery in Trinidad, I discovered the Americorps Watershed Stewardship Project (WSP). I joined WSP with a placement at the Forest Service WA Center under Michael Furniss, a dynamic thinker who was focusing on the environmental impacts of forest roads on streams. My first assignment was to conduct "culvert autopsies" on forest roads in the Pacific Northwest following the devastating 1995 floods. Working with hydrologists and geologists, we visited hundreds of failed road-stream crossings and, for each, documented the cause of the culvert failure and the resulting volume of sediment delivered to the stream channel. At many sites we discovered that culverts had been plugged with small sticks, triggering massive debris flows, devastating the stream, and washing-out downslope roads. Based on this work, we concluded that traditional methods for sizing culverts failed to provide the desired level of protection (i.e. designing for the 100-year storm), because they accounted only for hydraulic capacity without considering the need to convey wood and sediment. Our work on this topic led to several publications and gave me the opportunity to travel to various conferences and workshops to present our findings and recommendations.

During our fieldwork we also witnessed numerous repairs to storm-damaged road-crossings on salmon-bearing streams, where culverts were installed that blocked migrating salmon. These observations, along with inspiration from Bill Trush and support from Michael Furniss and AmeriCorps WSP, led me to start developing FishXing, a software package used to evaluate and design road culverts for fish passage. I put my FORTRAN programming skills to use writing pseudocode, and Susan Firor (BS ERE 1993), then a lecturer in the ERE department and one of my former instructors, wrote the program in Visual Basic. As the software became more popular, our project team grew, and I learned a great deal about fish. This collaboration continued for more than a decade, as we continuously improved the software and developed on-line learning systems around the topic of fish passage engineering (fishxing.org). In the end, AmeriCorps WSP proved to be a highly rewarding experience that sent me down my future path, both professionally and personally — I also met my wife while serving in AmeriCorps.

When my two years with AmeriCorps were up, I looked around for opportunities and found two. It was the beginning of a new era of fisheries restoration, and my field partner and I decided to apply for a restoration grant with the State as independent consultants using our skills learned from our time at the WA Center. We were awarded the grant, which led me in 1999 to start my own company, Michael Love & Associates.

The other opportunity that arose at that time was a solicitation by National Marine Fisheries Service to conduct fish passage engineering research to inform the development of new fish passage design guidelines for the agency. Margaret Lang and I teamed up and won the job. We developed an ambitious study plan using HSU students to conduct the fieldwork. This led to three years of monitoring fish attempting to pass through culverts, and measuring hydraulic conditions in and around the culverts. I worked with fisheries biologists, hydrologists, and geomorphologists as part of the project, greatly improving my understanding of stream systems and fish behavior. The project also brought me into contact with many others involved in fisheries restoration throughout the state, which helped bring in more business for my one-person company.

After a few years I was so busy with projects that I asked my old friend and schoolmate, Tony Llanos, PE (BS ERE 1996), to join me, resulting in the first "associate." We worked on all kinds of fish passage projects, including technical fish ladders, nature-like fishways, bridges, and tide gates. We frequently teamed with larger firms for projects. Eventually, we began to branch out into wetland and tidal estuary restoration, and I brought on another engineer, Rachel Shea, PE, who had an education in fluvial geomorphology. In more recent years we expanded by two more, Nanette Nickerson (BS ERE 2012) and Travis James (BS ERE 2007), making it a five-person company.

My business strategy has always been to stay relatively small, allowing me to be involved in all the different aspects of a project, and making it easier to ensure a high level of quality service for clients. It has also been my ongoing belief that it is beneficial in the long-run to collaborate rather than compete in our area of practice. This includes sharing lessons learned with colleagues, and helping each other find the best solutions to specific problems. I believe that many of the opportunities I have been given over the years came from collaboration, and I find that truly exciting and rewarding. Ω

ERE Announcements, Awards, & Competitions

by Heidi Otten, ERE Junior and ERE Messenger Student Editor
Mike Anderson, ERE Emeritus Professor
Brad Finney (BS ERE 1976), ERE Professor

ANNOUNCEMENTS

Kerri Hickenbottom will be joining the ERE department this Fall semester as an Assistant Professor. Kerri has a B.S. in Civil and Environmental Engineering from the University of Nevada, Reno, and an M.S. in Environmental Engineering from the Colorado School of Mines, and she is currently completing her Ph.D. at the Colorado School of Mines. Her research focuses on membrane performance in advanced hybrid treatment systems. This fall Kerri will be teaching ENGR 351 and ENGR 115 lab.

Editor's Note: We received this news too late to include a full article in the current issue. In the cover story of our next issue (Fall 2015), Kerri will provide us with a brief biography, list of interests, and plans for the future.

AWARDS

HSU 2014-15 Outstanding Student Awards

Outstanding Contribution to a Campus Club, Program, or Organization

Tatiana Lewis, major in ERE, for her leadership and mentorship with the CHECK IT peer education program.

Academic Excellence and Achievement: Outstanding Undergraduate Research Project

Jairo Luque Villanueva, ERE

"Forward Osmosis-Direct Contact Membrane Distillation Sewer Mining Waste to Resource System."
Faculty advisor: Andrea Achilli, ERE Assistant Professor.

Jairo will also represent HSU at the 29th Annual California State University (CSU) Student Research Competition at CSU San Bernardino in May.

Society of Women Engineers (SWE) Region A Awards

The HSU Student Section of SWE received four awards: Best Outreach Event for their volunteer work with the Society of Hispanic Engineers (SHPE) at Zane Middle School in Eureka; Best Professional Development Event for the Brown Bag speech organized by SWE, given by Dr. Eileen Cashman about her sabbatical; Best Inclusion and Diversity Event for the 3-day resume workshop SWE hosted with SHPE; and Greatest Membership Retention Award for retaining 77% of its members between the 2013-14 and 2014-15 school years.

2015 Wang Family Excellence Award: Arne Jacobson

See "ERE Prof Arne Jacobson Receives Wang Family Excellence Award" on page 18.

2015 McCrone Promising Faculty Scholars Award: Andrea Achilli

Dr. Achilli received this award for his ten currently active projects involving water treatment, and for his offering of a new design elective: Design of Water Treatment and Reuse Systems. The award includes $1,500 to assist in his research program.

2014-2015 Distinguished Alumni Award: Lonny Grafman

Lonny earned dual degrees from HSU in Physical Science and Mathematics in 2004. He has served as an instructor in the HSU ERE Department for the past decade. Lonny is director of Practivistas Dominicana, a Spanish immersion and appropriate technology study abroad program. He is also founder and president of Appropedia, a collaborative website focusing on sustainable projects, and CEO of Propelsion, a technology incubator in Humboldt County.

COMPETITIONS

Math Modeling Competition

Each winter, the Consortium for Mathematics and Its Applications (COMAP) sponsors the annual Mathematical Modeling Contest (MCM) and Interdisciplinary Contest in Modeling (ICM), in which student teams clarify, analyze, and propose solutions to open-ended problems. For more information visit: http://www.comap.com/undergraduate/contests/

ERE student teams have participated in this four-day-long contest for many years, competing against other teams from thousands of universities. This year, four ERE student teams entered the competition that began on Thursday evening, February 5 and ended on Monday evening, February 9. Each team produced a report summarizing their solution to one of four possible problems.

The team consisting of Logan Baumgartner, Alan Ramirez, and Xuesi Feng selected a problem that required they build a mathematical model to analyze the quantity of medicine needed, possible feasible delivery systems, locations of delivery, and the speed of manufacturing of a vaccine or drug to optimize the eradication of Ebola. Logan, Alan, and Xuesi competed against 5,356 teams and were awarded a ranking of Successful Participant.

The team consisting of Friedel Pretorius, Zachary Ruiz, and Tahsa Sturgis selected a problem that required

modeling churn in an organization with the intent of aiding managers and decision makers to build successful systems for recruiting, hiring, training, and evaluating employees. The team's report was awarded the score of Meritorious. Only 12 (2%) of the 641 teams working this problem scored higher, and 88% of the teams received lower scores.

The team consisting of Dustin Fredricey, Matti Nylander, and Julian Quick selected a problem that required building a model for sustainability and a 20-year sustainable development plan for one country on the United Nations Least Developed Countries list. The teams used their model to evaluate the effect of their 20-year plan on the country's sustainability. Teams searched for pertinent data and grappled with how economic development must consider ecosystem health and social equitability. Dustin, Matti, and Julian competed against 1,496 teams and were awarded a ranking of Successful Participant.

The team consisting of Jo Murphy, Jacob Rowe, and George Corbett also selected the economic sustainability problem. Their team was awarded the ranking of Outstanding Winner, and two additional honors. For details on this team's awards, see "ERE Student Team is Outstanding Winner at International Math Modeling Contest" on this page.

Congratulations to the members of these teams for their high achievement in this event. Their efforts have brought recognition to the ERE Department and to HSU.

U.S. Department of Energy Race to Zero Student Design Competition

This annual competition is based upon a real-world scenario where a builder needs to update an existing house plan or create a new house plan. The house target performance is the DOE Zero Energy Requirements. For more information visit: http://energy.gov/eere/buildings/us-department-energy-race-zero-student-design-competition.

Student Participants:
Julian Quick, Richard Wilson, Kusondra King, Ryan Hancock, Troy Smith, Jenny Kunna, Noe Martinez, Robert Toledo, Brian Vargas, Andre Bernal.

Faculty Advisor: Douglas Saucedo.

ASCE Mid-Pacific Wastewater Treatment Competition

Every year, university student teams design, build, test and report on a wastewater treatment filter made of a limited number of everyday materials for a specific scenario. This year, the teams must treat wastewater containing runoff from agricultural facilities in order to wash lettuce to sell to high-end restaurants. The ERE department, in association with the local ASCE chapter, administers a local competition in which ERE student teams compete. Selected members from those teams then form a new team that competes in the Regional competition at UC Davis. For more information visit: http://www.ascemidpac.org/

Local Competition Participants:
John Rovai, Nicholas Campbell, Jason McMack, Leabeth Peterson, Cristina Olivares, Yaad Rana, Andres Pineda, Joseph Caminiti, Anthony Eggink, Neftali Romero, Emily Klee, Brain Weekly, Andrea Pedroza, Brian Vargas, Ryan Kaplan, Maria Diaz, Tahsa Sturgis, Friedel Pretorius, Matthew Nyberg, Jacob Rowe, Raymond Endicott, Brain Draegar, Chandler Ichikawa, Noe Martinez, Sara Newell

Regional Competition Participants:
Jason McMack, Yaad Rana, Andres Pineda, Brian Vargas, Jacob Rowe, Sara Newell. Ω

ERE Student Team is Outstanding Winner

International Math Modeling Contest

by Brad Finney (BS ERE 1976), ERE Professor

A team of three ERE students won high honors at the 2015 Interdisciplinary Contest in Modeling (ICM) in February. Jo Murphy, Jacob Rowe, and George Corbett selected a problem that required building a model for sustainability and a 20-year sustainable development plan for one country on the United Nations Least Developed Countries list. Their team was awarded the ranking of Outstanding Winner. This ranking was awarded to only four of the 1,496 teams working on this problem.

Jo, Jacob, and George also received two additional honors. Their submission was selected to receive the Rachel Carson award, which honors the American conservationist whose book "Silent Spring" initiated the global environmental movement and whose work spanned many disciplines concerned with the local and global environments. This award is presented to a team for excellence in using scientific theory and data in its modeling. Finally, the team is one of only two teams that were given the Two Sigma Scholarship Award, which provides a stipend of $3,000 for each of the three team members and a $1,000 award to the ERE department.

For more information on the contest and the selected problem, see "ERE Announcements, Awards, and Competitions" > "Competitions" > "Math Modeling Competition" on p. 16. Ω

ERE Prof Arne Jacobson

Receives Wang Family Excellence Award

by Heidi Otten, ERE Junior and ERE Messenger Student Editor

As students, we aren't always aware of the interesting and innovative work ERE faculty members do outside of the classroom. Recently, Dr. Arne Jacobson, ERE Professor and Director of the Schatz Energy Research Center (SERC), was awarded the prestigious 2015 Wang Family Excellence Award for his work in the renewable energy field.

The Wang Family Excellence award is given each year to five "CSU faculty and administrators who, through extraordinary commitment and dedication, have distinguished themselves by exemplary contributions and achievements in their academic disciplines and areas of assignment." Dr. Jacobson is one of only three HSU faculty members to have received the award since it was established in 1998.

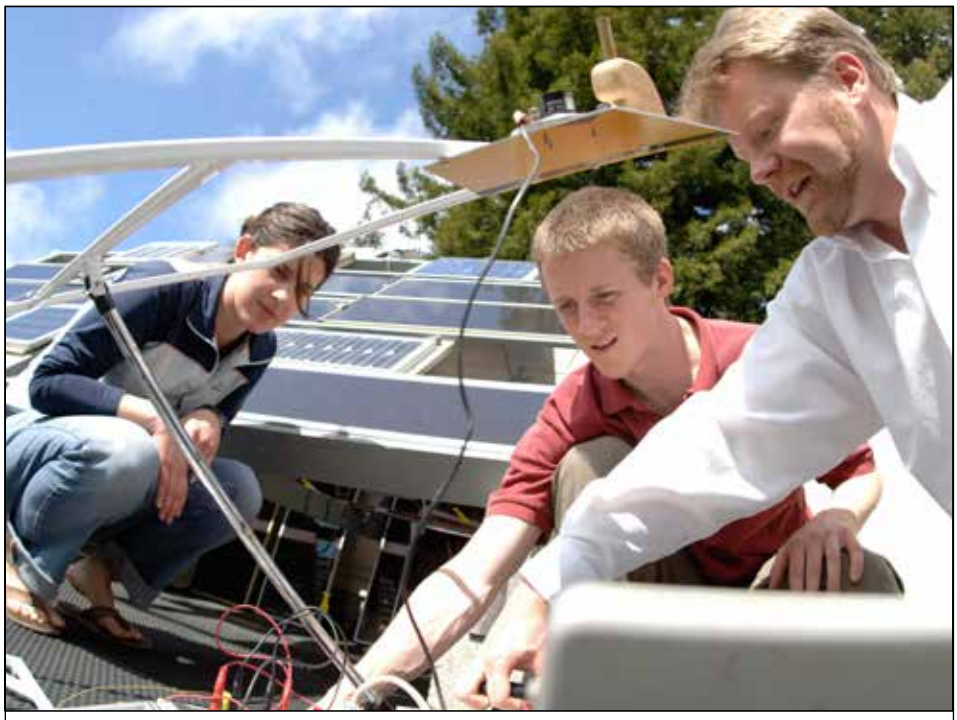
Professor Jacobson first started his work at HSU as a graduate student in the Environmental Systems graduate program, with an option in ERE. He was a part of the team that built the nation's first street-legal hydrogen-powered car.

After leaving HSU, Dr. Jacobson received his Ph.D. from UC Berkeley in the Energy and Resources Group. While at Berkeley, he began his involvement in the Kenyan solar market, where he worked on the issues of quality assurance and consumer protection. This work became a part of the body of research for which the Intergovernmental Panel on Climate Change won the Nobel Peace Prize in 2007.

Following his Ph.D. work, Dr. Jacobson took on a leading role in the Lighting Africa project, which has expanded to include the Lighting Asia and Lighting Global projects. These projects involve the development of commercial markets for affordable and reliable solar off-grid energy systems. The technical standards that Dr. Jacobson helped develop were adopted by the International Electrotechnical Commission (IEC), and made into international industry standards. The projects also include an international network of test labs, including SERC, that test off-grid solar power systems for quality and reliability.

In 2005, Dr. Jacobson brought his experience back to HSU when he joined the ERE Department. In addition to teaching senior-level ERE design courses and graduate seminars in the Energy Technology and Policy option of the Environmental Systems graduate program, he has brought more than $11 million to campus for clean energy projects that often involve ERE students. As an instructor, he says "I seek to combine theoretical rigor with hands-on learning, and I have worked to incorporate projects involving real clients into my classes."

For more information on the Wang Family Excellence Award and Dr. Jacobson's past and present projects, see the January 6, 2015 issue of Humboldt State Now. Ω



Professor Arne Jacobson (right) and graduate students Andrea Alstone and Peter Alstone testing solar modules on the roof of Science D.

"Growth for the sake of growth is the ideology of the cancer cell."

Edward Abbey, naturalist and author (1927-1989)

ERE Clubs Information Board

Compiled by Heidi Otten, ERE Junior and ERE Messenger Student Editor

Organization	Spring 2015 Activities	Fall 2015 Planned Activities
ERE Student Association (ERESA) **Email:** *eresa.hsu@gmail.com* **Webpages:** *http://www.humboldt.edu/clubs/club_sites/eresa.1* *&* *http://www.facebook.com/hsu.eresa*	• Weekly meetings • ERE Coffee Table • ASCE local water treat competition • ASCE MID-PAC water treat comp • Mock interviews at local firms • ERE Rafting Trip • Ice Cream Social • ASCE ERE Awards Banquet • ASCE Order of the Ring Ceremony • ERE graduation reception • Community outreach • Job Hunting Workshop	• Weekly meetings • ERE Coffee Table • All-Clubs meeting • ASCE Pizza with Professionals • New officer elections • Fall Follies • Resume Review by Professionals • Tour engineering firms • ERE graduation reception • Community outreach • Locker raffles
Engineers Without Borders (EWB) **Email:** *humboldtewb@gmail.com* **Webpage:** *http://www.humboldt.edu/ewb/*	• Construct Wiyot fish and wildlife cleaning station • Develop Appropriate Technology curriculum for schools • Demonstrate new rope pump at local schools • Continue implementing rainwater catchment systems	• Weekly meetings • Present interactive demonstration at Sister City Project's I-Block Party • Develop brochure: Basic off-grid water treatment for individual home sites • Assist with installment of greywater systems for the Hoopa Tribe
Renewable Energy Student Union (RESU) **Email:** *resu@humboldt.edu* **Webpage:** *http://www.humboldt.edu/resu/*	• Net Zero Housing Competition • HSU Solar Radiation Monitoring Station • Rock Creek Ranch energy audit and solar resource assessment	• Weekly meetings • Global Energy Forecasting Competition • HSU Solar Radiation Monitoring Station • Rock Creek Ranch visit • HEIF proposals
Society of Women Engineers (SWE) **Email:** *swe@humboldt.edu* **Webpage:** *hsu.swe.org* **Facebook:** *http://www.facebook.com/groups/swehumboldt/*	• Weekly meetings • Professional Headshot Fundraiser • Girl Scout Day • SWE Social • 2015 Regional SWE Conference at University of the Pacific • Zane Middle School outreach program • Membrane Project • Networking Workshop • Mock interviews with peers and professionals	• Weekly meetings • PaddleFest Cardboard and Duct Tape Kayak Race • Webinar viewing and Bowling Night • SWEshi • Brown Bag Speaker • Zane Middle School outreach program • Membrane Project • Societal Conference in Tennessee
Society of Hispanic Professional Engineers (SHPE) **Email:** *jl2357@humboldt.edu* **Webpage:** *coming soon*	• Weekly meeting for club logistics • Tri-Weekly study sessions • Study Skills Workshop • 4.0 Plan • La Chiquita Taco Lunch Fundraiser • Zane Middle School outreach program	• Weekly meetings • Weekly study sessions

In Memoriam

Jeffrey Scott Navarro

1979 - 2015

by Jo Murphy, ERE Senior

Over winter break, we lost an esteemed member of our ERE family. Jeff Navarro graduated from HSU in Fall 2014 with a degree in Environmental Resources Engineering and a minor in GIS. His engineering focus was on sustainable energy. At the time of his passing, Jeff was deeply into the process of applying for what would have been his first engineering job. He was anxious to continue the pursuit of what he referred to as "his calling" as a working engineer, and he was thrilled to be done with the ERE program. He was hoping to stay in the Humboldt area, which he had come to love as his home.

Jeff was a quality engineer and a pleasure to work with. He brought professionalism, patience, dedication and good humor to all of his work. His positive attitude could make even the most boring classes tolerable. He was always willing to put down his own work and help anyone in Science D with any question or problem. He was also an excellent source of much-needed distraction at times.

The qualities that made Jeff a good engineer also made him a good man and a great friend. He was a deeply moral person and he expected the same from others. A true gentleman, he was kind, considerate, humble and generous. He would do anything to help a friend. His conversations were likely to include phrases like "What can I do? How can I help? Do you need anything?"

He was perceptive, an astute observer of people. He would often sit at the periphery of events and watch and listen and laugh. Though he was reserved, he was warm and made friends easily. He spent his final days enjoying the hobbies he had little time for as an undergraduate: hiking, shooting, disk golf, and mountain biking.

Jeff's life and death should remind us all to love what we do here, and make time to do what we love. Let's also remember, as Jeff did, that we are part of this ERE community, and we each impact the lives of those around us with how we live and how we treat others. Ω